It's what you say and what you buy: A holistic evaluation of the Corporate Credit Facilities *

Nina Boyarchenko[1,2], Anna Kovner[1] and Or Shachar[1]

[1]Federal Reserve Bank of New York
[2]CEPR

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Abstract

We evaluate the impact of the Federal Reserve corporate credit facilities (PMCCF and SMCCF), estimating positive effects on prices and liquidity. The improvement in corporate credit markets can be attributed both to announcement effects of Federal Reserve interventions on the economy and to the differential impact of the facilities on eligible issues. Bond purchases have further significant effects, with the impact of direct purchases larger than the impact of purchases of ETFs. We show pass-through into primary markets through increased probability of issuance and better bond terms, particularly for issuers that need to refinance before 2022.

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1 Introduction

> "The effect of the programmes is more psychological than financial... The Fed has totally achieved their target."
>
> *Financial Times*, May 28, 2020.

The corporate bond market experienced historic turmoil in March 2020. As investors shed risky assets in response to the COVID 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 calculate the impact of the announcements of the CCFs and quantify the direct impact of secondary market purchases. We offer a holistic evaluation of the impact of the facilities announcements and purchases on: i) Secondary bond market functioning, both in spread and liquidity terms, ii) Market expectations of default, iii) Primary market functioning, both in quantity and spread terms, and iv) Intermediation activity in both secondary and primary markets. One of the key contributions of this paper is using transaction-level data that includes dealers' identities that can then be aggregated to the dealer-bond-level to overcome the identification issue, and to extract both the announcement effect on market prices and liquidity as well as the direct impact of purchases, calculating the impact on eligible securities and the corporate bond market more broadly.

The corporate-credit programs were the first time when the Fed intervened directly in the corporate bond market. Theory suggests a number of channels for the facilities to impact

corporate credit markets. First, as part of a suite of Federal Reserve actions, announcements may improve prospects for the U.S. economy, reducing the quantity of corporate credit risk and the prices investors are willing to pay for that risk. Second, the facilities may reduce indiscriminate asset sales by reducing the information sensitivity of eligible bonds. Third, facilities may impact intermediation, arising from dealers' increased willingness to provide liquidity in a market that now has a buyer of last resort. Fourth, there may be an additional direct impact on eligible securities from purchases and the presence of a backstop lending facility. We use different features of the facilities and the announcements, as well as daily data on ETF and individual bond purchases by the Fed to shed light on the relative importance of these channels, but do not view them as mutually exclusive. We find evidence for each of these channels, with both pricing and liquidity dramatically impacted by the initial announcements, and credit spreads more influenced by direct purchases. Improvement in the economy as captured by a reduction in expected default frequencies occurs differentially for the most affected industries as well as for eligible bonds from issuers with debt maturing within two years.

We document a dramatic improvement in average duration-matched 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 an additional 66 basis points. Expected default frequencies did not fall differentially for eligible bonds (although they did fall by about 21 basis points on average), suggesting that the initial announcement acted to reverse the increase in the price of credit risk, rather than the market expectations of the amount of credit risk. Adjusting credit spreads for default probabilities, the differential improvement around March 23 for eligible bonds was slightly higher, suggesting risk premia decreased even more than spread levels. The improvement in average quoted bid-ask spreads of eligible bonds around the initial announcement was 40 to 50 basis points, but not significantly changed for most bonds.

While most of the facility impact occurs around the March 23 announcement date, we estimate statistically significant impacts of facility purchases, suggesting that the purchases had an important impact on bond markets as well. 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 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 stress times (e.g., Dannhauser and Hoseinzade, 2021, and Falato et al., 2020), and the transmission under less strenuous market conditions remains an open question.

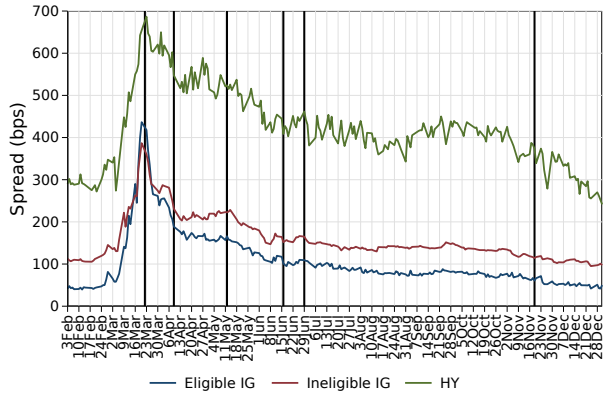
In addition to looking at the impact on secondary markets, this paper is the first to document formally how interventions in secondary markets affect primary market functioning. Improvements in secondary market conditions pass-through to the primary market in two ways: *directly* as primary market pricing is usually benchmarked to secondary market prices of similar bonds, and *indirectly* by increasing the willingness of dealers to underwrite bond issuance. Consistent with this hypothesis, there was an immediate improvement in primary market issuance and pricing after the facility announcement, particularly for issuers with imminent debt maturities. By the end of June, investment-grade issuers issued more than $702 billion of senior unsecured and secured bonds, nearly double issuance by the same point in 2019. We document an overall positive effect on issuance regardless of eligibility for issuers with debt maturing within two years, an increase that is even higher after controlling expected default frequencies. The price impact, however, is experienced mostly by eligible issuers. We document, however, that the existence of the facility does not distort issuance decisions – after the announcement investment-grade issuers actually appear to differentially extend maturities.

In order to understand the channels through which the CCFs affect credit markets, we estimate differences in the impact on eligible and non-eligible securities. The approach is

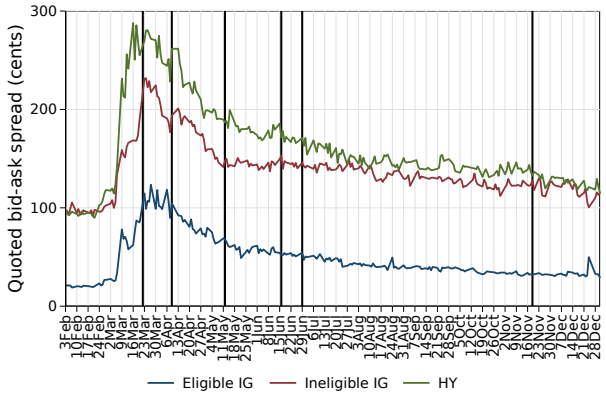
illustrated by the three bond "indices" shown in Figure 1: investment-grade rated bonds eligible for direct purchases by the facility; investment-grade rated bonds ineligible for direct purchases by the facility; and high-yield rated bonds. The left panel shows duration-matched spreads while the right panel shows effective bid-ask spreads. Comparing changes across the three indices, we see the biggest improvements in spreads and bid-ask spreads of bonds eligible for direct purchases by the facility, with the improvement most pronounced at the facilities' announcement. Thus, Figure 1 summarizes some of the basic findings of our paper: though market conditions have improved for all traded bonds, improvements have been biggest for bonds eligible for direct purchases by the facility and, in particular, for bonds bought in greater volumes by the facility. These differential improvements are most pronounced in spread space, with less differentiation in liquidity improvements across different parts of the bond market.

Figure 1. Largest impact for bonds eligible for purchases. This figure plots the average duration-matched spreads (left panel) and quoted bid-ask spreads (right panel) for three bond indices: investment-grade rated bonds eligible for direct purchases by the facility; investment-grade rated bonds ineligible for direct purchases by the facility; and high-yield rated bonds. Spreads computed as equal average across all available bonds. 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 16 (commencement of cash bond purchases); June 29 (PMCCF operational); November 19 (facility closure announcement).

(a) Duration-matched spreads



(b) Quoted bid-ask spreads



Although Figure 1 shows the aggregate effects, it masks the significant variation over

time which bonds trade and in the composition of the sample. In bond level regressions, we unpack the differences in eligibility between ratings and maturity and add controls for bond characteristics such as the size of the bond, its age and other characteristics associated with pricing. We also narrow the analysis to look at changes around the announcement event dates to better identify the specific impact of the facilities. Generally, if the impact of the initial announcement were on economic conditions more broadly, we would expect high yield issuers to be more affected, as increases in income would have greater impact on issuers closer to default. In contrast, if the impact is from the direct interventions by the facility, it should be seen mostly on eligible issuers. We estimate both an overall impact on all bonds around the announcement date as well as a differential fall in spreads of eligible issues. The impact on the economy is shown by the announcement date impact on EDFs which fall by almost 20 bp, but do not differentially fall for eligible issues.

An alternative interpretation of the differential improvements in eligible bonds arises from characteristics of indiscriminate asset sales. These may occur when asset owners need liquidity, but buyers need to invest in producing information on "safe" securities which were previously information insensitive. Indeed, Gorton and Ordonez (2014) argue that this sudden regime shift in information sensitivity of securitized assets during the financial crisis led to the ABS fire sales in fall of 2007. Figure 1 shows the dramatic increase in March 2020 in bond spreads of the highest rated issuers, which is consistent with this type of regime shift, since the highest rated issuers are not more sensitive to the COVID shock. We estimate improvements in bid-ask spreads only for bonds eligible for facility purchases. This is consistent with the facilities providing a backstop to the market and removing some of the need to produce information about investment-grade assets.

Another eligibility difference is in bond maturity, as both facilities target shorter maturities (the maximum maturity of bonds purchased is 4 years for the PMCCF and 5 years for the SMCCF). To the extent that the COVID shock differentially increased the information sensitivity of bonds of issuers with near-term refinancing needs, issuers eligible for the facili-

ties should experience a reduction in price and default risk, as the facilities provide certainty for those issuers' ability to refinance at reasonable prices. Consistent with this hypothesis, we find the largest announcement date decrease in spreads for eligible bonds of issuers with debt maturities before March 2022, although bid-ask spreads are not differentially affected. This suggests that the improvements in credit spreads for shorter maturity bonds are primarily due to improvements in perceptions of risks of those bonds (both the price of risk and the EDF) rather than actual increases in trading activity.

The performance dichotomy between credit spreads and trading activity measures begs the question – what role did dealers play in the March market dislocations and the subsequent recovery? Comparing intermediation by bank-affiliated and stand-alone dealers, we find that, although both groups reduced their net positions in late February and early March, stand-alone dealers exhibited "flight to intermediation safety" behavior, differentially reducing their net positions in shorter maturity and high yield bonds. Bank-affiliated dealers, instead, did not differentially change their net positions in these riskier securities. The withdrawal of stand-alone dealers from the market for riskier securities led to increased concentration of intermediation activity in shorter maturity and high yield bonds. This increased concentration persists until the commencement of facility purchases on May 12, despite a more rapid rebound in net positions, suggesting that facility purchases played a role in percolating the willingness to intermediate in riskier securities to a broad set of dealers. Similarly, in the primary market, we find that stand-alone dealers only restarted their underwriting activity when facility purchases began.

On November 19, 2020, Treasury Secretary Mnunchin released a letter written to the Federal Reserve in which he requested the return of unused funds to the US Treasury, and that the CARES Act facilities expire on December 31, 2020, an announcement that may have come as a surprise to financial markets. We estimate the impact of the announcement and find a small (2-6 basis points) spread increase for eligible issues, driven mostly by the price of risk. We do not consistently find statistically significant impacts on the rest of the bond market,

although we find some evidence that the announcement resulted in a repricing within issuers of eligible and non eligible bonds. We also do not estimate statistically significant spread or liquidity changes around the end of the year expiration of the facilities, which may be consistent with the lack of usage of the PMCCF and the very low purchasing rates of the SMCCF.

A number of recent studies have focused on the disruptions in asset markets in March 2020. Duffie (2020), Schrimpf et al. (2020), and He et al. (2020) study the disruptions in the Treasury market, focusing on the role that margins and intermediary constraints more generally played in Treasury market illiquidity that arose due to arbitrageurs' precipitous exit from Treasury-futures trades. More closely related to our work, D'Amico et al. (2020), Kargar et al. (2020), Haddad et al. (2020), Nozawa and Qiu (2020), and O'Hara and Zhou (2020) all study the disruptions in the secondary corporate bond market and the improvement in secondary corporate bond market functioning following the facilities announcement. Our study differs from these contemporaneous papers along five dimensions. First, we study multiple dimensions of secondary market functioning – priced spreads, expected default frequencies, and effective bid-ask spreads – at the *bond-level* and show that the improvements are not uniform across different metrics. Using granular, bond-level data allows us to document these improvements at the individual bond level, not just at the market or credit rating level. Second, we utilize the design of the facility, in particular, the eligibility criteria for direct purchases by the secondary market facility, to isolate the direct 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 from the announcement effect. 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 dealers in the market. We use the

regulatory version of TRACE, which allows us to identify bank-affiliated dealers, and study changes in intermediation at the dealer-bond level. Finally, we document the improvement in primary market conditions for corporate issuers. Unlike Acharya and Steffen (2020), we find that issuance has increased across the credit spectrum since the facilities announcement, and not just for issuers at the top of the credit spectrum.

