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The Global Dash for Cash: Why Sovereign Bond Market Functioning Varied across Jurisdictions in March 2020

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OVERVIEW

- In March 2020, the worsening COVID-19 pandemic sparked a global dash for cash by investors. This selling pressure occurred across advanced-economy sovereign bond markets and caused a deterioration in market functioning.
- The authors show that these market disruptions occurred disproportionately in the U.S. Treasury market and were due to investors' selling pressures being far more pronounced and broad-based.
- A contributing factor were differences in leverage dynamics, which helped pave the way for heavier buildup of leverage in the Treasury market compared to other sovereign bond markets. As a result, the COVID-19 shock catalyzed more deleveraging, and hence higher selling pressure, in the Treasury market.
- Finally, differences in market microstructure were not a primary driver of the disparity in market functioning.

In late February 2020, at the onset of the COVID-19 pandemic, heightened economic and market uncertainty led to a flight to quality as investors shifted their portfolios toward safe sovereign bonds. As the shock intensified in the second week of March 2020, however, this flight to quality became a global dash for cash, as investors sought to sell sovereign bonds to meet redemptions and margin calls and to build cash buffers.[1] These actions occurred across advanced-economy sovereign bond markets, causing bond yields to spike and market functioning to deteriorate broadly and sharply, and prompting central banks to intervene via asset purchases to restore market functioning.[2]

Although this dash for cash took place across advanced-economy sovereign bond markets, a range of metrics demonstrate that the March 2020 market disruptions occurred disproportionately in the U.S. Treasury market.

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To better understand this result, we assess differences in key drivers of the market disruptions across sovereign bond markets, via analysis of the data as well as outreach to a range of market participants.

First, we consider the depth and breadth of selling pressures across sovereign bond markets. Second, we explore the differences in the buildup of leverage by investors leading up to the March 2020 shock. Third, we assess the differences in market microstructures across sovereign bond markets, including market-maker obligations, the prevalence of central clearing, and reliance on electronic or voice trading platforms.

We find that a primary driver of the disproportionate disruptions to the U.S. Treasury market is that selling pressures were far more pronounced and broad-based in Treasury securities than in other sovereign bond markets, reflecting the U.S. dollar's role as the dominant global investment and funding currency. Differences in leverage dynamics were also a major factor, as stronger pre-pandemic issuance of Treasuries, as well as supportive financing conditions and other factors, helped pave the way for a heavier buildup of leverage in the Treasury market than in other sovereign bond markets. As a result, the COVID-19 shock catalyzed more deleveraging, and hence higher selling pressure, in the Treasury market. Finally, despite there being a number of differences in market microstructures across sovereign bond markets, we conclude that these differences were not primary drivers of the disproportionate disruptions to the Treasury market in March 2020.

Although central bank actions are not the focus of this article, we note that in response to the global dash for cash, several central banks intervened in their respective sovereign bond markets by conducting asset purchases. In line with our results that disruptions to the Treasury market were more severe relative to other sovereign bond markets, the Federal Reserve's response was larger and more front-loaded than that of other central bank counterparties, such as the European Central Bank (ECB), the Bank of England (BOE), and the Bank of Japan (BOJ) (see Chart 1A in Appendix 1).[3]

To offer some historical comparisons, periods of heightened market volatility and uncertainty during the global financial crisis (GFC) of 2007-09 were also accompanied by short periods of rising Treasury yields and sharp strains in Treasury market functioning. However, Treasury selling pressures during the GFC were not as strong as in the COVID-19 March 2020 event, likely reflecting concerns over bank creditworthiness during the GFC, which favored a shift by investors from bank deposits to Treasuries. Furthermore, the composition of Treasury investors in 2007-09 was different from that of 2020, with significantly lower participation from leveraged investors and open-ended mutual funds.

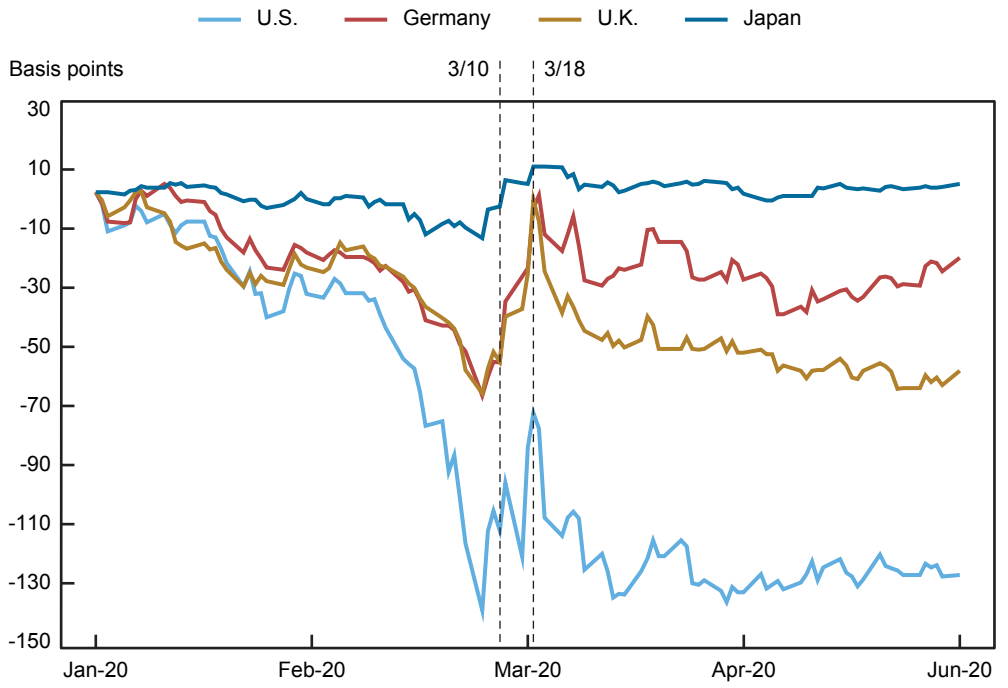
The COVID-19 March 2020 event was also quite different from the disruptions in U.S. financial markets observed in September 2019.[4] Rather than a global dash for cash, the adverse events of September 2019 were related to the low level of U.S. aggregate reserves (see, for example, Logan [2020a] and Copeland, Duffie, and Yang [2021]).

The rest of the article is organized as follows. The first section offers perspective on the performance of various measures of market functioning across jurisdictions during the March 2020 shock. The second section explores drivers of the apparent outsized reaction in U.S. Treasury markets compared to that of foreign sovereign markets, including differences in (1) the breadth and depth of selling pressures, (2) the expansion of sovereign supply and the buildup of leverage, and (3) features of market microstructures. This article uses publicly available data from a variety of sources; in Appendix 3, we list these data and their sources.

1. Dislocations Were Generally More Pronounced In U.S. Treasuries Than In Foreign Markets

At the start of the COVID-19 pandemic in late February 2020, investors digested the economic repercussions of the spread of the virus and impending lockdown measures, and, as is typical during periods of heightened economic uncertainty, began to demand higher-quality, safe assets. This behavior resulted in investors shifting their portfolios toward sovereign bonds, and the resulting buying pressure drove sovereign yields to broadly decline. As the crisis intensified in March 2020, however, investors' demand for cash surged, leading to selling pressure on sovereign bonds and thus to increases in yields. This down-and-up pattern in yields is illustrated for ten-year U.S., German, U.K., and Japanese bonds in Chart 1. For U.S., German, and U.K. sovereign bonds, the timing of this pattern is identical. From the beginning of 2020 until March 9, the cumulative yield for all three bonds steadily fell, with Treasury securities seeing the largest decline—137 basis points. On March 10 there was a sharp reversal, in which U.S., U.K., and German sovereign bonds all experienced cumulative yield increases of roughly 60 basis points. This reversal lasted until March 18. A similar but more muted pattern is seen for Japanese sovereign bonds.

Chart 1
Cumulative Yield Changes across Sovereign Bond Markets

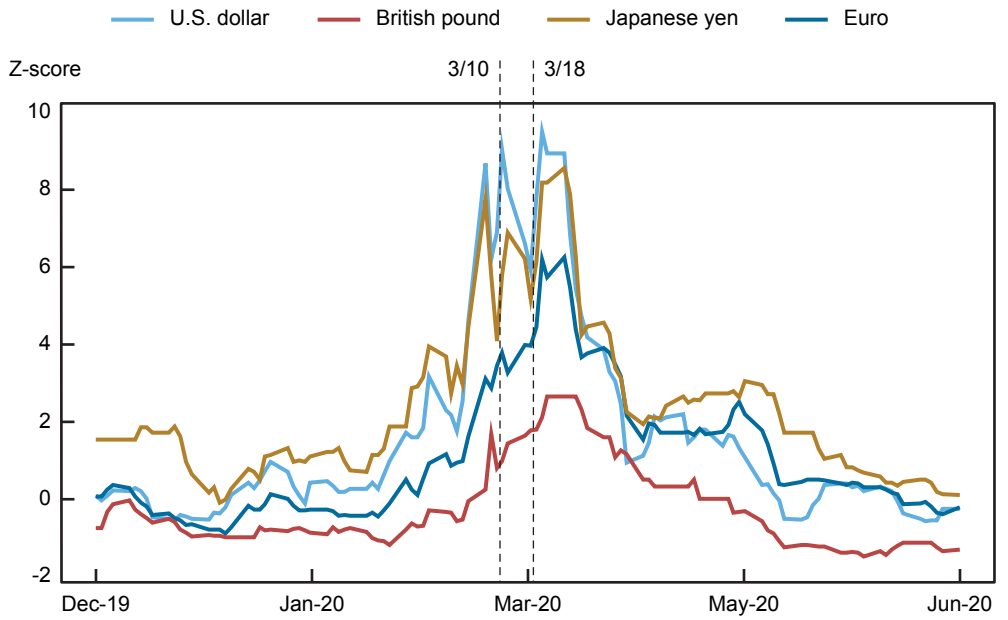


Source: Bloomberg L.P.