This 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. Grosse-Rueschkamp et al. (2019) show that this leads to a substitution away from bank loans, relaxing bank balance sheet constraints and leading to a re-allocation of bank credit to small and medium enterprises (Ertan et al., 2018). From a market financing perspective, Todorov (2020) shows that both market and funding liquidity of bonds eligible for purchases by the CSPP improves on announcement of the program. This differential improvement in funding and trading conditions for eligible bonds incentivized issuers to modify characteristics of their issuance to match eligibility criteria (De Santis and Zaghini, 2019). 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, with facilities' purchases expected to terminate by September 30, 2020 (subsequently extended to December 31, 2020).

More broadly, this paper is related to the literature on the effect that intermediary constraints play in equilibrium risk premia (see e.g. He and Krishnamurthy, 2012, 2013; Adrian et al., 2014; Brunnermeier and Sannikov, 2014; Adrian and Boyarchenko, 2012) and 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. (2017b) document a contemporaneous stagnation of dealer balance sheets, dealer deleveraging, and improvement in traditional metrics of secondary market liquidity after the 2007 – 2009 financial crisis. Measuring the relationship between dealer balance sheet constraints and bond-level liquidity, Adrian et al. (2017a) 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 rest of the corporate bond market.

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 announcements on secondary market credit spreads and measures of market functioning, and the impact of the announcements on primary market functioning in Section 6. We then look directly at the impact of the purchases in Section 5, and explore changes in intermediation in the secondary market in Section 8. Section 7 examines the effects of the closing of the facility on secondary market functioning. Finally, we conclude in Section 9. 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 corpo-

[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

rate 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 sheet included the following eligibility conditions for issuers: rated investment-grade by at least one nationally recognized statistical rating organizations (NRSROs) 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 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.

In addition to the initial announcement, we identify dates on which the Federal Reserve shared additional details about key terms of the corporate credit program, focusing on statements which affect the eligibility of certain issues or issuers. On April 9, 2020, the size of

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.

the combined facilities became larger with an increase in Treasury capital from $10 billion to $75 billion, with one half of the commitment currently funded and an agreement to fund the remainder as specified in the relevant facility agreement. 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] On November 19, it was announced that the facilities would not be extended past the December 31, 2020 date and the facilities were closed on December 31, 2020.

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.

3 Data

3.1 Secondary market corporate bond data

We use corporate bond transactions data from a regulatory version of the Trade Reporting and Compliance Engine (TRACE), which contain price, uncapped trade size, and buyer and seller identities as well as other trade terms. Registered FINRA dealers are identified by a designated Market Participant Identifier (MPID), and non-FINRA members are identified either as C (for client), or as A (for a non-member affiliate). Transactions are required to be reported in real-time, with 15 minutes delay, which at times need to be cancelled or corrected. 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-

[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.

exempt Alternative Trading System (ATS) as described in Adrian et al. (2017a). Additional details on cleaning of TRACE data are available in Appendix B.1.

Using traded prices and quantities from TRACE, we construct bond-day level measures of priced spreads (see Section 3.4 for details).

3.2 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 associate 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.

3.3 Bond and issuer characteristics

We use 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 fact-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-.

In addition to characteristics from Mergent FISD, we obtain one year expected default frequencies (EDFs) from Moody's KMV,[3] 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 use two measures of stress faced by issuers due to the COVID-19 epidemic. At the industry level, we consider issuers in 3-digit NAICS industries that had a 3 month decline of more than 20% in the total number of employees from January to April 2020, as reported by the Bureau of Labor Statistics, as being in the most affected industries.[4] At the issuer level, we consider firms that had corporate bonds maturing within the next 2 years as those most likely to have refinancing needs and thus most likely to be affected by any credit shortages.

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

[4] Figure A.5 in the Appendix plots the distribution of employment growth by industry.

3.4 Corporate bond spreads

We compute duration-matched spreads at the bond-trade level, similar to Gilchrist and Zakrajšek (2012). Given a bond-trade-level duration-matched (or "Z" spread) on bond b on trade date t, $z_{b,k,t}$, 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 including measures of default probability such as the bond-level expected default frequency based on Moody's KMV. The default-adjusted spread for bond b on date t (or "D"-spread), $d_{b,t}$, is then calculated as the difference between the priced and the predicted duration-matched spread on bond b on date t

$$d_{b,t} = z_{b,t} - \hat{z}_{b,t},$$

where $\hat{z}_{b,t}$ is the predicted duration-matched spread. Details of both of these calculations are available in Appendix B.2.

3.5 Sample

To capture the effect of the corporate credit facilities on the primary and secondary corporate bond markets, we focus on the evolution of the markets since February 2020. From the universe of corporate bonds with issue and issuer information in Mergent FISD, 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.[5] Finally, we only retain senior and senior secured bonds issued by issuers domiciled in the U.S.

Table 1 reports the summary statistics for duration-matched spreads, default-adjusted spreads, 1y expected default frequencies, bid-ask spreads, and primary market offering terms for the full 2020 sample.

4 Effect of facilities on secondary markets

We begin by evaluating the effect of the facilities on pricing and liquidity in the secondary market for corporate bonds. Our approach focuses on describing the cumulative facility impact and then narrowing in on identifying the direct impact by looking at event widows around the initial announcements, the market for securities eligible for direct purchases by the SMCCF and the effect on the overall market.

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 March 23 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

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

regression

$$\Delta M_{b,t} = \alpha_t + \beta_{b,t}\text{SMCCF eligible}_{b,t} + \vec{\gamma}_t\text{Bond characteristics}_{b,t} + \epsilon_{b,t}, \tag{1}$$

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 (1) 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 (1) as a repeated panel for each trading date in the sample.

Figure 2 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 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 of the SMCCF eligible bonds. Instead, the bid-ask spreads for the average bond decline rapidly after the facility announcement on March 22.

We now 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:

$$\Delta\mathcal{M}_{b(f),t-1,t+3} = \alpha + \beta\text{SMCCF-eligible}_{b(f),t} + \vec{\gamma}_t\text{Bond characteristics}_{b,t} + \epsilon_{b(f),t}, \qquad (2)$$

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 βcoefficient 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 ineligible and eligible bonds, as bonds issued by the same issuer can have different maturity dates and different individual bond ratings. So, when adding issuer fixed effects to the baseline specification, we identify 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 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 2 reports the results of this regression. The first four columns focus on the initial announcement. As we show in Figure 1, up until March 23, spreads had been steadily climbing as investors responded to the pandemic. In Column (1) we look at the more than one thousand bonds that traded and since 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 -30). 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, bonds eligible for the SMCCF fell by 2/3 more than other bonds (an additional 66 basis points), implying a total effect of more than 150 basis points. 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 have 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 issuers with rollover risk – those with debt maturing within two years that are eligible for the facility see a differential 50 basis point fall in spreads.

We turn in panels (b) and (c) for additional insight into the facilities' impact. Overall, Table 2a shows that, while duration-matched spreads have decreased on average, both across and within issuers, spread decreases have been biggest for bonds eligible for direct purchases by the facility. Table 2b shows that the same patterns hold for the default-adjusted spreads, suggesting that the improvements in spreads we saw in Figure 2 are primarily due to a reduction in the default risk premium priced in corporate bond spreads. Panel (c) shows, however, that the announcement of the facilities also led to a decrease in one year expected default frequencies. Focusing first on the specification without issuer fixed effects, we see that overall EDFs fall on the announcement date and more so for the bonds of issuers in industries affected by COVID. 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.

Taken together, Table 2 shows that, although the primary effect of the facilities announcement is to reduce the default risk premium charged in the secondary corporate bond market, with the biggest improvements in spreads for bonds eligible for direct purchases by the facility, the facility announcement has also served to mitigate somewhat the rise in one year

expected default frequencies. Given the "bridge financing" nature of the facilities, however, the improvements in expected default frequencies are biggest for investment-grade bonds: conditional on the issuers not defaulting in the short run, the expected default frequency of long term bonds is lower. The fall in the expected default probabilities and improvements in pricing for non-eligible bonds indicates that the announcement of the facilities acted to improve market participants' beliefs about the prospects for the U.S. economy, primarily through reducing the credit risk premium. Indeed, the estimated coefficient for eligible issues shows a larger differential decrease in default-adjusted spreads was bigger than in credit spreads themselves, consistent with larger decreases in credit risk premia.

The last four columns of the panels in Table 2 look at the impact of the subsequent announcement on April 9 which clarified the facility eligibility. 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 eligible ones, although the estimated coefficients are not statistically significant.

We turn now to the impact of the facilities on secondary bond market liquidity, shown in Table 2, Panel (d). Starting with the average effect α_t, we see relatively little response of bid-ask spreads to the announcement. Improvements in average bid-ask spreads we observed in Figure 2 appear to be concentrated in eligible issuers. Within the same issuer, liquidity improves only for the eligible bonds, with an estimated reduction in bid-ask spreads of almost 40 basis points, or 13 basis points on average for the three day event window.

We see an immediate differential response in the prices of eligible bonds and improvement in secondary market liquidity but not for all bonds. The corporate credit facilities stand as "lender of last resort" facilities in the corporate bond market, providing 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, effectively establishing a floor on secondary market prices of eligible bonds. For the subset of bonds that traded, bid-ask spreads were

reduced presumably as dealers were more willing to make markets and demand improved.

5 Do purchase decisions matter?

Given the strong response of markets to the facilities' announcement, a natural question is to what extent purchases contributed to maintaining the improvements in positive secondary market conditions. To help answer this question, we examine the response of secondary market spreads and liquidity to the facility purchases themselves.

In particular, we modify the announcement date regression (2) and estimate the following specification in stacked windows around the purchases:

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

$$\begin{aligned}\Delta\mathcal{M}_{b(f),t-1,t+3} = \alpha + \beta_{\text{ETF}} \text{Indirectly purchased}_{b(f),t} + \beta_{\text{bond}} \text{Directly purchased}_{b(f),t} \\ + \vec{\gamma}_t \text{Bond characteristics}_{b,t} + \epsilon_{b(f),t}\end{aligned} \tag{4}$$

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 3 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, understanding the impact of these purchases is important to understand. 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 more than the price of risk. The effect of purchases on bid-ask spreads is relatively small, around 1 basis point, and seems to be seen across both types of purchases.

In summary, we document an ongoing effect of the facility through purchases, particularly on spreads although less so on bid-ask spreads. Bonds purchased through eligible ETFs have smaller differential improvements in secondary market conditions. This may be because when additional ETF shares are created, dealers should be purchasing portfolios of the underlying bonds, perhaps separating the purchase dates from the ETF purchase dates. In Appendix Table A.6, we look at the impact of the share of the bond issue that is purchased and find similar results.

6 Effects on primary market issuance

While secondary markets lend themselves to quantifying the impact of facilities through the many bonds that trade each day, the goal of the corporate credit facilities is to support markets in order to support the provision of credit to non-financial corporations in the U.S. Therefore we turn to primary market issuance 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.

We make four changes relative to the methodology we used to evaluate the effect of the facilities on the functioning of the secondary market. First, reflecting the relatively low frequency of corporate bond primary issuance, 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 and (3) the operational period of the facility where the SMCCF was actually purchasing and the PM-CCF was open. Second, instead of using bond-level credit ratings to determine CCF eligibility, we use issuer-level credit ratings (see details in Appendix B.3). Finally, the market convention is to price offering yields as spreads to nearest-maturity on-the-run Treasury yield. Thus, 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 B.4, rather than either the duration-matched or the default-adjusted spreads we studied in the secondary market context.

6.1 Extensive margin: who has issued?

Figure 3 plots the cumulative amount issued in the primary corporate bond market since January 1, 2020, together with the cumulative amount issued by the same week in 2019. Figure 3b shows that, prior to the March 22, 2020, issuance by investment-grade rated issuers was lagging relative to the pace of issuance in 2019. The announcement of the facilities,

however, spurred a dramatic increase in the pace of investment-grade issuance, with year-to-date investment-grade issuance almost double what was issued during the same period in 2019. High-yield-rated issuers did not experience the same sort of slow down in issuance at the start of the year, partially since high yield issuance is in general slow at the start of the year, but neither did the pace of high yield issuance accelerated to the same extent after the facilities announcement. Thus, although the facilities announcement improves primary market conditions across the board, the improvement for issuers not eligible for the facilities has been more gradual.

We look at this more formally in Table 4 which estimates a probit regression of issuance. We also split the sample into two types of corporate bond issuers. One set of issuers has outstanding corporate bonds maturing withing two years (i.e. between March 2020 and March 2022). We call the second set of issuers "opportunistic", as they do not have an imminent need to refinance outstanding debt. For simplicity we do not consider the effect on a possibly larger universe of potential issuers that do not have any outstanding bonds.

Beginning in the first two columns with issuers that need to refinance, the onset of the pandemic is marked by a dramatic reduction in high yield issuance. All issuers are more likely to issue after the facility announcement although eligible issuers (IG) are not more likely to issue than high yield. While the overall issuance impact of the facility market by the facility implementation period is positive, and differentially so for eligible issuers, the issuance impact of the facility announcement is strongest on opportunistic issuers. Eligible (IG) issuers are disproportionally accessing primary markets after the announcement, with an estimated coefficient of 0.39.

It is important to note that increased issuance does not necessarily translate into increased real activity, such as investment, by the issuers. 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.