Notes: The chart shows the cumulative yield changes for ten-year sovereign bonds, starting on January 1, 2020. U.S., Germany, U.K., and Japan denote Treasury, bund, gilt, and Japanese government bond (JGB) securities, respectively.

In addition to the increase in yields, March 2020 saw an increase in the implied volatility of sovereign bond yields, reflecting, in part, investors' uncertainty over the global economic repercussions of the pandemic. Chart 2 shows an often-used measure of this volatility and illustrates how, across a number of sovereign bonds, it started increasing in late February 2020 and peaked in March 2020.

Chart 2
Implied Volatility across Sovereign Bond Markets

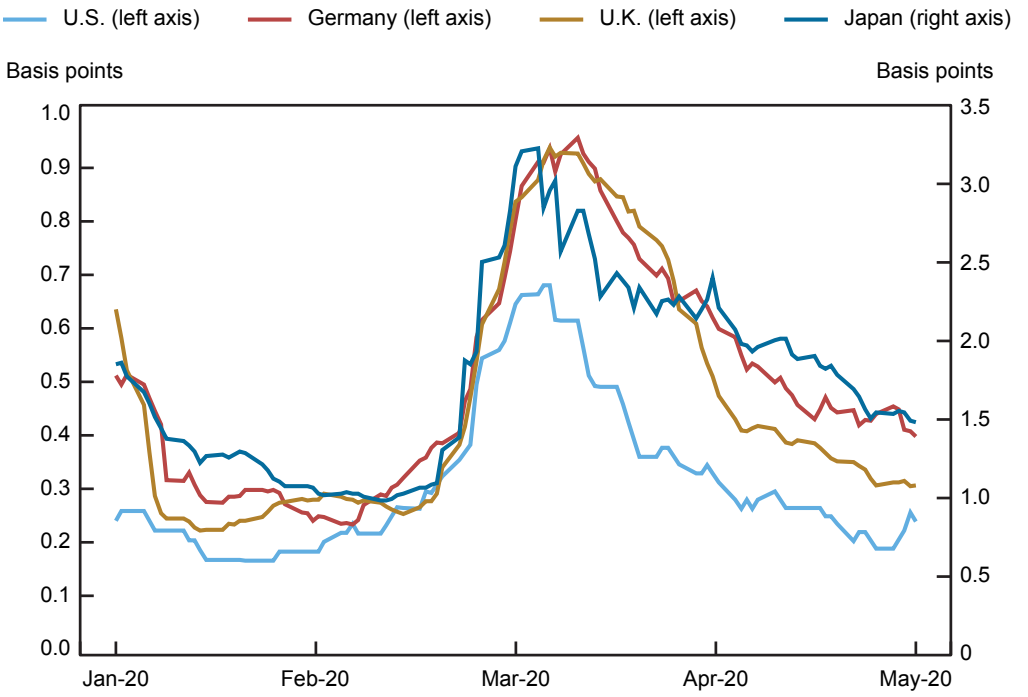


Source: Bloomberg L.P.

Notes: The chart shows a measure of implied volatility of sovereign bonds using a three-month to ten-year swaption. A swaption consists of an option on a forward-settling interest rate swap. The implied volatility measures the magnitude of expected future fluctuations of the underlying swap rate, as priced into the option according to an option pricing model. For each sovereign bond, the resulting measure is then normalized by its respective z-score, where that z-score is calculated on a 2017-19 sample.

Alongside these changes in yields and volatility, sovereign bond liquidity deteriorated significantly in March 2020. A common measure of bond liquidity is the difference in prices that market makers offer to purchase and sell specific bonds, or the bid-ask spread. An increase in this bid-ask spread over late February and March 2020 for U.S., German, U.K., and Japanese ten-year sovereign bonds is illustrated in Chart 3. This evidence, along with the aforementioned rise in volatility, suggests significant stress on trading conditions across sovereign bond markets.

Chart 3
The Spread between Bid and Ask Yields across Sovereign Bond Markets



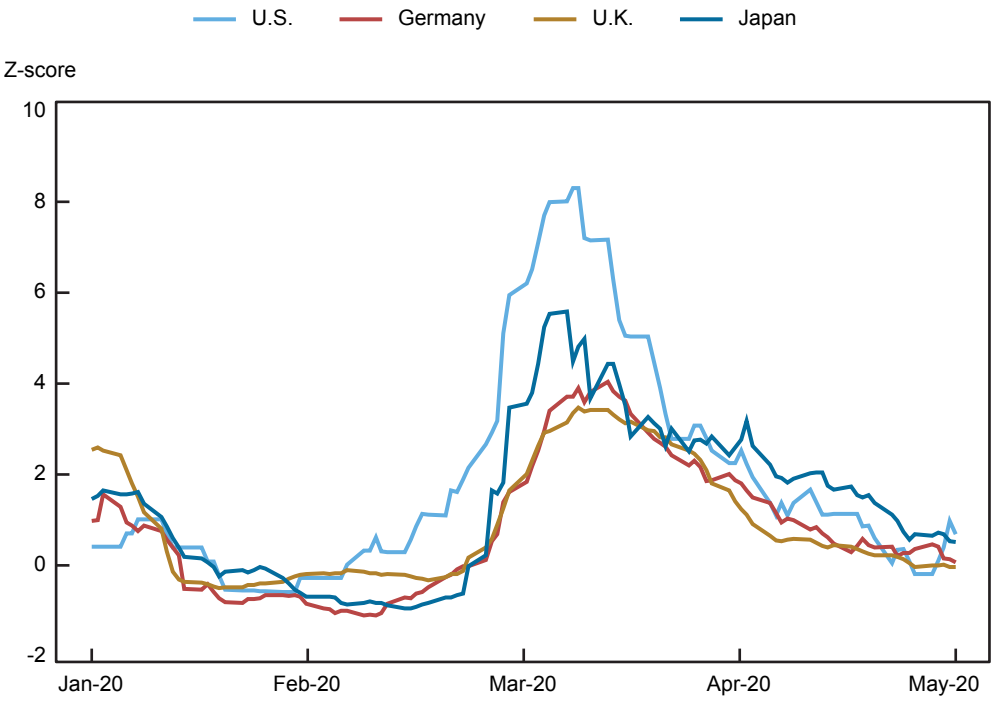
Source: Bloomberg CBBT.

Notes: The chart shows the spread between bid and ask yields for ten-year sovereign bonds on a ten-day backward-looking moving average. U.S., Germany, U.K., and Japan are Treasury, bund, gilt, and Japanese government bond (JGB) securities, respectively.

Although selling pressures materialized across the board for sovereign bonds in March 2020, the impact on trading conditions for U.S. Treasuries was the largest. This impact can be seen when considering bid-ask yield spreads after they have been normalized by their historical z-score.[5] This transformation makes the yield spreads comparable, since they become a measure of how much a given spread differs from its historical standard deviation, where a z-score of 2 or less means that the spread is within its usual range. These normalized measures are illustrated in Chart 4 and demonstrate that the deterioration in sovereign bond liquidity was more pronounced in U.S. Treasuries. Indeed, the normalized U.S. spread reaches a high z-score of 8, whereas the highs for normalized German, U.K., and Japanese spreads are less than 6.

Chart 4

The Normalized Spread between Bid and Ask Yields across Sovereign Bond Markets

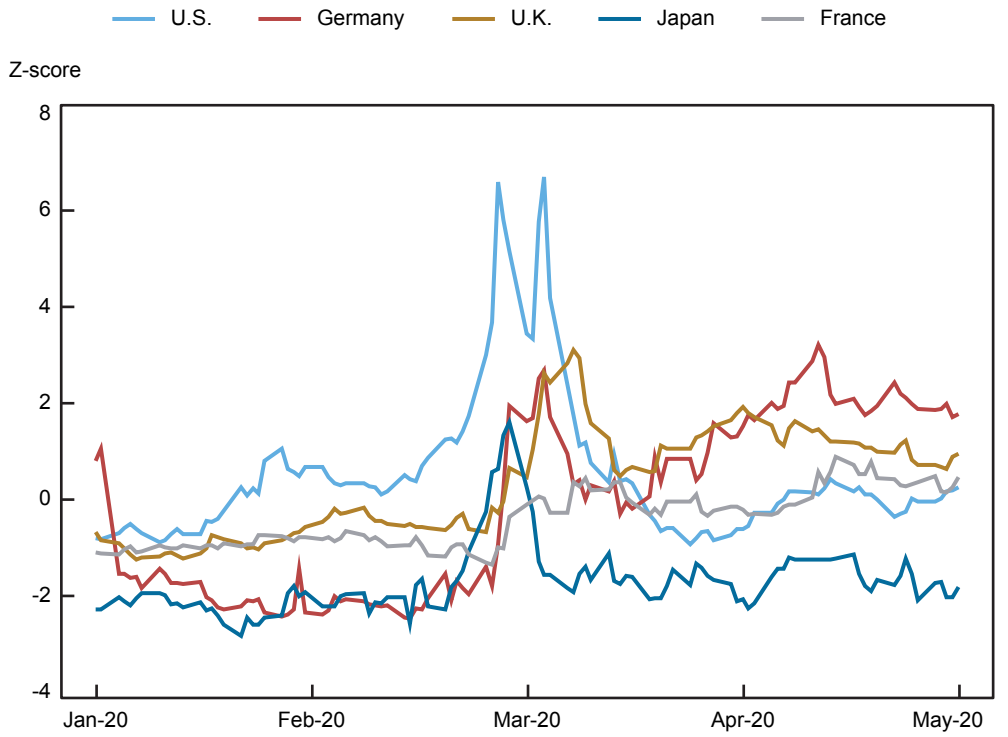


Source: Bloomberg CBBT.

Notes: The chart shows the spread between the ten-day backward-looking moving average of bid and ask yields for ten-year sovereign bonds, normalized by their respective z-scores. Z-scores are computed from a ten-day moving average of end-of-day bid-ask spreads using data from January 2017 to January 2019. U.S., Germany, U.K., and Japan are Treasury, bund, gilt, and Japanese government bond (JGB) securities, respectively.

The disproportionate adverse impact on trading conditions in U.S. Treasury markets is also seen in another standard financial metric: the difference between investors' expectations of the fair value yield of a sovereign bond and actual yields. This comparison is informative because differences between the two could indicate stressed liquidity conditions as well as dislocations in price discovery. Investors' expectations of the fair value yield are captured by fitting a curve to the data on yields using a spline. This is done for every sovereign bond market, producing a time series of differences between expectations of the fair value yield and actual yields.[6] Then, as with bid-ask yield spreads, the computed differences are normalized by a historical z-score to allow for comparisons across sovereign bond markets. As illustrated in Chart 5, the difference between fitted and actual yield curves for U.S. sovereign bonds has a z-score larger than 6 twice in the first half of 2020, whereas the differences for German, U.K., Japanese, and French sovereign bonds remain less than a z-score of 3.

Chart 5
Deviations from Fair Value Pricing across Sovereign Bond Markets



Source: Bloomberg L.P.

Notes: The chart shows the difference between investors' expectations of the fair value yield of a sovereign bond and actual yields, where these differences are normalized by a z-score. In normal times, this difference should be close to zero; large deviations from zero could indicate stressed liquidity conditions or dislocations in price discovery. These differences are the average spline errors, or the average of security yield errors from a fitted curve generated by Bloomberg. Z-scores are calculated on the sample period 2017-19. U.S., Germany, U.K., Japan, and France are Treasury, bund, gilt, Japanese government bonds (JGB), and Obligations assimilables du Trésor (OAT) securities, respectively.

2. Why Was the Deterioration More Pronounced in U.S. Treasuries?

In this section, we explore the likely drivers behind the disproportionate deterioration in the functioning of the U.S. Treasury market during mid-March. We begin by considering differences in investors' selling pressures across sovereign bond markets. We then analyze differences in the pace of sovereign bond issuance leading up to the crisis and in the mix of investor types that were purchasing sovereign bonds at issuance. Finally, we consider differences in market microstructures across sovereign bond markets.

2.1 Differences in Depth and Breadth of Selling Pressures

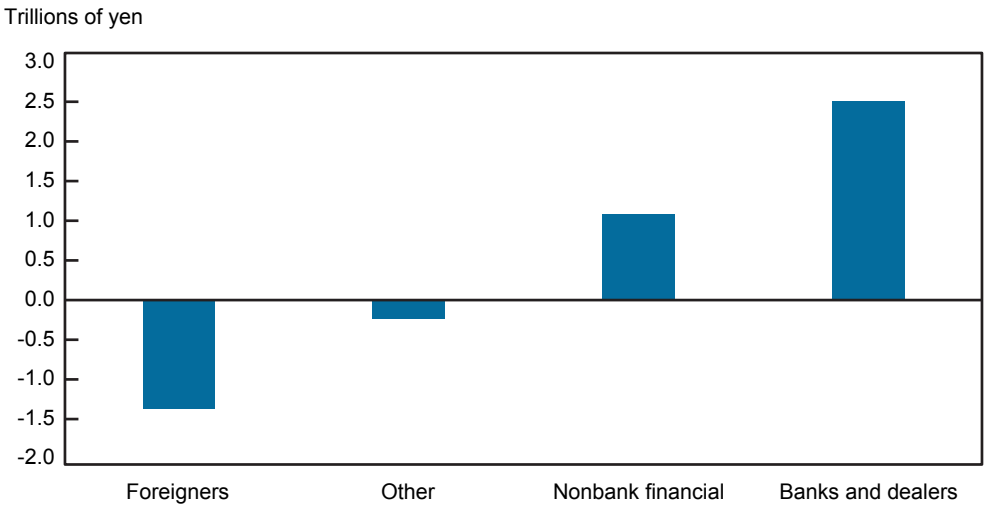
We start by documenting that the breadth and depth of selling pressures across investor types was more severe in U.S. Treasuries than in other major sovereign bond markets. We first consider the actions of foreign-reserve managers at central banks and then turn to private investors.

In general, central banks hold foreign reserves to help absorb external payment shocks, to contain currency volatility, and to bolster confidence in the country's ability to meet its external obligations. During the COVID-19 shock, some central banks liquidated their foreign currency reserves at a dramatic pace.[7] Key reasons for these sales were to contain currency depreciation pressures, to channel foreign exchange liquidity to domestic institutions, to offset revenue shortfalls from collapsing commodity prices, to cover maturing debt payments, and to build precautionary liquidity buffers.

While foreign central banks sold reserves denominated in all major currencies, sales of U.S. dollars dominated. Central banks sold roughly $170 billion in U.S dollar reserves, compared to around $25 billion in euro and less than $10 billion in yen assets over the first quarter of 2020, according to private-sector estimates.[8] These estimates imply that sales of U.S. dollar reserves accounted for more than 80 percent of total reserve sales. This skew toward U.S. dollars is far in excess of the U.S. dollar's share of foreign exchange reserves, which was 60.9 percent in February 2021.[9]

Available data also suggest that sales from private investors were more pronounced in U.S. Treasuries than in other sovereign bonds. Monthly data on investor transactions in and holdings of sovereign bonds are available for Japan and Italy. In both markets, the data show that bond selling pressures in March 2020 were dominated by foreign investors as domestic nonbank investors in Japan and Italy—including asset managers, insurers, and pension funds—appeared to either add to sovereign bond positions in March 2020 or remain roughly neutral (Charts 6 and 7).[10] In contrast, selling pressures in the U.S. Treasury market were broad-based. In addition to foreign investors, U.S. domestic mutual funds—whose share of marketable Treasury holdings had more than doubled since the global financial crisis—were significant net sellers of U.S. Treasuries in the first quarter of 2020 (Chart 8).[11]

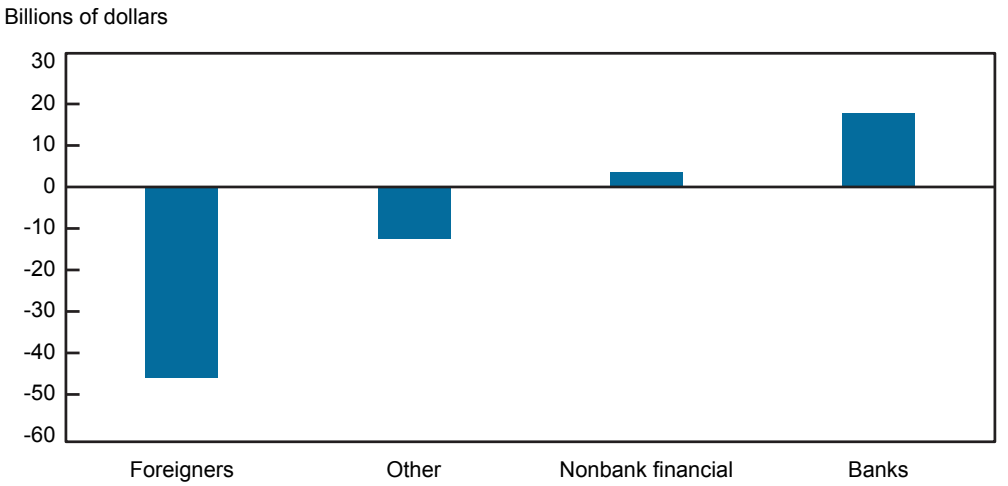
Chart 6
Net Purchases of Japanese Sovereign Bonds in March 2020



Source: Japan Securities Dealers Association (JSDA).

Notes: The chart shows the net purchases of Japanese sovereign bonds (JGBs) in the secondary market, excluding bills, by investor type in March 2020. Nonbank financial includes investment trusts and insurers.