6.2 Intensive margin: at what terms?

One measure of market functioning is the price at which issuers have been able to issue debt in the primary market and the amount of debt they are able to issue. In Table 5, we estimate how offering terms changed over 2020 for firms that were actually able to issue. While we did not estimate a disproportionate impact 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 offer amount is even higher after controlling for issuer risk. Note that there was no high yield issuance in the pandemic onset period thus we do not estimate a coefficient on the interaction of IG and Pandemic onset.

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

$$\begin{aligned}\text{Offering term}_{b(f),t} = \alpha + \beta_d \text{Sub-period dummy}_t + \beta_{IG}\text{IG}_{b,t} + \beta_{d,IG}\text{Sub-period dummy}_t \times \text{IG}_{b,t} \\ + \gamma \text{Mills ratio}_{f,t} + \vec{\gamma}_t \text{Bond characteristics}_{b,t} + \epsilon_{b(f),t}\end{aligned} \tag{5}$$

where the Mills ratio is the predicted Mills ratio from the corresponding first stage in Table 4. 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.

In Figure 3a, 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 SMCCF. Instead, the year-to-date issuance in the more than 5 years ma-

turity category in 2020 is nearly double relative to that issued during the same period in 2019 ($660 billion in 2020 vs $340 billion in 2019). Similarly, the issuance of bonds with maturity of five years or below in 2020 is also nearly double relative to that issued during the same period in 2019 ($340 billion in 2020 vs $155 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). Instead, consistent with the improved overall secondary market functioning we documented above and the continued demand for long-term fixed income assets by long-term investors, such as pension funds (see e.g. Greenwood and Vayanos, 2010), issuers issue across the maturity spectrum. If anything, we estimate in Panel (b) that eligible issuers are extending maturities after the facility announcement, even though only short term debt is eligible for the facilities. A key measure of the market is the offering price. After the facility announcement, offering spreads remain much higher than before the pandemic onset, even controlling for the EDF of the issuer. Eligible issuers disproportionately benefit after the announcement with 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. Overall, prices at issuance are lower for the lower risk borrowers eligible for the facilities.

Finally in Panel (d) we look at gross spreads paid to underwriters. These do not disproportionately fall for eligible issuers until the facility is fully operational. At that point we estimate a negative, statistically significant relationship for IG borrowers. The amount appears small at 2-5 basis points, however gross spreads are generally small in the first place, meaning that this is a sizable economic impact.

6.3 Underwriting activity

We conclude this section by examining how underwriting activity has changed since the facilities announcement on March 22, 2020. Starting with the lead underwriter information

from Mergent FISD, we hand-match each reported lead underwriter to the corporate parent and, if applicable, to the registered eligible seller.

In Table 6, we examine bond offerings underwritten in 2020, identifying offerings underwritten by at least one 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. We control for changing market conditions with weekly fixed effects and narrow in on the impact of access to the facilities for eligible sellers exploiting some time variation in eligibility. Underwriter eligibility does not appear to have a significant effect on the offering size or maturity (Panels (a) and (b)) after controlling for issuer risk with both an investment-grade fixed effect and expected default frequency, but issuers underwritten by eligible sellers post registration for the facility have offering spreads that are dramatically lower - almost 150 basis points (Panel (c)). The impact is found in issuers rolling over their debt, but less so for opportunistic issuers. Coefficients for non-bank underwriters are also large and negative although not statistically significant. Panel (d) examines the fees charged and shows that these non bank underwriters appear to be charging less for their services after registration – the dross spreads is significantly lower post registration.

7 The end of the facilities

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 announcement from the Treasury on November 19. 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 of these announcements that given one intervention, bond markets would expect future shocks to be met with future interventions.

8 Dealer intermediation and the facilities

In this Section, we examine the relevance of the intermediary constraints channel for post-announcement improvements in secondary market conditions. Unlike the effects on secondary market functioning in Section 4, the impact of the facilities on dealer balance sheets is unlikely to be immediate, and short event windows may not capture the extent of changes. We focus instead on the evolution of intermediation over 2020.

From the perspective of intermediary asset pricing, the facilities act by providing a "specialist" buyer of corporate credit, 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 both the substantial improvement in credit spreads and liquidity conditions.

8.1 Does intermediation become more concentrated?

We begin by examining whether market dislocations in March lead to less diversified intermediation. Less diversity in intermediation leads to more fragile market making, sowing the seeds for future rapid liquidity deterioration. To measure intermediation diversity, we construct the Herfindahl–Hirschman index (HHI) of gross dealer activity at the bond-date level

$$HHI_{b,t} = \sum_{d=1}^{\mathcal{N}_{b,t}} \left(\frac{Q^{\mathrm{B}}_{d,b,t} + Q^{\mathrm{S}}_{d,b,t}}{\sum_{j=1}^{\mathcal{N}_{b,t}} Q^{\mathrm{B}}_{j,b,t} + Q^{\mathrm{S}}_{j,b,t}} \right)^2,$$

where $Q^{\mathrm{B}}_{d,b,t}$ is the total (dollar) amount bought and $Q^{\mathrm{S}}_{d,b,t}$ is the total (dollar) amount sold by dealer d of bond b on trade date t. We estimate the following regression to track how

intermediation concentration has changed since February

$$
\begin{aligned}
HHI_{b,t} = \alpha_t &+ \beta_{vol,t}\text{Vol}_{b,t} + \beta_{b,t}\text{Bank issuer dummy}_b + \beta_{m,t}\text{Maturity before Sep 2025}_b \\
&+ \beta_{hy,t}\text{HY dummy}_{b,t} + \beta_{b,vol,t}\text{Bank issuer dummy}_b \times \text{Vol}_{b,t} \\
&+ \beta_{m,vol,t}\text{Maturity before Sep 2025}_b \times \text{Vol}_{b,t} + \beta_{hy,vol,t}\text{HY dummy}_{b,t} \times \text{Vol}_{b,t} \\
&+ \vec{\gamma}_t\text{Bond characteristics}_{b,t} + \epsilon_{b,t}.
\end{aligned}
$$

Figure 5 plots the estimated coefficients from the above regression without (left column) and with (right column) fixed effects. On average, the HHI of gross transacted volume remains relatively stable since February, indicating that, for an average bond, intermediation was no more concentrated through the March market dislocation than at the start of the year. When the facility began buying ETFs on May 12, dealer concentration increased in those bonds that were purchased indirectly via ETF purchases; the increase in concentration for bonds purchased directly (starting on June 16) is more modest.

In contrast, Figure 5c and Figure 5e show that concentration in intermediation of shorter maturity and high yield bonds increased in late February/early March, and remained elevated until the commencement of facility purchases on May 12. For shorter maturity bonds, ETF purchases did not have a differential impact on concentration; instead, concentration in intermediation of shorter maturity bonds decreases more for bonds bought directly by the facility. For high yield bonds, ETF purchases led to a temporary decrease in dealer concentration. That is, though ETF purchases were sufficient to incentivize increased intermediation diversity in high yield bonds, cash bond purchases were necessary to re-induce intermediation in shorter maturity bonds.

8.2 Do more constrained dealers intermediate less?

Figure 5 shows increased concentration of dealer activity for shorter term securities and for high yield bonds during March and April, leading to potential increased fragility in markets

for those security types. We now study whether these changes in concentration were driven by decreased intermediation of specific types of dealers in the market. In particular, we examine whether bank-affiliated dealers – whose intermediation decisions are more likely to reflect regulatory balance sheet constraints – differentially decreased their net inventories as compared to stand-alone dealers – whose intermediation decisions are more likely to reflect risk management considerations. Increases in dealers' net inventory represent increased willingness to extend balance sheet space to intermediate in the corporate bond market.

More specifically, we begin with net purchases $Q^{\text{net}}_{d,b,t}$ at the dealer-bond-day level, calculated as the difference between the quantity bought $Q^{\text{B}}_{d,b,t}$ and the quantity sold $Q^{\text{S}}_{d,b,t}$ of bond b by dealer d on day t. For each dealer-bond pair, we cumulate the net purchases since the start of the year to obtain the net position change up to date t:

$$NP_{d,b,t} = \sum_{s=\text{Jan 1}}^{t} Q^{\text{net}}_{d,b,s}.$$

We estimate the following regression for the cumulative changes in net dealer inventories[6] relative to March 22 as a function of bond and dealer characteristics:

$$\begin{aligned}\Delta NP_{b,d,t} = {} & \alpha_t + \alpha_d + \beta_{b,t}\text{Bank issuer dummy}_b + \beta_{hy,t}\text{HY dummy}_{b,t} \\ & + \beta_{m,t}\text{Maturity before Sep 2025}_b + \beta_{S,b,t}\text{Bank issuer dummy}_b \times \text{Eligible seller}_{d,t} \\ & + \beta_{S,m,t}\text{Maturity before Sep 2025}_b \times \text{Eligible seller}_{d,t} \\ & + \beta_{S,hy,t}\text{HY dummy}_{b,t} \times \text{Eligible seller}_{d,t} + \vec{\gamma}_t\text{Bond characteristics}_{b,t} + \epsilon_{b,t}.\end{aligned}$$

Here, $\text{Eligible seller}_{d,t}$ is a dummy equal to 1 if dealer d is an eligible seller to the facility as of date t,[7] with a positive estimate of $\beta_{S,m,t}$ and $\beta_{S,hy,t}$ indicating that dealers eligible to transact with the facility increase inventories in shorter term and high yield bonds more

[6] We explore changes in net inventory due to dealer-to-customer-and-affiliate transactions in Appendix Figure A.4.

[7] See Table A.4 for the list of eligible sellers and the facility registration dates up to June 26, 2020.

than those that dealers that are not registered with the facility.

Figure 6 reports the estimated coefficients from the above regression for bank-affiliated (left column) and stand-alone (right column) dealers. Figure 6a shows that, on average, both bank-affiliated and stand-alone dealers decreased inventory starting in late February, but started quickly rebuilding inventory after the initial facilities announcement on March 22. By the end of our sample, stand-alone dealers, on average, had more than doubled their net inventory relative to the start of the year, while the bank-affiliated dealers increased their net inventory at a slightly slower pace.

Turning next to differences across eligibility criteria, Figures 6c and 6d shows that stand-alone dealers but not bank-affiliated differentially increased inventory in bonds maturing before September 2025. Similarly, in Figures 6e and 6f, we see that stand-alone dealers decreased their inventory of high yield bonds while bank-affiliated dealers did not. That is, prior to the CCF announcement on March 22, all dealers decreased their net inventories on average, and stand-alone dealers reduced their inventory of riskier securities – those with longer maturities and those with lower credit ratings. Such intermediation "flight to safety" is consistent with a decreased appetite for bearing risk on behalf of stand-alone dealers. Bank-affiliated dealers, instead, decreased their inventories on average but not in particular inventories of riskier securities, suggesting that a simple balance sheet constraint is unlikely to be the key explanation for their role in the March dislocations.

After the facilities announcement, stand-alone dealers returned to the market for riskier securities, dramatically reducing their inventory of shorter maturity bonds and increasing their inventory of high yield bonds, even relative to the start of the year. Stand-alone dealers that are eligible sellers to the facility increase net inventory of high yield bonds at an even faster pace, and increase their net inventory of shorter maturity bonds. The facility thus acts as a "buyer of last resort", re-assuring the more risk-averse stand-alone dealers that a buyer will be available in the market in case of further market turbulence.

In contrast, bank-affiliated dealers did not differentially increase their net position in

high yield bonds after the facilities announcement, and, once facility purchases commenced, increased net inventory of shorter maturity bonds. Furthermore, eligibility to sell to the facility does not seem to have a substantial effect on the willingness of bank-affiliated dealers to hold bond inventories, which is again consistent with limited impact of bank balance sheet constraints. In related work, O'Hara and Zhou (2020) find that primary dealers bought investment-grade bonds at a higher rate following the facility announcement. Our results suggest that that differential effect is potentially driven by the willingness of stand-alone dealers to re-enter the market for high yield intermediation, rather than an active re-allocation by bank-affiliated dealers to intermediation in investment-grade bonds.

Taken together, Figure 6 shows that the increased dealer concentration in shorter-term and high yield securities that we saw in Figure 5 is due to a withdrawal of stand-alone dealers from those markets.

9 Conclusion

The corporate credit facilities represent an unprecedented intervention by the Federal Reserve in corporate credit markets, and it offers an opportunity to deepen our understanding of the functioning of those markets and the associated transmission channels. We document that there is a sizable announcement effect when the CCFs are announced, both for bonds that are eligible for the facilities and for those that are not. The large announcement effect is driven by reduced risk premia, supported by increased intermediation from dealers, especially those which are eligible to transact with the facility. The impact on prices and liquidity is differentially larger for eligible issuers. In addition to the impact on secondary markets, we document in this paper how these improvements in secondary markets are accompanied by improvements in access to credit in primary markets. Eligible issuers are more likely to issue once the facilities have been announced and eligible issuers issue at lower prices. This is the first paper to show a direct pass-through from the secondary market to the primary

corporate bond market.