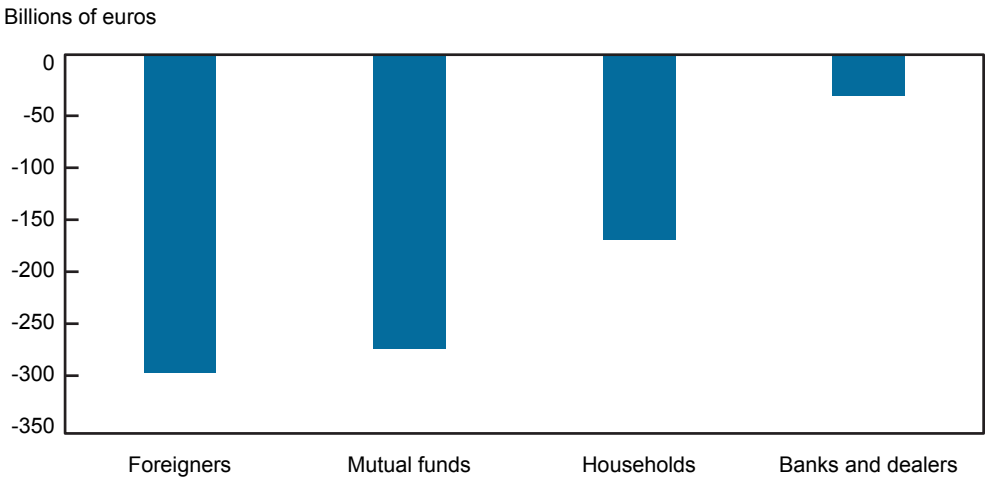
Chart 7
Aggregate Change in Italian Sovereign Bond Holdings in March 2020



Sources: Banca d'Italia; Haver Analytics.

Note: The chart shows the aggregate change in holdings of Italian sovereign bonds (BTP) by investor type in March 2020.

Chart 8
Net Purchases of U.S. Treasuries by Investor Type in the First Quarter of 2020



Source: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

Notes: The chart shows the net purchases of U.S. Treasuries by main investor type in the first quarter of 2020. The households investor type includes hedge funds.

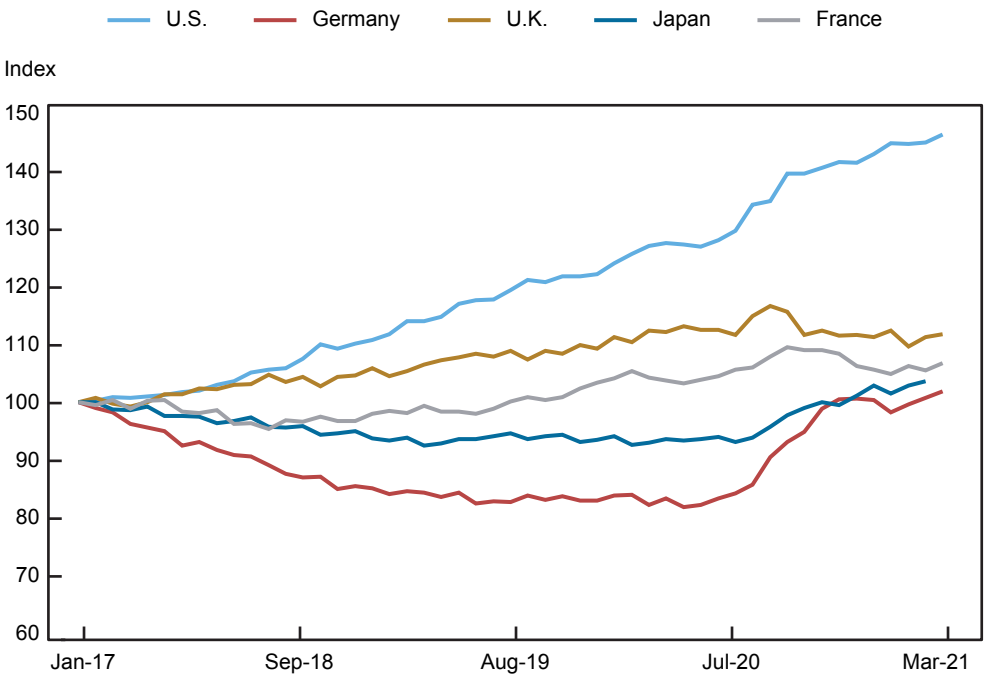
Meanwhile, banks in foreign jurisdictions played a much larger role in absorbing investor sales than banks in the U.S. Data from Japan and Italy show heavy net purchases from banks that helped offset foreign sales (Charts 6 and 7), whereas U.S. banks were modest net sellers of U.S. Treasuries in the first quarter of 2020 (Chart 8).[12]

Reports from foreign market participants largely corroborated these divergences, though patterns of sales were not uniform across foreign jurisdictions. Market participants in Japan downplayed the scale and impact of reserve manager sales in the Japanese government bond (JBG) market, noting that foreign investors were net buyers of medium-term JGBs, a sector in which foreign central banks tend to be most active. Instead, market participants highlighted that sales were concentrated in longer-dated JGBs and driven largely by foreign hedge funds and commodity trading advisors (CTAs). German market participants noted selling pressures from reserve managers and insurers and highlighted that other investors were net buyers.

2.2 Differences in Supply and Leverage

We also identify differences in supply as well as leverage dynamics leading up to the onset of the COVID-19 shock as factors driving the disproportionate disruptions in Treasury markets. From the start of 2017 to just before the March 2020 shock, U.S. Treasury securities outstanding, excluding holdings by the Federal Reserve, increased by more than 45 percent (upward of $3 trillion), while growth in other jurisdictions was either modest (U.K., France) or roughly flat (Germany, Japan) (Chart 9). These differences in sovereign bond supply to the private sector are important, since the large issuance of Treasury securities set the stage for the eventual amplification of Treasury strains through higher market leverage by financial institutions and more limited bank and dealer capacity to absorb investor sales, both of which we examine below.

Chart 9
Total Outstanding Sovereign Bonds by Country



Sources: Haver Analytics; European Central Bank; Federal Reserve Board, H.4.1 Statistical Release, "Factors Affecting Reserve Balances"; authors' calculations.

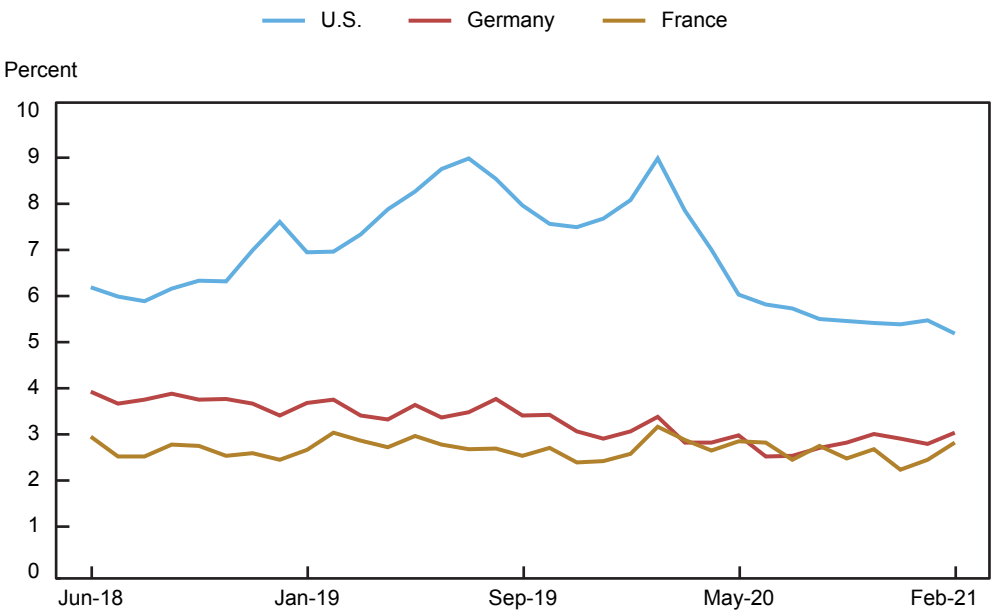
Notes: The chart shows a time series of the change in sovereign bonds outstanding measured in local currencies and excluding holdings by central banks. All amounts are indexed, with January 2017 set to 100.

Market leverage

Having a significant portion of highly leveraged investors active in a sovereign bond market can be problematic because in the face of large, unanticipated shocks, these levered investors often quickly delever by selling their securities. In the run-up to the COVID-19 shock, significantly more leverage underpinned the Treasury market than other sovereign bond markets. As a result, the shock generated substantially more selling pressure in the Treasury market from leveraged investors, augmenting the market dislocations described earlier.

The activity of levered funds usually cannot be directly observed in the data. However, because levered funds primarily use repurchases (repos) to raise cash to buy sovereign bonds, increases and decreases in market leverage can be indirectly observed by comparing repo volumes. Repo volumes for U.S., French, and German sovereign bond markets are illustrated in Chart 10, with volumes normalized by the total amount of outstanding government securities to allow for comparison across markets. The fact that normalized volume was highest for Treasuries is consistent with the idea that investors in Treasuries are more highly levered. Further, the measure increased for Treasuries up until the COVID-19 shock, whereas it declined for French and German sovereign bond markets. Finally, there was a marked decline in the share of repo volumes relative to outstanding government securities for U.S. Treasuries after the COVID-19 shock, consistent with rapid delevering by levered funds.