Since several Federal Reserve facilities were announced at the same time, it is natural to wonder if the announcement effect also reflects a positive impact of those facilities. However, any announcements with a positive impact on economic fundamentals should benefit high yield issuers more than the investment grade issuers eligible for the facility. In this case, we would be underestimating the differential impact of the facility as it would be masked by a differential impact of the overall official sector response larger for ineligible issues. The significant estimates of the impact of purchases on individual bonds and the results when controlling for issuer-level fixed effects are additional compelling evidence for the direct facility impact.

Given the scale of the announcement effect, it is natural to wonder if the presence of the facility as a backstop would have been enough to ensure a recovery in market functioning, without any purchases. We estimate a statistically significant effect of the dollars of purchases, suggesting that the amount of purchases also matters, including for measures of liquidity such as spreads. However, individual bond purchases appear to have more of an effect than do ETFs. Whether there are nonlinearities between the impact of purchases that are small relative to market volumes and no purchases at all is, however, nearly impossible to estimate. The removal of the backstop, once market conditions normalized, was met with aplomb by the market, with only small spread increases for eligible issues.

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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).

(a) 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

(b) 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

Table 2: Facility announcement effects. Three-day changes around announcement days. "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) Duration-matched spreads

	March 23				April 9			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-30.14	-14.68	-28.90	-29.33	-22.01	-8.73	-15.00	-24.11
	(11.12)***	(13.43)	(12.98)**	(11.70)**	(10.15)**	(10.42)	(10.25)	(10.48)**
SM-CCF eligible	-22.33	-16.73	-23.09	-9.62	7.39	1.25	12.01	2.35
	(4.72)***	(4.34)***	(5.42)***	(5.79)*	(4.94)	(5.02)	(6.74)*	(4.72)
Most affected			5.72				-4.97	
			(5.32)				(6.47)	
Most affected × eligible			-6.66				-15.41	
			(22.78)				(14.51)	
Debt maturing w/in 2 year				-2.72				5.37
				(4.22)				(3.09)*
Debt maturing w/in 2 year× eligible				-16.50				5.60
				(8.44)*				(7.94)
Issuer FE		✓				✓		
Adj. R-sqr.	0.03	0.16	0.03	0.04	0.01	0.37	0.01	0.01
N. of obs	1066	880	844	1066	1079	888	862	1079
N. of clusters	375	189	293	375	394	203	305	394

(b) Default-adjusted spreads

	March 23				April 9			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-27.40	-18.54	-27.15	-26.28	-20.86	-8.87	-14.34	-23.19
	(11.86)**	(16.68)	(13.84)*	(12.30)**	(10.38)**	(10.54)	(10.55)	(10.72)**
SM-CCF eligible	-23.68	-16.95	-24.07	-11.43	7.05	1.73	12.76	2.78
	(4.75)***	(4.38)***	(5.43)***	(5.83)*	(5.06)	(5.13)	(6.96)*	(4.90)
Most affected			6.86				-4.67	
			(5.70)				(6.34)	
Most affected × eligible			-8.77				-16.12	
			(23.04)				(14.55)	
Debt maturing w/in 2 year				-4.15				5.88
				(4.29)				(3.12)*
Debt maturing w/in 2 year× eligible				-15.38				4.23
				(8.57)*				(8.07)
Issuer FE		✓				✓		
Adj. R-sqr.	0.05	0.16	0.05	0.06	0.01	0.36	0.01	0.01
N. of obs	1045	861	832	1045	1040	856	835	1040
N. of clusters	370	186	289	370	380	196	296	380

(c) 1y EDF

	March 23				April 9			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-7.14	-7.89	-5.89	-8.65	-0.33	2.12	-0.78	-0.24
	(2.89)**	(3.90)**	(3.52)*	(3.12)***	(1.57)	(1.72)	(2.04)	(1.58)
SM-CCF eligible	2.30	-1.04	1.29	4.09	1.28	0.70	1.34	0.35
	(1.13)**	(0.65)	(1.03)	(1.66)**	(0.69)*	(0.48)	(0.67)**	(0.80)
Most affected			-6.95				2.51	
			(3.81)*				(1.48)*	
Most affected × eligible			2.05				-2.46	
			(5.60)				(1.70)	
Debt maturing w/in 2 year				3.32				-0.11
				(1.89)*				(1.37)
Debt maturing w/in 2 year× eligible				-3.55				1.38
				(2.00)*				(1.60)
Issuer FE		✓				✓		
Adj. R-sqr.	0.00	0.70	0.03	0.00	0.00	0.74	0.01	-0.00
N. of obs	1045	861	832	1045	1045	860	837	1045
N. of clusters	370	186	289	370	383	198	297	383

(d) Bid-ask spread

	March 23				April 9			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-4.01	6.36	-3.16	-4.32	12.12	6.25	11.89	12.95
	(17.75)	(6.81)	(17.57)	(17.70)	(6.62)*	(7.77)	(6.34)*	(6.71)*
SM-CCF eligible	-18.94	-12.95	-17.92	-22.49	-2.15	-0.66	-0.59	-4.73
	(4.33)***	(4.52)***	(4.21)***	(5.86)***	(2.02)	(1.64)	(1.89)	(3.56)
Most affected			8.35				8.00	
			(10.09)				(4.70)*	
Most affected × eligible							-18.59	
							(15.29)	
Debt maturing w/in 2 year				2.62				-3.12
				(4.49)				(2.20)
Debt maturing w/in 2 year× eligible				6.32				4.62
				(8.30)				(4.34)
Issuer FE		✓				✓		
Adj. R-sqr.	0.01	0.47	0.01	0.01	0.02	0.28	0.03	0.02
N. of obs	573	471	573	573	1051	915	1051	1051
N. of clusters	226	124	226	226	337	201	337	337

Table 3: Purchase effects. Three day changes 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) 1y 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 4: Probability of issuance. "Opportunistic issuers" are those that don't have any debt maturing within 2 years. All regressions include month fixed effects. Standard errors clustered at the issuer level reported in parentheses below point estimates. Reference period starts in January 2017. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-2.67	-2.71	-2.86	-2.86	-2.63	-2.69
	(0.08)***	(0.09)***	(0.18)***	(0.20)***	(0.09)***	(0.10)***
Pandemic onset	-0.33	-0.41	-2.63	-2.95	-0.29	-0.34
	(0.31)	(0.33)	(0.13)***	(0.23)***	(0.31)	(0.33)
Facility implementation	0.18	0.20	0.39	0.50	0.09	0.07
	(0.11)*	(0.11)*	(0.21)*	(0.23)**	(0.14)	(0.15)
Facility operational	-0.08	-0.04	0.04	0.12	-0.12	-0.09
	(0.10)	(0.10)	(0.22)	(0.23)	(0.12)	(0.12)
IG	0.31	0.21	0.45	0.29	0.24	0.18
	(0.05)***	(0.06)***	(0.14)***	(0.18)	(0.06)***	(0.06)***
IG × Pandemic onset	0.41	0.21	2.62	2.56	0.41	0.19
	(0.32)	(0.33)	(0.20)***	(0.23)***	(0.33)	(0.35)
IG × Facility implementation	0.29	0.30	0.02	0.13	0.39	0.38
	(0.11)***	(0.12)**	(0.21)	(0.26)	(0.14)***	(0.16)**
IG × Facility operational	-0.05	-0.10	-0.29	-0.38	0.05	-0.01
	(0.11)	(0.13)	(0.23)	(0.28)	(0.13)	(0.15)
WAM	-0.02	-0.01	-0.02	-0.01	-0.02	-0.01
	(0.00)***	(0.00)***	(0.00)***	(0.00)**	(0.00)***	(0.00)***
Log EDF		-0.07		-0.10		-0.05
		(0.01)***		(0.03)***		(0.01)***
Pandemic onset × Log EDF		-0.11		-0.14		-0.11
		(0.05)**		(0.09)		(0.05)**
Facility implementation × Log EDF		0.02		0.12		-0.02
		(0.02)		(0.04)***		(0.04)
Facility operational × Log EDF		-0.00		0.02		-0.02
		(0.04)		(0.07)		(0.04)
Pseudo R.-sqr.	0.06	0.05	0.06	0.06	0.05	0.05
$\chi^2(p-val)$	382.36 (0.00)	368.84 (0.00)	4458.75 (0.00)	2324.74 (0.00)	239.11 (0.00)	221.35 (0.00)
N. of obs	169400	116046	38692	27490	130708	88556
N. of clusters	984	815	461	378	920	762

Table 5: Offering terms. "Opportunistic issuers" are those that don't have any debt maturing within 2 years. All regressions include month-of-year fixed effects. Standard errors clustered at the issuer level reported in parentheses below point estimates. Reference period starts in January 2017. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Log offering amount

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.88	1.88	2.19	-0.51	5.29	3.32
	(0.86)***	(1.27)	(1.79)	(2.95)	(0.84)***	(1.22)***
Pandemic onset	-0.30	-0.11	-0.08	-0.54	-0.35	0.37
	(0.14)**	(0.25)	(0.17)	(0.82)	(0.12)***	(0.22)*
Facility implementation	0.30	-0.21	-0.52	-0.12	0.70	-0.09
	(0.43)	(0.20)	(0.37)	(0.55)	(0.40)*	(0.19)
Facility operational	-0.20	-0.25	-0.52	-0.44	-0.17	-0.18
	(0.16)	(0.17)	(0.42)	(0.40)	(0.14)	(0.14)
IG	0.15	0.26	0.37	0.45	0.01	0.14
	(0.12)	(0.12)**	(0.33)	(0.34)	(0.10)	(0.10)
IG × Pandemic onset	0.51	0.64			0.67	1.07
	(0.17)***	(0.32)**			(0.22)***	(0.20)***
IG × Facility implementation	-0.13	0.57	0.64	0.86	-0.54	0.31
	(0.40)	(0.22)***	(0.32)*	(0.34)**	(0.39)	(0.23)
IG × Facility operational	0.27	0.28	0.54	-0.15	0.20	0.37
	(0.16)*	(0.22)	(0.48)	(0.61)	(0.13)	(0.20)*
Log EDF		-0.11		-0.21		-0.06
		(0.04)**		(0.10)**		(0.05)
Pandemic onset × Log EDF		0.19		-0.13		0.64
		(0.17)		(0.27)		(0.18)***
Facility implementation × Log EDF		0.06		0.20		0.04
		(0.06)		(0.14)		(0.06)
Facility operational × Log EDF		0.03		-0.11		0.10
		(0.08)		(0.14)		(0.07)
Mills ratio	0.42	0.83	0.93	1.69	0.10	0.28
	(0.25)*	(0.39)**	(0.59)	(0.96)*	(0.21)	(0.36)
Adj. R.-sqr.	0.33	0.36	0.37	0.36	0.35	0.37
N. of obs	922	887	419	407	503	480
N. of clusters	241	227	102	97	189	178

(b) Offering maturity

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-42.11	-75.33	-50.87	-83.49	-38.62	-82.79
	(9.70)***	(13.08)***	(17.56)***	(27.29)***	(13.15)***	(15.79)***
Pandemic onset	-3.33	-5.72	1.74	-25.32	-3.55	4.21
	(1.63)**	(3.05)*	(2.45)	(10.36)**	(2.03)*	(6.46)
Facility implementation	-4.19	-6.32	-4.21	-2.98	-3.76	-7.54
	(3.15)	(3.91)	(7.22)	(7.29)	(2.54)	(2.58)***
Facility operational	-7.36	-7.41	-8.53	-8.54	-6.81	-5.95
	(1.70)***	(1.61)***	(4.29)**	(4.17)**	(2.26)***	(2.03)***
IG	6.97	9.12	7.51	8.34	6.82	9.79
	(1.40)***	(1.40)***	(3.51)**	(3.40)**	(1.50)***	(1.45)***
IG × Pandemic onset	5.23	0.06			4.55	8.30
	(2.35)**	(4.63)			(3.58)	(6.80)
IG × Facility implementation	8.62	11.26	10.49	11.76	7.36	11.83
	(2.88)***	(3.95)***	(6.43)	(6.14)*	(2.53)***	(2.91)***
IG × Facility operational	3.60	0.25	4.43	-4.56	1.93	-0.86
	(1.99)*	(2.89)	(4.83)	(5.38)	(2.32)	(3.28)
Log EDF		-2.05		-2.76		-2.12
		(0.52)***		(1.07)**		(0.66)***
Pandemic onset × Log EDF		-2.85		-9.43		6.25
		(2.35)		(4.03)**		(6.51)
Facility implementation × Log EDF		-1.27		0.45		-1.94
		(0.71)*		(1.50)		(0.87)**
Facility operational × Log EDF		-1.03		-2.23		-1.21
		(1.22)		(1.23)*		(1.63)
Mills ratio	13.77	22.94	16.72	24.48	14.76	25.61
	(2.75)***	(4.21)***	(5.39)***	(9.15)***	(3.28)***	(4.95)***
Adj. R.-sqr.	0.13	0.14	0.07	0.09	0.17	0.20
N. of obs	922	887	419	407	503	480
N. of clusters	241	227	102	97	189	178

(c) Offering spread

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	90.15	305.89	-161.25	-121.83	392.76	642.20
	(125.98)	(142.32)**	(214.11)	(316.62)	(121.36)***	(133.12)***
Pandemic onset	-142.39	-211.69	81.50	-410.97	-142.28	-256.45
	(24.24)***	(37.41)***	(36.36)**	(88.53)***	(24.38)***	(35.83)***
Facility implementation	219.52	299.02	375.23	392.33	117.80	237.12
	(101.76)**	(74.69)***	(106.26)***	(88.70)***	(92.57)	(59.32)***
Facility operational	166.60	140.49	287.20	265.43	109.20	74.67
	(41.36)***	(37.25)***	(70.28)***	(45.70)***	(35.39)***	(30.76)**
IG	-160.70	-157.55	-116.47	-122.36	-163.47	-154.96
	(22.37)***	(17.88)***	(42.74)***	(36.84)***	(22.95)***	(18.98)***
IG × Pandemic onset	213.09	103.83			208.41	81.97
	(30.66)***	(46.73)**			(30.68)***	(29.27)***
IG × Facility implementation	-102.78	-182.91	-239.40	-159.16	-27.92	-189.45
	(100.60)	(80.37)**	(112.37)**	(98.09)	(93.26)	(74.17)**
IG × Facility operational	-160.86	-98.39	-293.26	-178.59	-104.34	-49.28
	(44.42)***	(48.68)**	(73.23)***	(91.07)*	(36.87)***	(46.28)
Log EDF		30.11		12.59		38.32
		(7.32)***		(11.88)		(9.40)***
Pandemic onset × Log EDF		-79.77		-183.64		-124.19
		(30.71)**		(29.01)***		(27.23)***
Facility implementation × Log EDF		14.25		48.57		-2.69
		(20.54)		(24.79)*		(22.49)
Facility operational × Log EDF		13.47		40.20		10.78
		(17.09)		(26.28)		(20.13)
Mills ratio	-4.05	-62.33	40.66	57.15	-77.83	-144.44
	(37.99)	(42.27)	(66.70)	(101.86)	(30.47)**	(38.71)***
Adj. R.-sqr.	0.51	0.64	0.62	0.71	0.48	0.63
N. of obs	922	887	419	407	503	480
N. of clusters	241	227	102	97	189	178

(d) Gross spread

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	12.10	13.08	8.73	12.34	12.63	10.22
	(2.08)***	(3.03)***	(4.48)*	(8.09)	(2.41)***	(3.00)***
Pandemic onset	-4.00	-4.64	0.85	1.86	-4.62	-4.64
	(0.65)***	(0.87)***	(0.40)**	(1.82)	(0.70)***	(0.94)***
Facility implementation	-0.04	0.56	1.85	1.41	-0.75	0.97
	(1.01)	(0.82)	(1.22)	(1.75)	(1.36)	(1.17)
Facility operational	2.62	2.00	3.59	3.00	2.72	1.94
	(0.95)***	(0.91)**	(1.81)**	(1.77)*	(1.08)**	(1.04)*
IG	-3.56	-3.94	-2.12	-2.24	-3.73	-4.41
	(0.61)***	(0.59)***	(1.21)*	(1.33)*	(0.68)***	(0.62)***
IG × Pandemic onset	3.84	3.85			3.82	4.98
	(0.71)***	(1.13)***			(1.01)***	(0.97)***
IG × Facility implementation	0.39	-0.00	-1.02	-0.73	0.71	-0.39
	(1.05)	(0.85)	(1.18)	(1.30)	(1.44)	(1.19)
IG × Facility operational	-1.84	-2.05	-2.79	-4.95	-2.19	-1.55
	(0.92)**	(0.94)**	(1.88)	(1.94)**	(0.99)**	(1.11)
Log EDF		0.14		0.34		-0.03
		(0.17)		(0.36)		(0.20)
Pandemic onset × Log EDF		-0.32		0.29		0.56
		(0.54)		(0.59)		(0.72)
Facility implementation × Log EDF		0.10		0.05		0.08
		(0.21)		(0.45)		(0.20)
Facility operational × Log EDF		-0.44		-1.39		-0.01
		(0.24)*		(0.29)***		(0.30)
Mills ratio	-0.21	-0.30	0.19	-0.35	-0.56	0.18
	(0.70)	(1.01)	(1.54)	(2.74)	(0.84)	(1.05)
Adj. R.-sqr.	0.54	0.59	0.55	0.57	0.52	0.60
N. of obs	867	837	380	371	487	466
N. of clusters	233	219	98	92	185	175

Table 6: Offering terms and underwriters. "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. Reference period starts in January 2017. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Log offering amount

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.06	3.84	2.80	4.76	5.82	4.67
	(0.70)***	(0.90)***	(1.44)*	(1.75)***	(0.89)***	(1.22)***
IG	0.06	0.24	0.46	0.24	-0.03	0.10
	(0.13)	(0.12)*	(0.27)*	(0.29)	(0.14)	(0.14)
At least 1 bank eligible seller	-0.14	-0.13	-0.03	-0.06	-0.31	-0.26
	(0.12)	(0.12)	(0.29)	(0.24)	(0.12)***	(0.12)**
At least 1 bank eligible seller × post registration	0.13	0.16	-0.16	-0.16	0.31	0.29
	(0.21)	(0.23)	(0.27)	(0.32)	(0.27)	(0.28)
At least 1 non-bank eligible seller	-0.08	-0.10	-0.29	-0.33	-0.06	-0.05
	(0.09)	(0.09)	(0.24)	(0.26)	(0.12)	(0.13)
At least 1 non-bank eligible seller × post registration	0.38	0.44	0.07	0.67	0.33	0.33
	(0.21)*	(0.23)*	(0.39)	(0.35)*	(0.23)	(0.24)
Log EDF		-0.04		-0.06		-0.01
		(0.04)		(0.06)		(0.04)
Mills ratio	0.22	0.30	0.71	-0.09	0.12	0.07
	(0.20)	(0.29)	(0.46)	(0.58)	(0.25)	(0.37)
Week FE	✓	✓	✓	✓	✓	✓
Adj. R.-sqr.	0.40	0.43	0.55	0.49	0.43	0.42
N. of obs	895	859	394	383	467	446
N. of clusters	239	225	95	92	186	175

(b) Offering maturity

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-44.58	-70.80	-75.55	-109.09	-46.31	-75.99
	(10.33)***	(14.68)***	(21.08)***	(25.82)***	(15.83)***	(17.92)***
IG	10.39	11.54	12.28	15.19	9.00	10.79
	(1.79)***	(1.83)***	(4.87)**	(4.60)***	(1.88)***	(2.24)***
At least 1 bank eligible seller	0.61	0.91	13.99	13.11	-1.02	-0.51
	(2.78)	(2.76)	(3.45)***	(2.73)***	(2.86)	(2.92)
At least 1 bank eligible seller × post registration	-9.04	-7.83	-11.04	-6.15	-7.79	-7.08
	(4.14)**	(4.20)*	(3.87)***	(4.62)	(6.07)	(6.60)
At least 1 non-bank eligible seller	-0.58	-0.09	1.48	2.88	-1.64	-2.00
	(1.26)	(1.39)	(2.51)	(2.73)	(1.66)	(1.89)
At least 1 non-bank eligible seller × post registration	-4.30	-3.99	-9.83	-12.29	-2.02	-0.21
	(3.90)	(4.68)	(5.13)*	(5.12)**	(4.77)	(5.58)
Log EDF		-2.24		-2.89		-2.63
		(0.54)***		(0.97)***		(0.89)***
Mills ratio	13.69	19.72	18.26	24.66	14.10	19.71
	(2.88)***	(4.58)***	(6.56)***	(7.69)***	(3.43)***	(5.10)***
Week FE	✓	✓	✓	✓	✓	✓
Adj. R.-sqr.	0.09	0.10	-0.00	0.02	0.16	0.18
N. of obs	895	859	394	383	467	446
N. of clusters	239	225	95	92	186	175

(c) Offering spread

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	113.99	262.63	-239.34	530.18	399.24	374.70
	(162.88)	(226.09)	(358.38)	(290.30)*	(156.67)**	(192.33)*
IG	-212.90	-197.12	-208.26	-255.39	-182.81	-165.16
	(26.68)***	(23.23)***	(85.64)**	(50.12)***	(25.08)***	(27.18)***
At least 1 bank eligible seller	15.63	6.41	59.13	77.65	9.84	10.27
	(16.36)	(14.54)	(39.69)	(49.88)	(25.52)	(17.75)
At least 1 bank eligible seller × post registration	-14.20	-47.39	-134.39	-150.40	34.10	10.71
	(35.82)	(34.54)	(47.54)***	(42.24)***	(28.86)	(28.16)
At least 1 non-bank eligible seller	-19.26	-12.52	-41.65	-18.24	-32.48	-17.56
	(9.83)*	(11.08)	(23.01)*	(17.87)	(20.09)	(19.83)
At least 1 non-bank eligible seller × post registration	-49.62	-66.60	-124.42	-68.27	1.48	-42.75
	(28.87)*	(39.88)*	(96.74)	(51.72)	(28.76)	(33.27)
Log EDF		38.11		56.06		35.27
		(8.59)***		(12.38)***		(8.60)***
Mills ratio	26.94	6.05	124.28	-72.22	-43.50	-6.73
	(52.68)	(75.24)	(112.79)	(102.72)	(41.67)	(61.44)
Adj. R.-sqr.	✓	✓	✓	✓	✓	✓
N. of obs	0.54	0.64	0.66	0.76	0.54	0.67
N. of clusters	895	859	394	383	467	446
N_clust	239	225	95	92	186	175

(d) Gross spread

	All		With debt maturing in 2 years		Opportunistic	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	12.54	14.65	10.16	14.91	7.40	4.68
	(2.37)***	(3.10)***	(5.35)*	(4.65)***	(3.52)**	(5.09)
IG	-4.02	-4.29	-3.49	-3.60	-3.84	-4.28
	(0.56)***	(0.54)***	(0.97)***	(0.68)***	(0.67)***	(0.62)***
At least 1 bank eligible seller	0.28	0.37	2.80	2.88	-0.54	-0.42
	(0.74)	(0.70)	(1.45)*	(1.48)*	(1.16)	(1.14)
At least 1 bank eligible seller × post registration	0.72	0.77	1.00	1.02	0.52	0.78
	(0.52)	(0.55)	(0.67)	(0.71)	(0.58)	(0.62)
At least 1 non-bank eligible seller	0.05	0.06	0.84	1.05	-0.39	-0.30
	(0.21)	(0.23)	(0.45)*	(0.51)**	(0.40)	(0.41)
At least 1 non-bank eligible seller × post registration	-0.36	-0.31	-2.48	-2.52	0.12	-0.02
	(0.59)	(0.71)	(0.96)**	(0.84)***	(0.70)	(0.76)
Log EDF		0.15		0.33		-0.11
		(0.13)		(0.12)**		(0.19)
Mills ratio	-0.56	-1.00	-1.13	-2.37	0.29	1.57
	(0.67)	(0.93)	(1.57)	(1.39)*	(0.94)	(1.28)
Adj. R.-sqr.	✓	✓	✓	✓	✓	✓
N. of obs	0.59	0.63	0.69	0.70	0.55	0.61
N. of clusters	838	807	358	351	450	431
N_clust	230	216	90	87	179	169

Table 7: Facility closure announcement effects. Three-day changes around announcement days. "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) Duration-matched spreads

	November 19				December 29			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-4.99	-5.73	-5.51	-5.75	-2.07	-3.39	-2.53	-1.79
	(3.83)	(2.78)**	(4.45)	(3.96)	(2.52)	(2.25)	(2.92)	(2.77)
SM-CCF eligible	1.65	0.76	1.94	1.07	-0.40	0.14	-0.47	-1.15
	(0.87)*	(0.35)**	(1.30)	(1.44)	(0.60)	(0.63)	(0.84)	(1.04)
Most affected			1.54				0.12	
			(0.89)*				(0.88)	
Most affected × eligible			-0.78				-1.27	
			(1.57)				(1.53)	
Debt maturing w/in 2 year				1.31				-0.43
				(1.02)				(0.73)
Debt maturing w/in 2 year× eligible				0.70				1.28
				(1.60)				(1.52)
Issuer FE		✓				✓		
Adj. R-sqr.	0.02	0.52	0.02	0.03	0.05	0.21	0.04	0.05
N. of obs	1161	970	932	1161	867	673	724	867
N. of clusters	418	227	325	418	355	161	284	355

(b) Default-adjusted spreads

	November 19				December 29			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-4.58	-5.75	-5.20	-5.42	-1.06	-2.79	-1.80	-0.86
	(3.79)	(2.80)**	(4.41)	(3.86)	(2.37)	(2.09)	(2.72)	(2.60)
SM-CCF eligible	1.59	0.80	1.91	1.11	-0.42	0.13	-0.48	-1.14
	(0.83)*	(0.34)**	(1.25)	(1.43)	(0.61)	(0.65)	(0.84)	(1.05)
Most affected			1.75				-0.03	
			(0.93)*				(0.86)	
Most affected × eligible			-0.96				-1.24	
			(1.56)				(1.53)	
Debt maturing w/in 2 year				1.41				-0.30
				(0.98)				(0.72)
Debt maturing w/in 2 year× eligible				0.54				1.20
				(1.57)				(1.53)
Issuer FE		✓				✓		
Adj. R-sqr.	0.02	0.54	0.02	0.02	0.04	0.20	0.04	0.04
N. of obs	1145	957	917	1145	858	666	718	858
N. of clusters	411	223	318	411	351	159	283	351