Chart 10
Repo Volumes as a Percentage of Total Outstanding

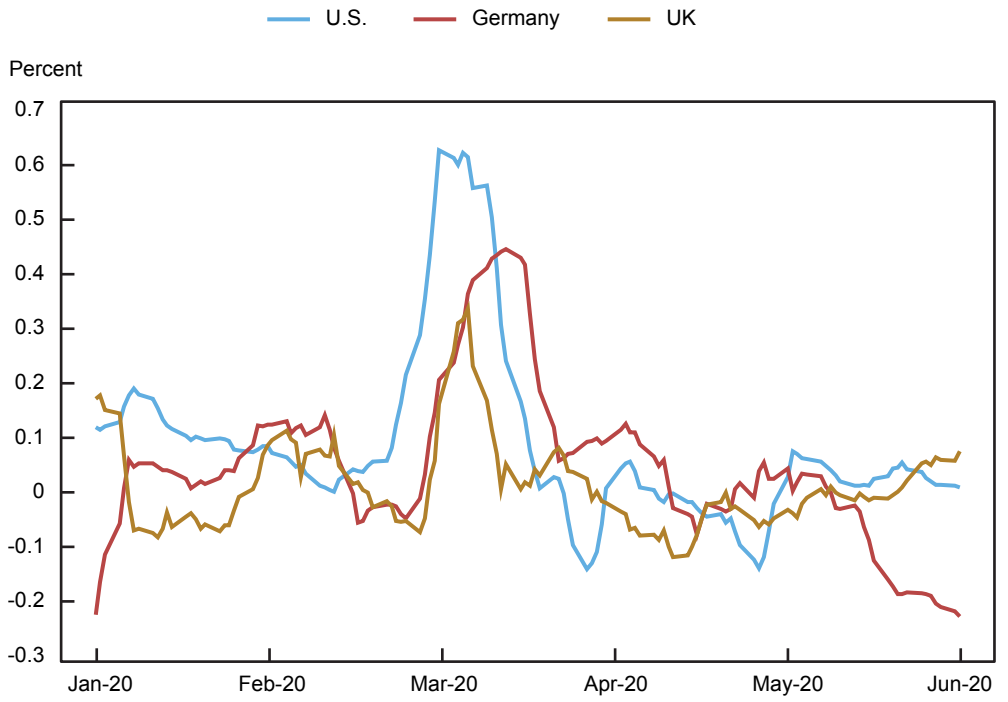


Sources: Bloomberg L.P.; CME Group, Repo-Funds Rates; Haver Analytics.

Notes: The chart shows the ratio of repo volumes involving a sovereign bond over the total amount outstanding of that sovereign bond. U.S., Germany, and France are Treasury, bund, and Obligations assimilables du Trésor (OAT) securities, respectively.

In our Treasury market outreach, participants corroborated this increase in leverage and attributed it to attractive relative value opportunities, especially in the cash-futures basis.[13,14] Following these market insights, we examine whether the outsized delevering and subsequent deterioration in the functioning of the Treasury market can be seen in disruptions in the implied rate of return of the cash-futures basis trade. In Chart 11, we compare the cash-futures basis across sovereign bond markets, noting that this return should be close to zero in the absence of frictions and shocks. The increase in this rate in March 2020 reflects the pronounced selling pressures in cash Treasuries, including deleveraging by relative value funds. In Appendix 2, we provide additional evidence of the increase in leverage in Treasury markets up until March 2020, followed by a rapid decrease. Similar points and evidence can also be found in the Inter-Agency Working Group on Treasury Market Surveillance (IAWG) Treasury Report (November 8, 2021), as well as in Schrimpf, Shin, and Sushko (2020), Barth and Kahn (2021), and Banegas, Monin, and Petrasek (2021).[15]

Chart 11
Return on the Cash-Futures Basis across Sovereign Bond Markets



Source: Bloomberg L.P.

Notes: The chart shows the return of the cash-futures basis across sovereign bond markets. For a given sovereign bond, this return is equal to the implied repo rate minus the three-month yield. The implied repo rate is calculated by Bloomberg from a combination of the first and second futures contracts. As the first contract nears its maturity date and open interest begins to materially decline, the calculation sources the implied rate from the second contract as it rolls to become the active contract. For the U.S. and Germany, the five-year Treasury and bund security yields are used, and for the U.K. the ten-year gilt security yield is used. Figures reflect a three-day moving average.

Feedback from foreign market participants corroborated that leveraged funds' participation in the cash-futures basis trade was not as large in other sovereign bond markets in the run-up to the crisis. For instance, the BOE's August Financial Stability Report indicated significantly lower participation of hedge funds in gilt cash-futures trades, though declining volumes of hedge fund gilt repos after March 2020 did point to some deleveraging. Likewise, Italian market participants noted that the Italian government bond cash-futures basis—which often spikes during shocks—faced limited pressure in March 2020.

Market participants acknowledged effects from unwinds of other levered trading strategies, though this deleveraging was not viewed as being as consequential as that in the United States. In Japan, while significant cash-futures basis positions were not accumulated prior to March, calendar spread trades—in which CTAs and hedge funds sell a Japanese sovereign bond future with a near-dated expiry and buy the same future with a longer-dated expiry—were negatively affected when the March-June calendar spread went deeply negative, according to market participants. In addition, some market participants familiar with the March 2020 episode in the Japanese sovereign bond market noted that an unwind of swap spread arbitrage trades contributed to strains in the functioning of that market.[16] The ECB's May Financial Stability Review also noted the impact of the deleveraging of volatility-targeting strategies, including risk parity funds, on the functioning of the European sovereign bond market in March, a dynamic that also affected U.S. Treasuries.

Bank and dealer activity

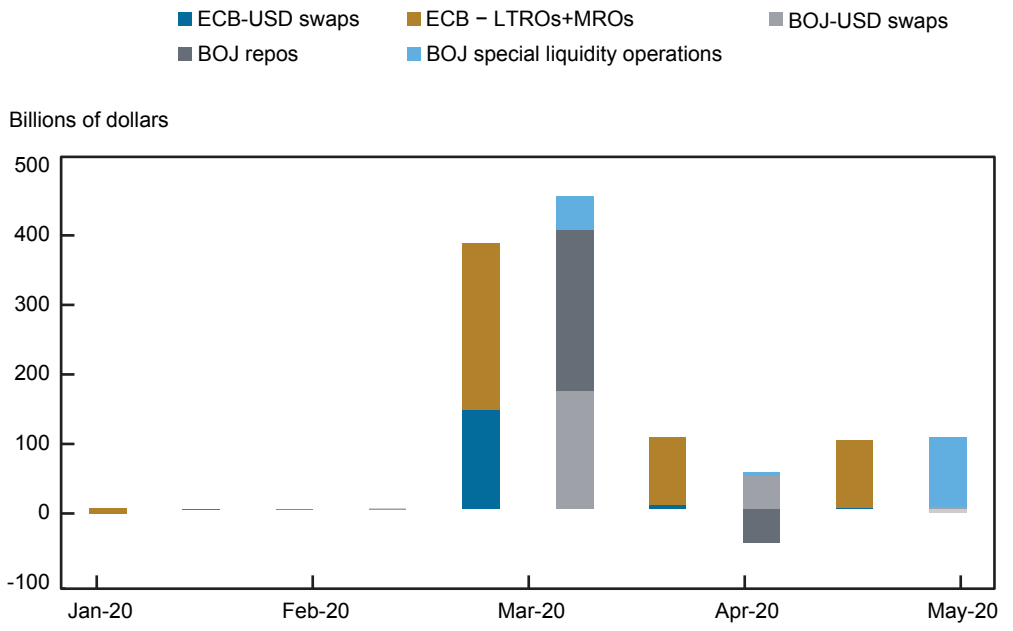
Relative to other jurisdictions, the heavier run-up in Treasury supply contributed to stronger growth in dealers' Treasury inventories ahead of the COVID-19 shock. Indeed, from 2017 to the eve of the crisis, dealer inventories of U.S. Treasuries tripled. Although dealer positions rose by an additional $40 billion in the first two weeks of March, it is possible that already elevated inventories helped limit further warehousing of securities and left dealers with less room to accommodate clients' selling pressures during the dash for cash.[17] In contrast, net positions of U.S. primary dealers rose by roughly $150 billion during the GFC.

Although data on other sovereign bond markets are more limited, available evidence points to stronger capacity or willingness among some foreign banking sectors to add to sovereign bond positions in March. In the U.K., for example, gilt dealers' net purchases (as a share of outstanding securities) during the first two weeks of the March shock were considerably larger than what was observed in the United States (Hall 2021). Moreover, banks in some other jurisdictions played a significantly bigger role in absorbing investor sales. For example, in March 2020 Japanese banks and dealers had 2.4 trillion yen of net purchases of Japanese sovereign bonds, and Italian banks and dealers increased Italian sovereign bond holdings by 18 billion euro.

The larger purchases by foreign banks in March may have also reflected the use of these sovereign bonds as collateral to obtain funding from central bank liquidity facilities. Japan market participants noted that banks used Japanese government bonds as collateral to obtain U.S. dollar liquidity through the BOJ's U.S. dollar swap line and other liquidity facilities (Chart 12).

Chart 12

Monthly Net Changes in Liquidity Provision by the European Central Bank and Bank of Japan



Sources: Bloomberg L.P.; Bank of Japan.

Notes: The chart shows the net amount of liquidity provided on an end-of-month over end-of-month basis by the European Central Bank (ECB) and the Bank of Japan (BOJ) from January to May 2020. ECB-USD swaps is the U.S. dollar swap line between the ECB and the Federal Reserve; ECB-LTROs+MROs is the ECB's long-term refinancing operations and main refinancing operations; BOJ-USD swaps is the U.S. dollar swap line between the BOJ and the Federal Reserve; BOJ repos are the BOJ's repo operations; BOJ special liquidity operations include the BOJ's Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus, Fund-Provisioning Measure to Stimulate Bank Lending, and Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth.

Market participants in Germany hypothesized that increased demand for German government bond ("bunds") collateral during the March shock may have been partly a byproduct of the ECB's long-term refinancing operations (see Chart 12). While the ECB accepts a broad range of collateral, the scale of the liquidity-providing operations may have caused some banks to exhaust their lower-quality collateral, leading to greater use of bunds. Participants also noted that some clearinghouses began to request higher-quality collateral, such as bunds and French sovereign bond securities ("OATs"), during the shock.[18]

2.3 Differences In Market Microstructure

Last, we explore whether the disproportionate effects of the COVID-19 shock on Treasury markets relative to other sovereign bond markets might be due to key differences in bond market structures. On the margin, some market participants noted that differences in market structure may have played a modest role, but in general, structural factors were not identified as major sources of differentiation in March 2020.

Market-maker obligations

A potential difference across sovereign bond markets could be the obligations of market makers to quote a bid and ask spread, especially during times of stress. Market participants, however, reported that these quoting obligations likely were not a major mitigant in March 2020. Market makers in all surveyed foreign jurisdictions except for Germany are subject to requirements—either by debt management offices or by electronic trading platforms—to support secondary market trading (Table 1). However, these obligations tend to have weak enforcement mechanisms, can change dynamically with trading conditions, and are typically averaged over monthly or longer windows, making them less stringent in periods of transitory stress.[19] Indeed, in at least one jurisdiction, participants noted that the benefits of being selected to manage a syndication can provide a stronger incentive to perform on market-making criteria than penalties for noncompliance.

Degree of central vs. bilateral clearing

Another difference across sovereign bond markets that could be related to the differences in market deterioration during the COVID-19 shock is the degree of central clearing compared with bilateral clearing.[20] Across all jurisdictions, for example, liquidity tended to be better in futures markets, which are centrally cleared, both during the March shock and more generally. According to the outreach, however, superior futures liquidity was viewed as largely due to the much smaller number of traded instruments—especially in the euro area, where the cash market is highly segmented—as well as the scarcity of cash securities in some jurisdictions.[21] Of note, Inoue (2020) provides evidence that price discovery takes place mainly in futures markets across U.K., French, German, Italian, and Japanese sovereign bond markets, whereas in the United States price discovery may be evenly split, with limited lags for price movements in cash and futures markets.

The degree of central clearing in cash and repo markets varies widely across jurisdictions. In the cash markets, the share of centrally cleared transactions ranges from roughly more than 80 percent in Japan to none in the U.K. (Table 2). In repo markets, the range is a bit narrower, with market participants in most jurisdictions estimating a share of somewhere between 25 and 75 percent. Of note, central clearing, where it exists across regions, is mandated by the exchange or brokerage platform, not by monetary or regulatory authorities. Nevertheless, market participants didn't highlight the divergent impacts on market functioning as stemming from these differences.

Table 1
Secondary Market Requirements for Market Makers

	Obligation from:		
Country	Trading Platform	Official Sector	Obligation
France	No	Yes	PDs must participate in auctions, place securities, and maintain a liquid secondary market. PDs ensure a consistent coverage of products issued by AFT by quoting firm bid and ask prices on a continuous basis. A 2 percent share of the secondary market is considered a reasonable minimum.
Germany	No	No	None
Italy	Yes	Yes	PDs must fulfill the quoting obligations set by MTS: full coverage of BTPs having at least forty-five days of residual maturity (each PD is assigned a subset of the outstanding securities). The Italian Treasury conducts an overall assessment of PDs' performance on an annual basis, with ongoing monitoring of individual performance (also on the repo market). Noncompliance can lead to a PD losing its status, and by meeting the requirements, PDs can access reserved reopenings of bond auctions and be selected to manage syndications.
Japan	No	Yes	Responsibility on the secondary market: The special participants shall provide sufficient liquidity to the JGB secondary market.
United Kingdom	No	Yes	GEMMs are "expected to make effective two-way prices . . . in order to provide continuous liquidity, and to achieve a minimum market share of at least 2.0 percent on a six-month rolling average basis."
United States	No	Yes	A prospective PD must demonstrate a substantial presence as a market maker in cash and repo operations for at least one year prior to application, maintaining at least a 0.25 percent share. PDs have a pro rata auction bidding requirement in the primary market.

Sources: Association for Financial Markets in Europe (AFME); Italian Ministry of the Economy and Finance; Ministry of Finance Japan (MoF); U.K. Debt Management Office (DMO); Federal Reserve Board.

Notes: PD is primary dealer and denotes a securities dealer with market maker status; AFT is Agence France Trésor; MTS is the main trading platform for Italian government bonds; BTP is Buoni del Tesoro Poliennali; JGB is Japanese government bond; GEMM is gilt-edged market maker.

Electronic vs. voice trading

Market participants noted varying degrees of electronic trading across jurisdictions; in particular, more trades were executed electronically in Germany, France, and Italy than in the U.K. and Japan (Table 2). However, market participants did not cite these differences as driving any meaningful differences in liquidity conditions in March despite the shift toward a work-from-home environment.

Table 2
Commentary on Features of Secondary Market Trading across Sovereign Bond Markets

	Central vs. Bilateral Clearing	Electronic vs. Voice
Germany	Almost all cash bunds are cleared bilaterally. Roughly 75 percent of repo is cleared bilaterally.	Platforms are more dominant than voice. More voice trading is typically seen during times of stress, but no change was observed in March 2020, possibly due to transition to work-from-home.
Italy	Almost all interdealer cash BTPs are centrally cleared (roughly 60 percent of total primary dealer activity). The majority of repos negotiated on the MTS market are centrally cleared.	Trading is mostly done on electronic platforms (roughly split 70-30 on platforms vs. OTC in 2020); OTC transactions are more common in the dealer-to-customer segment.
Japan	The vast majority (roughly over 80 percent) of cash JGB activity is via CCP (JSCC).a	The share of electronic trading is low, maybe over 10 percent, but has been increasing over time. Electronic trading is fragmented and used mainly by asset management firms and trust banks.
United Kingdom	No cash gilts are cleared centrally. Repo is mixed, with roughly 40 percent traded on CCPs.	Dealers intermediate about 90 percent of the cash market using both voice and electronic platforms. Less than 10 percent is electronic matching systems (as of 2016).
United States	Roughly 10 percent of Treasury cash transactions are centrally cleared, 70 percent are bilaterally cleared, and 20 percent involve hybrid clearing, in which one leg of a transaction on an IDB platform is centrally cleared and the other leg is bilaterally cleared (TMPG). Noncentrally cleared bilateral repo represents a significant portion of the Treasury market, roughly equal in size to centrally cleared repo trades.	Roughly 50 percent of cash trading volume occurs on high-speed electronic IDB venues, while dealer-to-customer trading accounts for the other half of activity and takes place across a mix of venues, including voice, electronic streaming, and RFQ protocols. Similarly, repo trading occurs across a similar mix of voice request for quote and IDB platforms.

Source: Federal Reserve Bank of New York Staff Outreach.

Notes: BTP is Buoni del Tesoro Poliennali; MTS is the main trading platform for Italian government bonds; OTC is over-the-counter; JGB is Japanese government bond; CCP is central counterparty; JSCC is the Japan Securities Clearing Corporation; IDB is interdealer broker; TMPG is Treasury Market Practices Group; RFQ is request-for-quote.

a This percentage shows the share of the JSCC in delivery versus payments (DVP) settlements of JGBs, calculated by dividing the total value of JGB DVP settlement in which the JSCC delivers or receives JGBs by the total value of JGB DVP settlement via the BOJ-NET, the Bank of Japan Financial Network System.

3. Discussion and Conclusion

The COVID-19-related shocks in early March 2020 induced a global dash for cash by investors. Although investors sold a wide variety of assets, among sovereign bond markets there was a disproportionate deterioration in the functioning of the market for U.S. Treasuries. Based on a review of the empirical evidence as well as discussions with market participants, we find that the greater decline in Treasury market functioning relative to that of other sovereign bond markets was mainly driven by more pronounced and broad-based selling pressures, reflecting in part the U.S. dollar's dominant currency status. Furthermore, we argue that a greater amount of Treasury issuance leading up to the COVID-19 March disruptions and a heavier buildup of leverage in this market were major factors in explaining the larger selloff pressures in Treasuries versus other sovereign bonds. Less important for the impact of the dash for cash were differences in the market microstructure of various sovereign bond markets at that time.

Questions remain about how well the Treasury market will absorb future selling pressures from a broad base of investors. A significant change in the Treasury market since March 2020 is the introduction of the Standing Repo and FIMA Repo Facilities by the Federal Reserve.[22] These liquidity facilities allow eligible counterparties to exchange Treasuries for cash at an administered rate. As a stable source of funding, the facilities could reduce uncertainty over the costs of holding inventories for dealers and so may help smooth market functioning during future adverse events.