(c) 1y EDF

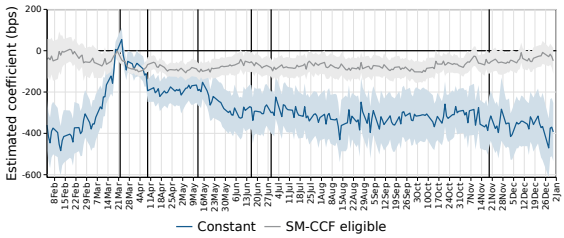
	November 19				December 29			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.51	-0.59	1.56	1.14	1.70	-0.32	1.38	2.04
	(3.35)	(0.77)	(3.90)	(3.64)	(1.01)*	(0.96)	(1.12)	(1.17)*
SM-CCF eligible	0.43	-1.46	0.50	1.66	0.24	0.06	0.32	-0.01
	(0.95)	(0.86)*	(1.45)	(0.68)**	(0.28)	(0.09)	(0.39)	(0.29)
Most affected			1.53				1.15	
			(0.90)*				(0.37)***	
Most affected × eligible			0.31				-0.40	
			(1.68)				(0.51)	
Debt maturing w/in 2 year				0.63				-0.48
				(0.98)				(0.50)
Debt maturing w/in 2 year× eligible				-2.23				0.52
				(1.54)				(0.62)
Issuer FE		✓				✓		
Adj. R-sqr.	0.01	0.89	0.01	0.01	0.05	0.84	0.05	0.05
N. of obs	1145	957	917	1145	860	668	720	860
N. of clusters	411	223	318	411	351	159	283	351

(d) Bid-ask spread

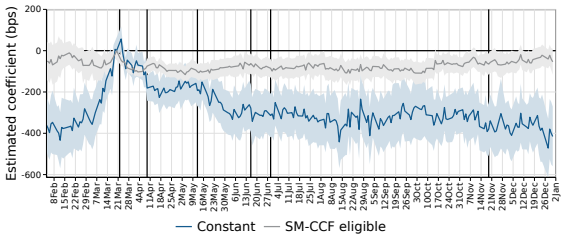
	November 19				December 29			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-0.40	-1.87	-0.52	-0.27	3.65	5.57	3.97	3.85
	(1.90)	(1.79)	(1.90)	(1.90)	(3.65)	(4.52)	(3.78)	(3.80)
SM-CCF eligible	-0.28	-0.65	-0.60	-0.76	-1.86	-0.99	-2.28	-2.60
	(0.54)	(0.68)	(0.55)	(0.79)	(0.85)**	(1.18)	(0.73)***	(1.07)**
Most affected			-0.14				-3.42	
			(1.35)				(3.31)	
Most affected × eligible			2.76				4.50	
			(1.91)				(3.51)	
Debt maturing w/in 2 year				-0.35				-0.55
				(0.92)				(1.37)
Debt maturing w/in 2 year× eligible				0.78				1.23
				(1.09)				(1.61)
Issuer FE		✓				✓		
Adj. R-sqr.	0.00	0.29	0.00	0.00	0.01	0.14	0.01	0.00
N. of obs	1628	1448	1628	1628	1005	859	1005	1005
N. of clusters	468	288	468	468	346	200	346	346

Figure 2. 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 dummies and standard bond and issuer characteristics. All regressions control for standard bond 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).

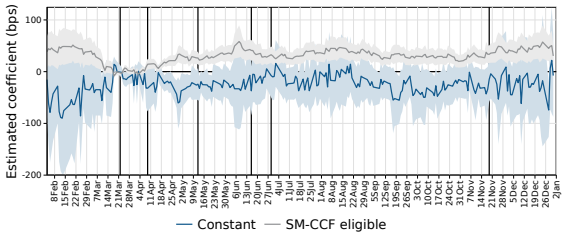
(a) Duration-matched spreads



(b) Default-adjusted spreads



(c) 1 year EDF



(d) Bid-ask spreads

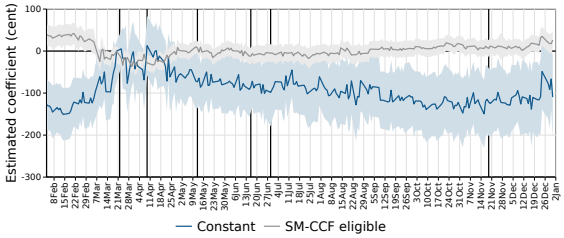
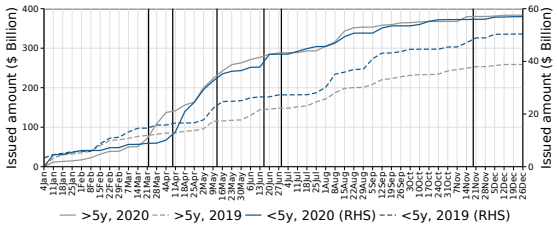


Figure 3. Primary market issuance improved since CCF announcement. This figure plots the year-to-date (through June 27, 2020) cumulative issuance in USD billion terms, together with the corresponding year-to-date cumulative issuance in 2019. Event lines at: March 22 (initial CCF announcement); April 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) By maturity



(b) By credit rating

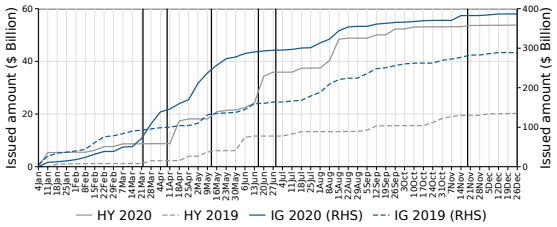
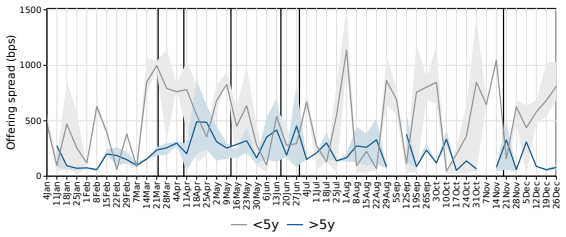


Figure 4. Primary market pricing flat since CCF announcement. This figure plots the average offering spread to nearest-maturity on-the-run Treasury yield for fixed coupon corporate bonds, together with the interquartile range in the spread. Average and interquartile range computed on an offering-amount-weighted basis. 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) By maturity



(b) By credit rating

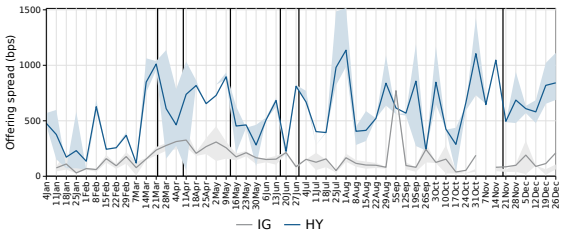
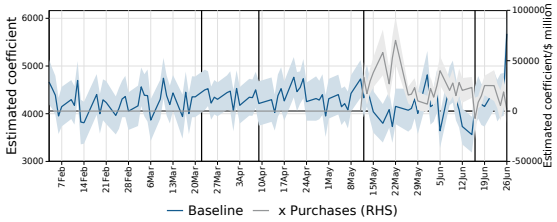
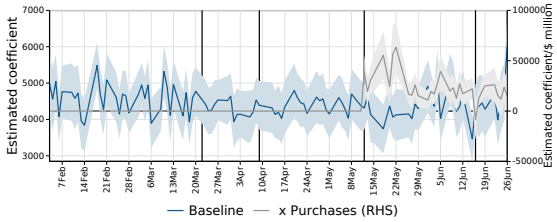


Figure 5. Increased concentration in dealer activity. This figure plots the estimated coefficients from the regression of bond-level HHI on bank issuer, bond maturity prior to Sep 2025, high yield rating dummies and daily facility purchases with (right column) and without (left column) issuer fixed effects. All regressions control for standard bond 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).

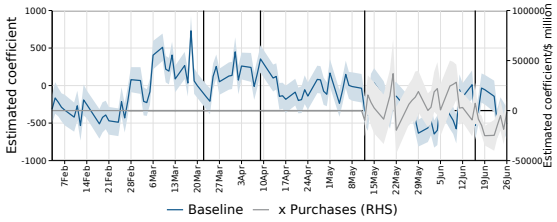
(a) Constant, no FE



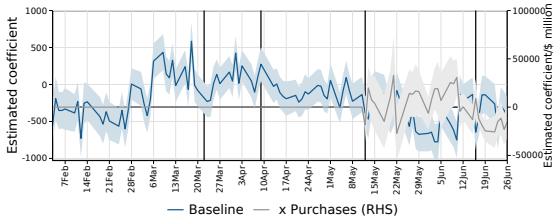
(b) Constant, FE



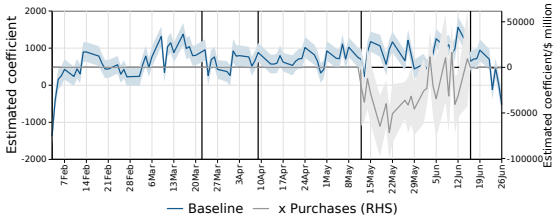
(c) Maturity dummy, no FE



(d) Maturity dummy, FE



(e) HY dummy, no FE



(f) HY dummy, FE

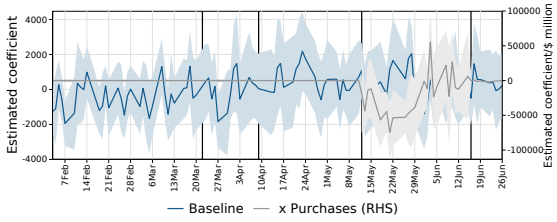
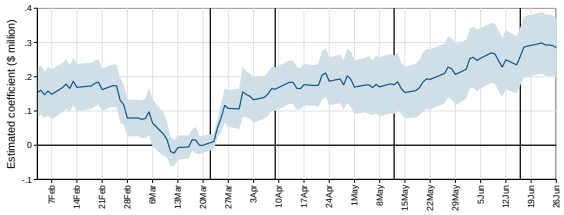
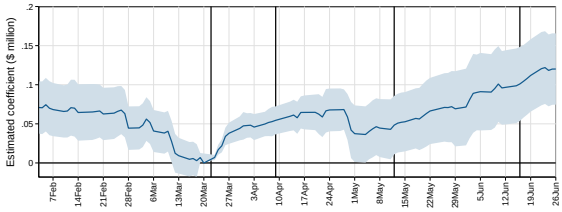


Figure 6. Bank-affiliated dealers increase net inventory since March. This figure plots the estimated coefficients from the regression of cumulative bond-level changes since March 22 in net position on bank issuer, bond maturity prior to Sep 2025, high yield rating and eligible seller dummies for bank-affiliated (left column) and stand-alone (right column) dealers. All regressions control for standard bond characteristics and dealer fixed effects. 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).

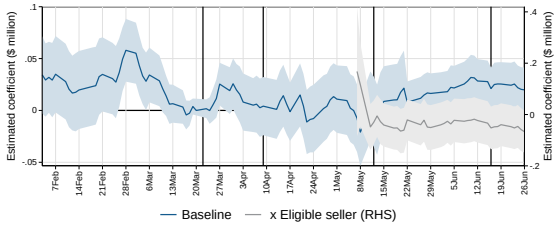
(a) Constant, bank-affiliated



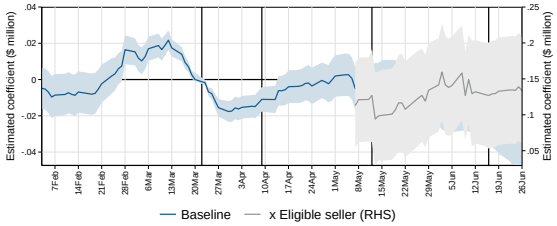
(b) Constant, stand-alone



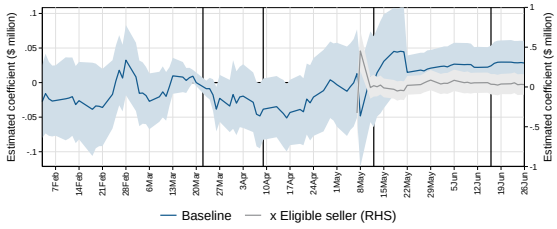
(c) Maturity dummy, bank-affiliated



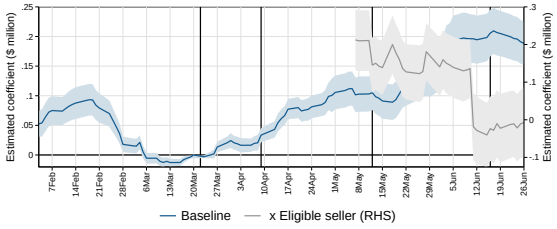
(d) Maturity dummy, stand-alone



(e) HY dummy, bank-affiliated



(f) HY dummy, stand-alone



A Additional results

A.1 Effect on CDS markets

Haddad et al. (2020) postulate that the increases in the CDS-bond basis in March for investment-grade issuers that were primarily driven by a lack of increases in CDS spreads suggest that the deterioration in spreads on corporate bond of the same issuers were not driven by increased riskiness of those issuers. In this section, we investigate to what extent the impact of the facilities that we document for corporate bonds spill-over into CDS markets.