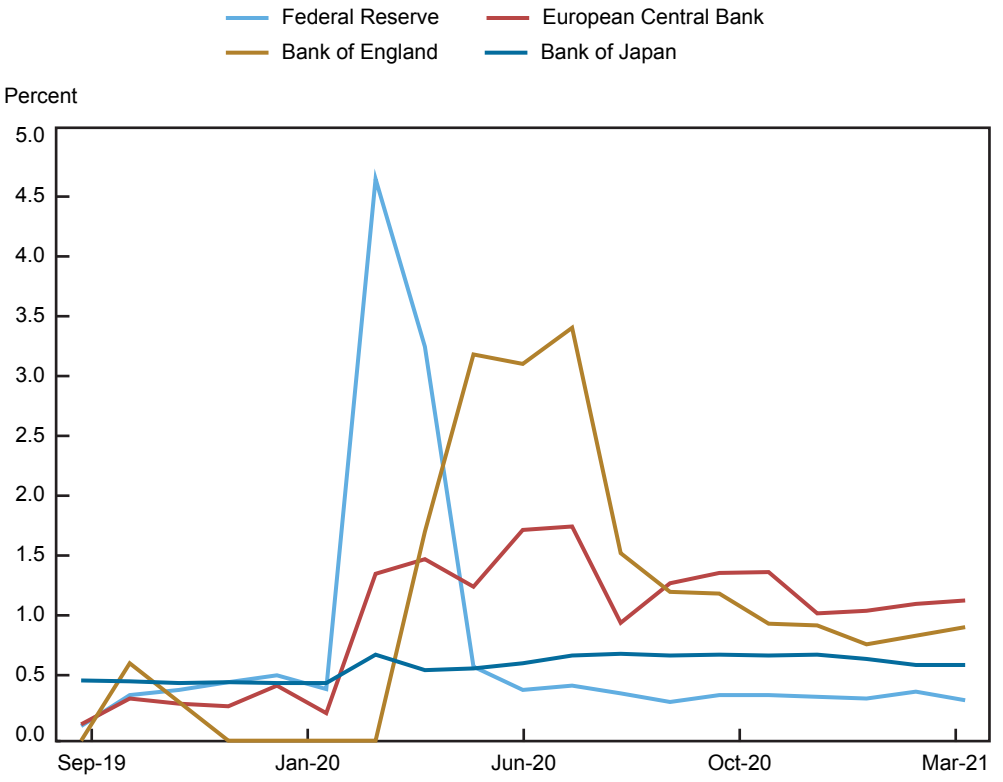
Furthermore, the Treasury market may undergo significant changes. The November 2021 IAWG report lays out specific policy areas where action could be taken to strengthen the resilience of the market. Building on this report as well as past efforts, in a recent speech, Gary Gensler, chair of the U.S. Securities and Exchange Commission (SEC), stated that his staff was looking into making recommendations to enhance Treasury market functioning, integrity, and resiliency. This effort includes evaluating whether principal trading firms that engage in purchasing and selling Treasuries should be registered as dealers with the SEC, whether oversight of trading platforms should be enhanced, whether the quality of data reporting can be improved, and whether central clearing should be expanded (Gensler 2021b).

Further, there are calls for reforms of money market funds, with the goal of mitigating systemic risk to the U.S. money markets (for example, see McCabe et al. [2013], McCabe, Cipriani, and Martin [2022], and Jin et al. [2022]). Indeed, the SEC recently proposed amendments to the rules that govern money market funds, to reduce the likelihood of runs on these funds during times of stress (see Securities and Exchange Commission [2021], as well as Gensler [2021c]). Finally, SEC staff have noted the recent significant growth in open-ended bond funds and their role in the Treasury market and, as a result, are exploring whether the resiliency of these funds during times of stress can be enhanced (Gensler 2021a).

Appendix 1: Additional Charts

Chart 1A

Central Bank Gross Monthly Purchases as Percentage of Outstanding



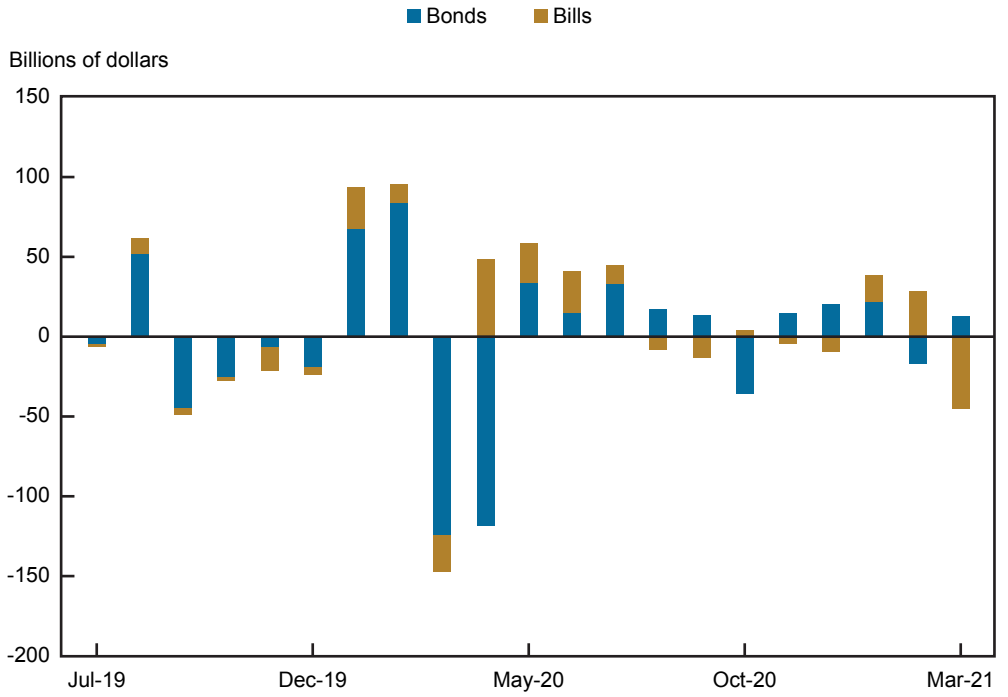
Sources: Bloomberg L.P.; European Central Bank; Bank of Japan; Federal Reserve Board; Bank of England.

Notes: The chart shows the central bank purchases of domestic sovereign bonds as a percentage of the total amount outstanding. Total amount outstanding is as of the end of 2019. ECB is European Central Bank, BOE is Bank of England, and BOJ is Bank of Japan. ECB purchases include the Public Sector Purchase Programme (PSPP) and public-sector purchases under the Pandemic Emergency Purchase Programme (PEPP).

Appendix 1 (Continued)

Chart 1B

Monthly Changes in U.S. Treasury Holdings of Foreign Official Institutions



Sources: U.S. Treasury Department, Treasury International Capital (TIC) System; Haver Analytics.

Note: The chart shows monthly changes in Treasury bond and bill holdings of foreign organizations.

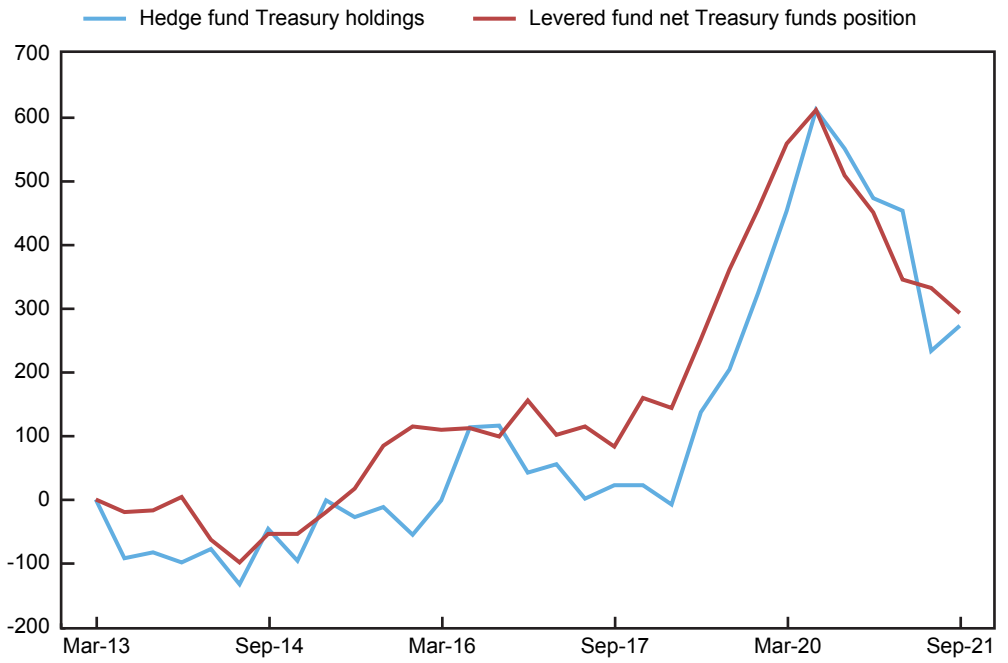
Appendix 2: Evidence of Leverage Activity in the Treasury Market

In this appendix, we look for direct evidence of the role of leveraged investors in the U.S. Treasury market by looking for evidence of hedge funds executing long cash-futures basis trades. This trading strategy typically entails a leveraged account shorting (or selling) a government bond future, buying the corresponding "cheapest-to-deliver" (CTD) cash security, and then delivering the cash security into the future at expiry.[23]

We observe that hedge funds executed this trading strategy more leading up to the COVID-19 shock, as evidenced by their increased holdings of cash Treasuries as well as larger net-short positions in Treasury futures (see Chart 2A). Both cash Treasury holdings and net-short Treasury futures positions then declined, consistent with hedge funds delevering and exiting the long cash-futures basis trade. This trading strategy appears to comprise the bulk of the rise and fall of Treasury leverage, evidenced by the similar size and timing of changes in both hedge funds' cash Treasury holdings and in their short-Treasury futures positions (Chart 2A).