CDS data Spreads and liquidity of single-name CDS and CDS indices at a daily frequency are sourced from Markit. For single-name CDS, we use spreads of CDS contracts written on USD-denominated senior unsecured debt (tier=SNRFOR) of U.S. firms, and the common no restructuring assumption (docclause=XR14). For the same entities, if the data is available, we also use some measures from Markit CDS liquidity report,[8] including index membership flag, bid-ask spread, dealers count per tenor, total number of end-of-day contributions, and weekly gross and net notional volumes and contracts from the Depository Trust and Clearing Corporation (Table 6). The liquidity data covers the universe of the most commonly traded single-name CDS contracts.

In addition to the single-name CDS contracts, which have experienced less liquidity since the global financial crisis and might not react to the facilities as quickly as other credit instruments, we also analyze the impact on CDX.NA.IG and the CDX.NA.HY indices, with 5-, 7-, and 10-year maturity. Although the 5-year maturity is typically the most liquid, we are interested in studying the facilities' impact across the term-structure curve given the 5-year maturity limit in the SMCCF. The CDX.NA.IG is a basket of 125 North American IG single-name CDSs, and the CDX.NA.HY is a basket of 100 North American HY single-name CDSs. We calculate the index-to-CDS basis, which is the difference between the price of a basket of single-name CDSs that replicates the cash flow and credit risk exposure of the index contract. The index-to-CDS basis is argued by Junge and Trolle (2015) to be a measure of overall liquidity of the CDS market, as it reflect the difference between the index spread and the intrinsic value implied by the spreads of its constituents. We analyze both on- and off-the-run indices.[9] For more details on single-name CDS and the indices, see Boyarchenko et al. (2020).

Changes in CDS market liquidity The results in Section 2 suggest that improvements in secondary market spreads have been particularly pronounced for bonds maturing prior to September 2025, even when comparing bonds issued by the same issuer. One potential

[8] In addition to the conditions we apply to filter the CDS spreads data, we apply two additional conditions to the liquidity metrics data. Specifically, PrimaryCoupon=Y and Range=Average. "PrimaryCoupon" indicates whether the running coupon is the primary coupon for the entity-tier; and, "Average" range represents the mean of entity-tier bid-ask spreads.

[9] If spreads for an index are available for two different versions of the same series simultaneously, we choose the version with the largest number of contributing dealers.

explanation for this differential improvement is differential liquidity of contracts on matched-maturity single name CDS contracts for shorter maturity bonds. Similar to specification (1), we estimate the relationship between the cumulative change in bid-ask spreads and net notional as a fraction of gross notional for single name CDS contracts relative to the peak in the week of March 16 – 20 and issuer characteristics:

$$\Delta M_{f,t} = \alpha_t + \beta_{b,t}\text{Bank issuer dummy}_f + \beta_{idx,t}\text{SN in IDX}_{f,t} + \beta_{hy,t}\text{HY dummy}_{f,t} + \epsilon_{f,t},$$

where $\text{SN in IDX}_{f,t}$ is a dummy equal to 1 if the single name CDS contract on issuer f is included in any series and version of either the North American investment-grade or high yield (CDX.NA.IG or CDX.NA.HY) CDS index on date t.

Figure A.1 plots the estimated coefficients, together with the 95 percent confidence bands, for characteristics of interest from the above regression of improvements in effective bid-ask spreads on the 5 year single name CDS contracts (left column) and single name net notional outstanding as a fraction of gross notional (right column). Starting with the effective bid-ask spreads, Figure A.1a shows that, on average, effective bid-ask spreads on 5 year CDS contracts increased ahead of the facilities announcement but have not retracted substantially since. Even more puzzlingly, effective bid-ask spread on high yield single names rose relatively less (Figure A.1c) since the start of the year and have also stabilized at levels similar to those the week of March 16 – 20. That is, the liquidity of investment-grade CDS contracts deteriorated at the beginning of March relative to the liquidity of high yield CDS contracts, suggesting that the muted response of investment-grade CDS spreads documented by Haddad et al. (2020) may be due to illiquidity of the contracts. More broadly, the only segment of the five year single name CDS market that exhibits an improvement in effective bid-ask spreads relative to March levels are the contracts *not* included in a CDS index, which is traditionally the less liquid segment of the single name CDS market (Figure A.1e).

The right column of Figure A.1 shows that these patterns in the effective bid-ask spreads on 5 year CDS contracts are consistent with the overall trading activity in the CDS market. On average, net notional as a fraction of gross notional has not changed meaningfully since the beginning of the year (Figure A.1b), but selling pressure has relatively increased for high yield single names (Figure A.1d) and for single names included in an index (Figure A.1f). That is, while for the average issuer, net selling pressure has remained relatively stable over the course of the year, net selling pressure has increased for more risky names and more liquid names.

Turning next to the cross-maturity heterogeneity, Figure A.2 shows that these effects are bigger for shorter maturities. Indeed, for the three year contract, the relative improvement in effective bid-ask spreads on high yield single name CDS since the facilities announcement is even statistically significantly bigger than the improvement in spreads on investment-grade bonds. That is, improvements in effective bid-ask spreads on single name CDS are bigger for shorter maturity contracts, written on either high yield single names or on names not included in an index or, in other words, contracts that traditionally are less liquid,[10] with little improvement in the effective bid-ask spreads on the average CDS name of any maturity.

[10]Boyarchenko et al. (2020) show that, post-crisis, the majority of both gross and net notional outstanding of single name CDS is concentrated in names included in an index, with the prevalence of single name contracts not included in an index declining over time.

Thus, if the differential improvement in secondary market bond spreads on bonds maturing before September 2025 were due to the relative ease of hedging of risks to those bonds in the CDS market, the improvements would be concentrated in spreads on bonds of issuers whose single name CDS contracts are not included in a CDS index. Instead, we see the differential improvement in spreads on shorter maturity bonds even within an issuer.

What leads to a differential improvement in effective bid-ask spreads for high yield single name CDS and CDS not included in an index? The net notional changes we documented in Figures A.1d and A.1f suggest that the causes are different across the two dimensions, with liquidity of CDS not in an index most likely improving due to increased interest in buying protection on those names. Figure A.3 suggests that the differential improvement in the liquidity of high yield single name CDS contracts may instead be due to relatively smaller dislocations between the single name and index CDS markets for high yield names. Although the index-single-name basis widened for both investment-grade and high yield indices in late March (around the index roll date), the basis for the CDX.NA.HY index has returned to be close to 0 across all maturities, while the convergence of the index-single-name basis has been slower for the CDX.NA.IG index, especially for shorter maturities. The right column of Figure A.3 shows that this differential improvement in the index-single-name basis is partially due to increased willingness of dealers to provide quotes for the high yield but not the investment-grade index. In addition, deviations in the pricing of the investment-grade index may be bigger due to market participants' expectations of firm downgrades, which would lead to substantial revisions in the composition of the investment-grade index before the next roll date in September. Thus, liquidity in high yield single name CDS improved differentially since March because of relatively smaller dislocations in the high yield CDX market, not because of increased hedging demand (buying pressure) stemming from the corporate bond market.

B Technical appendix

B.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.

B.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

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

where T is the time-to-maturity of the bond, C_b is the coupon on the bond, and $Z_t\left(s\right)$ 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 $\epsilon_{b,t}$.

B.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.

B.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] *Key Facts*:[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

[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`

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]

[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/corporate-credit-facility-faq`
[g] Federal Reserve Bank of New York: `https://www.newyorkfed.org/newsevents/news/markets/2020/20200615`

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
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: Facility announcement effects across event horizons. 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	-24.84	-14.68	-12.81	-44.31	-8.73	-2.99
	(24.96)	(13.43)	(7.62)*	(20.06)**	(10.42)	(10.51)
SM-CCF eligible	-30.24	-16.73	-14.25	-6.44	1.25	-3.00
	(11.43)***	(4.34)***	(2.11)***	(9.26)	(5.02)	(1.46)**
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.27	0.16	0.20	0.46	0.37	0.38
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	-28.86	-18.54	-14.50	-42.21	-8.87	-4.14
	(25.11)	(16.68)	(9.74)	(20.38)**	(10.54)	(11.09)
SM-CCF eligible	-31.84	-16.95	-14.30	-5.84	1.73	-2.77
	(11.61)***	(4.38)***	(2.10)***	(9.40)	(5.13)	(1.48)*
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.27	0.16	0.19	0.46	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	-12.42	-7.89	-3.10	2.48	2.12	2.13
	(6.20)**	(3.90)**	(1.28)**	(2.44)	(1.72)	(1.86)
SM-CCF eligible	-1.83	-1.04	-0.39	0.31	0.70	0.33
	(1.10)*	(0.65)	(0.31)	(0.39)	(0.48)	(0.28)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.78	0.70	0.80	0.85	0.74	0.51
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	28.32	6.36	4.32	15.22	6.25	1.34
	(31.50)	(6.81)	(4.00)	(21.27)	(7.77)	(2.57)
SM-CCF eligible	-22.09	-12.95	-7.17	-17.56	-0.66	-1.50
	(12.33)*	(4.52)***	(1.80)***	(5.85)***	(1.64)	(1.23)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.39	0.47	0.33	0.27	0.28	0.33
N. of obs	462	471	471	869	915	920
N. of clusters	120	124	124	191	201	203

Table A.6: Purchase effects. Three day changes 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

Table A.7: Purchase effects across event horizons. '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

Table A.8: Probability of issuance for different cut-offs. "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 starts in January 2017. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) 1 year cut-off

	Non-financial				Financial			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mat. w/in 1 year	Mat. w/in 1 year	Opportunistic	Opportunistic	Mat. w/in 1 year	Mat. w/in 1 year	Opportunistic	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	0.38	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)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mat. w/in 3 years	Mat. w/in 3 years	Opportunistic	Opportunistic	Mat. w/in 3 years	Mat. w/in 3 years	Opportunistic	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	31161	21692
N. of clusters	543	452	863	717	206	187	242	197

Table A.9: Facility closure announcement effects across event horizons. 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)
SM-CCF 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	1.85	-1.67	-2.79	0.92
	(40.58)	(2.80)**	(3.82)	(7.65)	(2.09)	(1.40)
SM-CCF eligible	0.55	0.80	0.05	0.60	0.13	-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

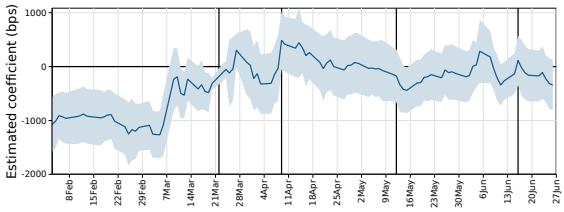
	Nov 19			Dec 29		
	1D	3D	5D	1D	3D	5D
Constant	1.63	-0.59	-0.18	-3.20	-0.32	-0.57
	(0.82)**	(0.77)	(0.56)	(2.35)	(0.96)	(1.03)
SM-CCF eligible	-1.05	-1.46	-0.77	-0.34	0.06	-0.13
	(0.56)*	(0.86)*	(0.49)	(0.19)*	(0.09)	(0.09)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.96	0.89	0.91	0.61	0.84	0.86
N. of obs	841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

(d) Bid-ask spread

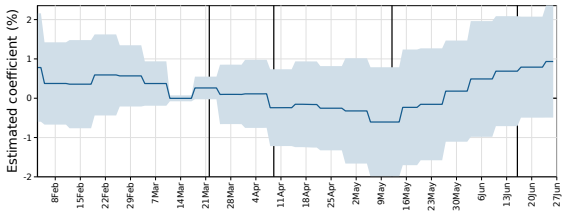
	Nov 19			Dec 29		
	1D	3D	5D	1D	3D	5D
Constant	1.77	-1.87	-1.21	-5.49	5.57	2.78
	(5.98)	(1.79)	(1.64)	(9.71)	(4.52)	(2.70)
SM-CCF eligible	-0.14	-0.65	1.03	2.84	-0.99	-0.69
	(2.02)	(0.68)	(0.55)*	(3.09)	(1.18)	(0.62)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.31	0.29	0.28	0.04	0.14	0.11
N. of obs	1274	1448	1450	770	859	859
N. of clusters	266	288	288	185	200	200

Figure A.1. CDS liquidity. This figure plots the estimated coefficients from the regression of cumulative issuer-level changes effective single name CDS bid-ask spreads (left column) and net notional as a fraction of gross notional (right column) on bank issuer, bond maturity prior to Sep 2025, high yield rating, and inclusion in an CDS index dummies. 95% confidence bands based on heteroskedasticity-robust standard errors 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).

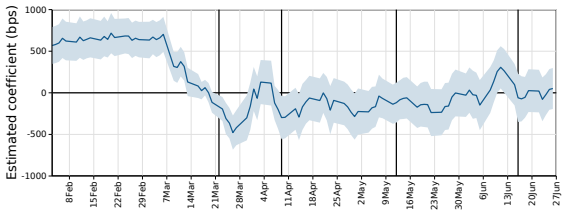
(a) Constant, 5 year BAS



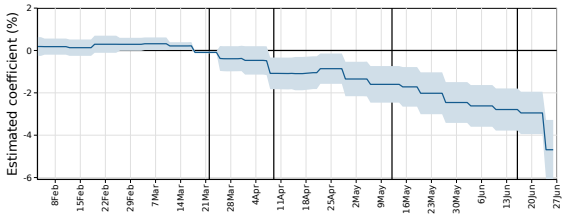
(b) Constant, Net notional



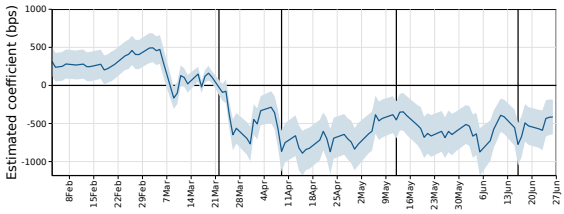
(c) HY dummy, 5 year BAS



(d) HY dummy, Net notional



(e) Not in IDX, 5 year BAS



(f) Not in IDX, Net notional

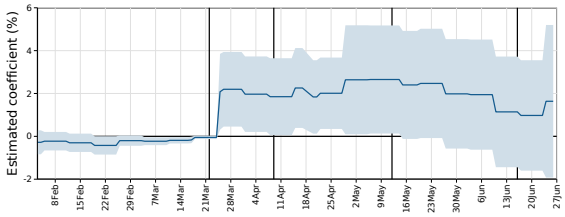
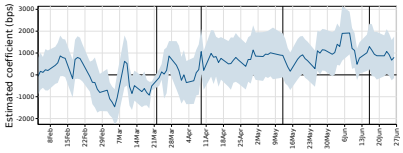
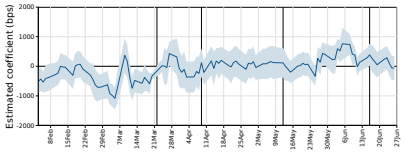


Figure A.2. CDS bid-ask spreads at different maturities. This figure plots the estimated coefficients from the regression of cumulative issuer-level changes effective single name CDS bid-ask spreads on 3 year (left column), 7 year (middle column), and 10 year (right column) contracts on bank issuer, bond maturity prior to Sep 2025, high yield rating, and inclusion in an CDS index dummies. 95% confidence bands based on heteroskedasticity-robust standard errors 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).

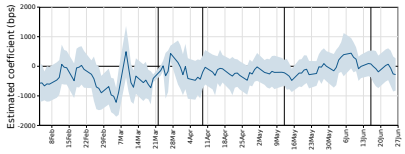
(a) Constant, 3 year



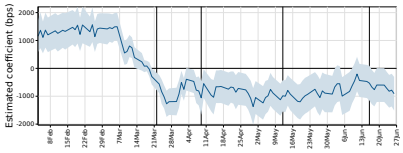
(b) Constant, 7 year



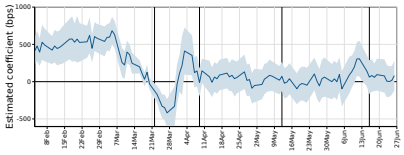
(c) Constant, 10 year



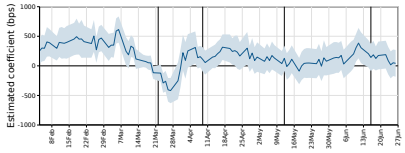
(d) HY dummy, 3 year



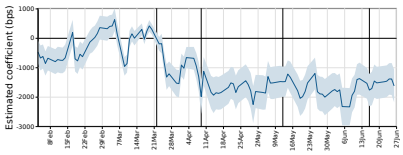
(e) HY dummy, 7 year



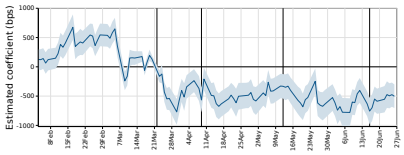
(f) HY dummy, 10 year



(g) Not in IDX, 3 year



(h) Not in IDX, 7 year



(i) Not in IDX, 10 year

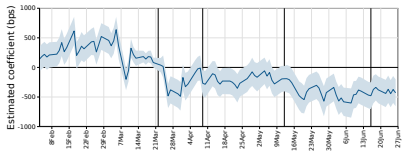
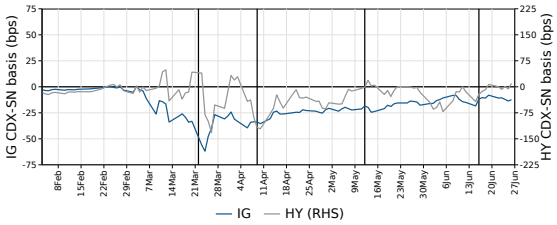
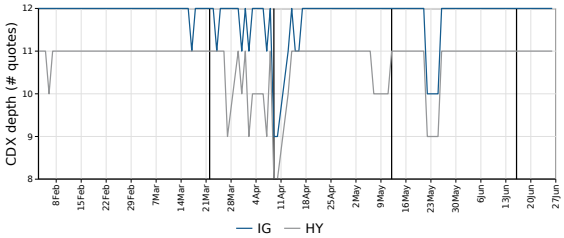


Figure A.3. CDX liquidity. This figure plots the index - single name basis (left column) and index depth (right column) for investment-grade and high yield North American CDS indices. Event lines at: March 22 (initial CCF announcement); April 9 (first term sheet update); May 12 (commencement of ETF purchases); June 16 (commencement of cash bond purchases).

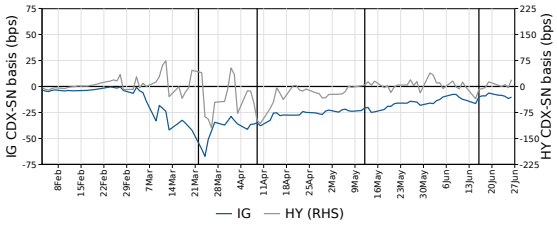
(a) Basis, 5 year



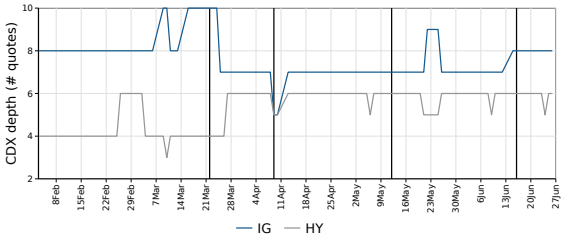
(b) Depth, 5 year



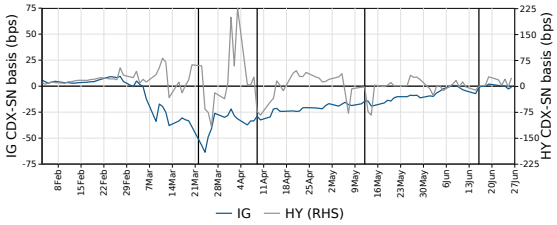
(c) Basis, 7 year



(d) Depth, 7 year



(e) Basis, 10 year



(f) Depth, 10 year

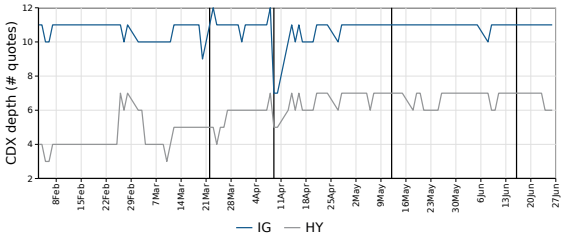
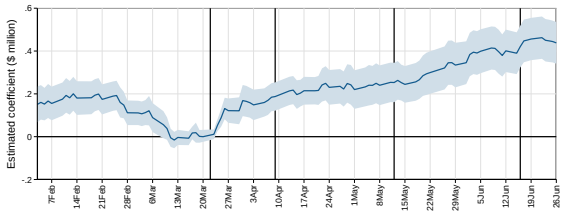
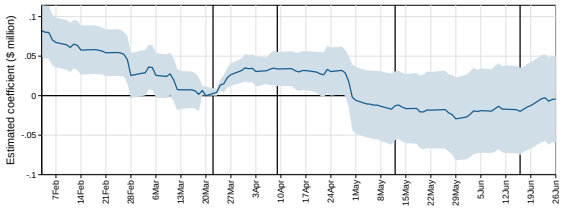


Figure A.4. Bank-affiliated dealers increase net inventory bought from customers since March. This figure plots the estimated coefficients from the regression of cumulative bond-level changes since March 22 in net purchases from customers on bank issuer, bond maturity prior to Sep 2025, high yield rating and seller eligibility dummies for bank-affiliated (left column) and stand-alone (right column) dealers. All regressions control for standard bond characteristics and dealer fixed effects. 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).

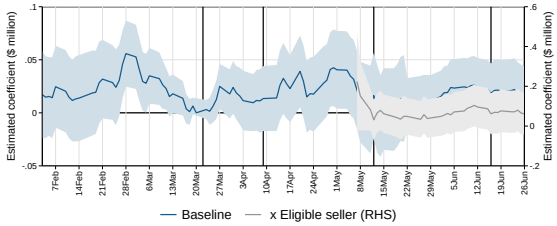
(a) Constant, bank-affiliated



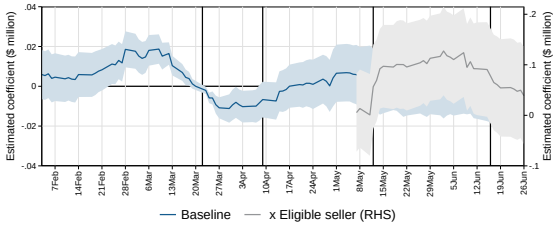
(b) Constant, stand-alone



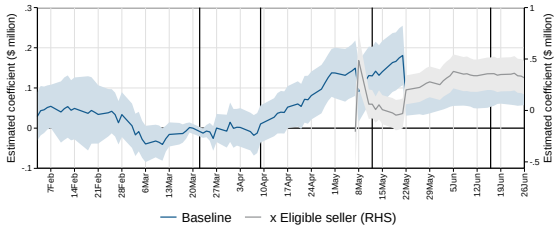
(c) Maturity dummy, bank-affiliated



(d) Maturity dummy, stand-alone



(e) HY dummy, bank-affiliated



(f) HY dummy, stand-alone

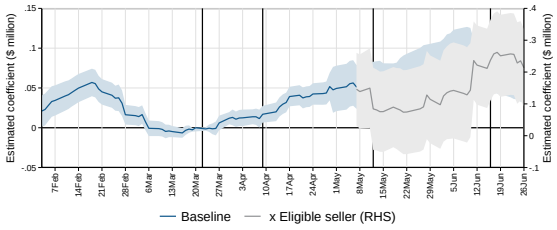


Figure A.5. Employment losses from January to April 2020. This figure plots the percentage employment losses from January to April 2020 by 3-digit NAICS industry. Monthly employment data from Bureau of Labor Statistics.

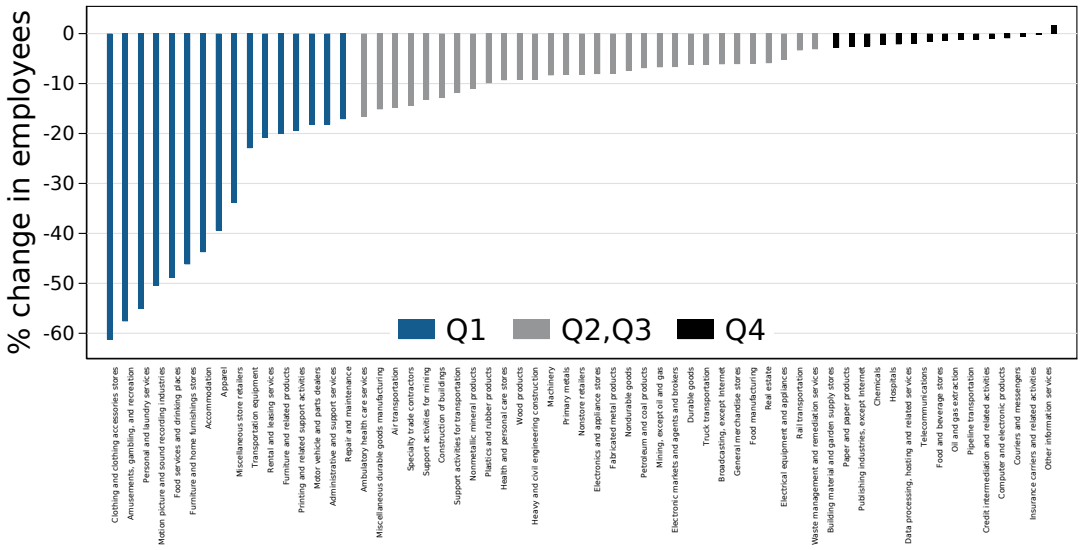


Figure A.6. Daily CCF purchase volume. This figure plots the time series of daily CCF purchase volume by asset class.