Chart 2A

Evidence of Hedge Funds Engaging in the Treasury Cash-Futures Basis



Sources: Commodity Futures Trading Commission; Federal Reserve Board, Enhanced Financial Accounts; Bloomberg L.P.

Notes: The chart shows evidence of hedge funds engaging in the cash-futures basis strategy leading up to the March 2020 COVID-19 event. To implement the cash-futures basis trade, a levered fund increases both its Treasury holdings and its futures position.

Appendix 3: Description of Data Sources

This article uses publicly available data from a variety of sources. The table below lists the data sources used by chart.

Relevant Chart	Data Series	Source
1	Cumulative yield change for U.S., German, U.K., and Japanese ten-year sovereign bonds	Bloomberg L.P.
2	Three-month to ten-year swaption for the U.S. dollar, euro, British pound, and Japanese yen	Bloomberg L.P.
3 and 4	Spread between bid and ask yields for U.S., German, U.K., and Japanese ten-year sovereign bonds	Bloomberg L.P.
5	Average spline errors, or the average of security yield errors from a fitted curve generated by Bloomberg	Bloomberg L.P.
6	Foreign exchange reserves by currency	International Monetary Fund
6	International debt by currency	Bank for International Settlements
6	International loans by currency	Bank for International Settlements
6	Foreign exchange turnover by currency	Bank for International Settlements
6	Global payments by currency	SWIFT
7	Net purchases of Japanese sovereign bonds in the secondary market by investor type (excluding bills)	Japanese Securities Dealer Association
8	Change in holdings of Italian sovereign bonds by investor type	Haver Analytics
9	Net purchases of U.S. Treasuries by investor type	Federal Reserve Board
10 and 11	Sovereign bond holdings outstanding, excluding holdings by central banks, for the U.S., Germany, U.K., Japan, and France	Haver Analytics

Appendix 3 (Continued)

Relevant Chart	Data Series	Source
11	Total repo volumes involving U.S., German, and French sovereign bonds	CME Group, RepoFunds Rate; Bloomberg L.P.
12	Estimated return on the cash-futures basis for the U.S., German, and U.K. sovereign bonds markets	Bloomberg L.P.; staff calculations
13	Liquidity provided by the European Central Bank's Long Term Refinancing Operations and Main Refinancing Operations	European Central Bank; Bloomberg L.P.
13	Liquidity provided by the U.S. dollar swap line between the European Central Bank and the Federal Reserve	European Central Bank; Bloomberg L.P.
13	Liquidity provided by the U.S. dollar swap line between the Bank of Japan and the Federal Reserve	Bank of Japan
13	Liquidity provided by the Bank of Japan's Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus	Bank of Japan
13	Liquidity provided by the Bank of Japan's Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth	Bank of Japan
13	Liquidity provided by the Bank of Japan's Fund-Provisioning Measure to Stimulate Bank Lending	Bank of Japan
1A	Central bank purchases of domestic sovereign bonds, for the U.S., euro area, U.K., and Japan	Bloomberg L.P.
1B	Monthly changes in U.S. Treasury bond and bill holdings of foreign organizations	Haver Analytics
2A	Hedge fund Treasury holdings	Bloomberg L.P.
2A	Levered funds net treasury funds position	Bloomberg L.P.

Notes

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[1] Fleming et al. (2021) provide an analysis of this shift from flight to quality toward a demand for larger cash buffers in the United States.

[2] A burst of recent work has focused on analyzing Treasury market conditions during the COVID-19 shock, including Duffie (2020), Fleming and Ruele (2020), and Schrimpf, Shin, and Sushko (2020). Further, Haddad, Moreira, and Muir (2021) and Kargar et al. (2021) focus on how the COVID-19 shock affected the U.S. corporate bond market.

[3] Logan (2020b), Clarida, Duygan-Bump, and Scotti (2021), Fleming et al. (2021), and Vissing-Jorgensen (2021) detail the Federal Reserve's actions in the Treasury market in response to the COVID-19 shock. Hutchinson and Mee (2020) and Hernandez de Cos (2021) describe the European Central Bank's response to the COVID-19 shock, Kuroda (2020) details the Bank of Japan's response, and Tenreyro (2021) compares the Bank of England's and the Federal Reserve's responses to the COVID-19 shock.

[4] For details on the September 2019 disruption, see Afonso et al. (2021).

[5] The z-scores are computed from a ten-day moving average of end-of-day bid-ask yield spreads from January 2017 to January 2019.

[6] Bloomberg L. P. publishes the time series of differences between actual yields and investors' expectations of the fair value yield for various sovereign bond markets. These differences, which are produced and published by Bloomberg, are the average spline errors, or the average of security yield errors, from a fitted curve.

[7] See Weiss (2021) for more details on how reserve managers handled their Treasury holdings in response to the COVID-19 shock.

[8] Despite central banks selling a substantial amount of U.S. dollar reserves, in the International Monetary Fund's (IMF) Official Foreign Exchange Reserves data the U.S. dollar share of global reserves edged higher in the first quarter of 2020. This increase, however, was driven entirely by large U.S. dollar and U.S. Treasury valuation gains. In Chart 1B in the appendix, we show that foreign official institutions decreased their holdings of U.S. Treasuries by roughly $150 billion in March 2020.

[9] Foreign exchange reserve data are published by the IMF. Euros and yen are typically the second- and third-largest currencies held in foreign exchange reserves, and in February 2021, their shares of total foreign exchange reserves were 20.5 percent and 5.7 percent, respectively.

[10] According to the Bank of Italy's November 2020 Financial Stability Report, foreign asset managers and hedge funds were particularly large sources of selling pressures.

[11] A main reason for mutual fund sales of Treasuries was to raise cash to meet investor redemptions and rebalance portfolios (Logan 2020a; Ma, Xiao, and Zheng 2020).

[12] Dealer net positions rose sharply in the first part of March 2020, absorbing client sales, but declined sharply by the end of March as the Federal Reserve commenced large-scale purchases.

[13] Market participants attributed the increase in the attractiveness of the cash-futures basis to the aforementioned steep increase in Treasury supply, real money demand for long-Treasury futures exposure, and favorable financing conditions, including generally subdued Treasury and repo volatility and low levels of margins and repo haircuts. A haircut is the ratio of the market value of the securities delivered in a repo over the value of cash received.

[14] The cash-futures basis is an arbitrage strategy that exploits differences between prices in a sovereign bond's secondary and futures markets.

[15] The IAWG Treasury Report can be found at https://home.treasury.gov/system/files/136/IAWG-Treasury-Report.pdf.

Notes (Continued)

[16] Leveraged swap spread trades exploit differences in the pricing of cash bonds and interest rate swaps. When swap spreads are negative (cash bonds trading cheap in comparison to swaps), relative value funds may initiate a long spread position by paying a fixed rate in swaps while assuming a repo-funded long cash bond position of comparable maturity.

[17] There were other factors that constrained dealer intermediation. Bank holding companies typically seek to optimize allocations across a number of constraints, including risk management, client needs, and franchise value, and regulatory considerations, such as capital or liquidity requirements. Bank dealers noted that, during the COVID-19 March 2020 event, an interplay of internally imposed constraints (such as profitability and risk tolerance), external factors (such as a lack of efficient hedging options), and regulatory considerations created frictions for dealers that reduced willingness to intermediate markets.

[18] Pelizzon, Schneider, and Moench (2021) also note that there was an increase in demand for German and French sovereign bonds during the COVID-19 shock.

[19] Italian rate traders noted that in the pre-GFC period, MTS (the main trading platform for Italian government bonds) imposed a quantitative limit on bid-ask spreads, but over the course of multiple crises, they had to soften the requirement and now only require a "best effort" while maintaining a ranking. The more stringent requirement is now from the Italian Treasury.

[20] Duffie (2020) reviews how the secondary market for Treasuries performed during the COVID-19 March 2020 shock and argues that mandatory central clearing will significantly improve market functioning during times of crisis.

[21] An exception was Italy, where BTP traders noted that in normal times, the centrally cleared interdealer cash market was more liquid than the futures market, though these roles reversed in times of stress.

[22] Ennis and Huther (2021) provide a brief description of the Standing Repo Facility and how the facility complements existing tools used by the Federal Reserve. Logan (2021) describes how both the Standing Repo Facility and the FIMA Repo Facility fit into and enhance the Federal Reserve's ability to implement monetary policy, particularly during times of stress.

[23] "The cheapest-to-deliver" cash security is the cash bond with the lowest residual maturity that is eligible to be delivered at the expiry of a futures contract at a given tenor. For example, for a ten-year futures contract, the securities that usually have the lowest value and are still eligible for delivery at the expiry of the contract will be off-the-run securities with approximately seven years of residual maturity.

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