**Term Spreads and the COVID-19 Pandemic: Evidence from International Sovereign Bond Markets \***

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**Abstract**

We explore the impact of the COVID-19 pandemic on the term structure of interest rates. Using data from developed and emerging countries, we demonstrate that the expansion of the disease significantly affects sovereign bond markets. The growth of confirmed cases significantly widens the term spreads of government bonds. The effect is independent of government policy and monetary responses to COVID-19 and robust to many considerations.

*Keywords*: COVID-19 pandemic, coronavirus, policy responses, government bonds, sovereign bond, term spread, term structure, interest rates.

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**1. Introduction**

The recent COVID-19 pandemic wreaked havoc on global financial markets (Baker et al. 2020a). While its influence on equities, commodities, or cryptocurrencies has been thoroughly scrutinized, government bond markets' response is an unchartered land—a mission we wish to rectify. He et al. (2020), who examine U.S. Treasuries, Arellano et al. (2020), Gubareva (2020), and Sène et al. (2020), who focus on emerging market bonds, Hartley and Rebucci (2020), who examine the impact of the post-pandemic quantitative easing in 21 bond markets, and Zaremba et al. (2020), who find that more stringent government responses are conducive to lower sovereign bond volatility, are exceptions. Joining this line of very scarce studies, we are the first to investigate the effect of COVID-19 on government bond term spread (henceforth, spread) around the world.

The bond yield curve reflects the expectations about the future path of short-run rates (Namely*,* the "Expectations Hypothesis") and perceived future risk contained in the risk premia. The link between term spread and uncertainty is also embedded in the Keynesian liquidity preference theory, dating back to Keynes (1936). High levels of uncertainty may induce growing demand for speculative and precautionary cash holdings since liquidity provides a safety cushion and allows to react quickly to unforeseen market developments. Empirical evidence lends support to the links between bond spreads, economic uncertainty, and global and local shocks (Beber et al. 2009; Sgherri and Zoli 2009; Augustin 2018). In consequence, the spread also contains information about expectations of future economic conditions, including output and growth (Ang et al., 2006; Favero et al., 2012; Rudebusch and Wu 2008).

The term spread/COVID-19 nexus can manifest through several channels. First, enormous economic costs of COVID-19 may impair a country's financial position, which translates into higher default risk (Arellano et al. 2020). This COVID-inflated economic uncertainty (Baker et al. 2020b; Altig et al. 2020) may steepen the curve. Thus, in the sovereign bond market, investors may require a higher risk premium on investment in the bonds of affected countries or overreact to pandemic-related news (Sène et al. 2020). Second, the liquidity risk channel implies that bond market investors may rebalance their fixed income portfolio by increasing exposure to more liquid shorter-term Treasury securities (Vissing-Jorgensen and Krishnamurthy 2011). Specifically, the buying pressure may drive down the yields on short-term securities (Push 2012). The same argument may lead to liquidity-induced sales of long-term Treasury securities, raising the yields on long-term bonds. The ensuing rise in the relative supply of longer-term government bonds can amplify the spread. Third, according to the preferred habitat/duration risk channel (Vayanos and Vila 2021), a decrease in the short rate should trigger purchases of longer-term securities by arbitrageurs, which translates into higher prices, hence lower yields and term premia on these securities. However, due to short-selling restrictions or a credit crunch in the market for short-term loanable funds, the moderating term premium effects of the duration risk channel can be limited. Fourth, if bond market investors anticipate an unconventional monetary expansion in response to the COVID-19-induced business-cycle recession, they may revise up their inflationary expectations. They will be willing to invest in longer-term Treasury securities only if their yields are sufficiently high.

 To sum up, these channels predict that the spread, which reflects the composite premium of multidimensional risk (default, duration, liquidity and inflation) in bond markets, increases in response to COVID-19 growth.

However, from a behavioral perspective, the spread may remain unchanged or even decrease. Specifically, waves of pessimism in financial markets amid COVID-19 growth can trigger the so-called "flight to safety" phenomenon, when government bonds are regarded as the only safe investment vehicle (Ben-Rephael 2017). This may potentially lead to a higher demand for bonds of all maturities —as opposed to riskier asset classes—and, hence, lower or unchanged spreads on the broad cross-section of bonds, effectively flattening the curve. However, investors may be reluctant to trade due to other behavioral motives such as: a) the "ostrich effect" (Galai and Sade 2006; Karlsson et al. 2009), b) the "information overload" effect (Agnew and Szykman 2005), or c) merely bad experience (Thaler and Johnson 1990). As a result, the spread can remain unchanged. Likewise, it can remain unchanged due to fundamental reasons. For instance, if investors anticipate that the reserve channel commands the term structure effects of COVID-19 infections and sovereign bond prices (see, e.g., Christensen and Krogstrup 2018), the term premium can increase, decrease or remain constant. This is because an increase in the supply of central bank reserves may put an upward pressure on asset prices across a broad spectrum of maturities.

Furthermore, if bond market investors expect an aggressive monetary policy expansion in response to the COVID-19-induced business-cycle recession, the term premium on Treasury securities might decline through at least two channels. First, long yields and hence term premia should decrease, in agreement with the signalling channel, according to which large-scale asset purchases affect medium- and long-term rates by signalling low future monetary policy rates (Christensen and Rudebush 2012, Bauer and Rudebusch 2014). Second, the portfolio balance channel (see, e.g., Christensen and Krogstrup 2018) – which arises from the reduction in the relative supply of the assets purchased – implies that large-scale asset purchases will translate into higher prices of the assets purchased, and, subsequently, a lower cost of funding for the sovereign borrower.

The importance of the term structure of government bonds cannot be overestimated. Practitioners closely follow and use it as an economic barometer by policy-makers. It has predictive powers of economic activity and asset returns (Campbell 1987; Wheelock and Wohar 2009). Hence, understanding the spread/COVID-19 nexus is of essential importance.

To evaluate the impact of COVID-19 on spreads, we examine data from 30 developed and emerging markets from January to September 2020 employing panel regressions. We provide evidence that COVID-19 significantly affects the spreads. Growth in the number of infections induces an increase in the spread. The effect is independent of policy interventions or monetary measures and is robust to a broad range of model specifications.

The remainder proceeds as follows. Section 2 presents data and methods. Section 3 summarizes the results. Finally, Section 4 concludes.

**2. Data and Methods**

We examine data from 30 developed and emerging markets (Table A1, Online Appendix). The COVID-19 study period runs from January 1, 2020, to September 12, 2020. We retrieved data from Datastream, Federal Reserve Bank of St. Louis[[1]](#footnote-1), and the Oxford COVID-19 Government Response Tracker[[2]](#footnote-2) (Table A2, Online Appendix).

Our primary dependent variable is the term spread, *TERM*, calculated as the 10-year government bond yield minus the three-month rate. Sovereign bonds of 10-year maturity are typically most liquid with the broadest international coverage and are commonly used in the asset pricing literature (e.g., Baltussen et al. 2020; Ilmanen et al. 2019). The yields are calculated based on Datastream 10-Year Government Bond Total Returns. Furthermore, following Martens et al. (2019), we represent the short-term rate by a three-month interbank rate. Given borrowing restrictions and availability limitations, interbank rates are more relevant from a practical perspective than analogous Treasury bill rates.

To explore the role of COVID-19 on spreads, we run the following panel data regression:

 $TERM\_{i,t}=α+γ\_{ΔCC}ΔCC\_{i,t}+\sum\_{c=1}^{C}γ\_{c}K\_{c,i,t}+ε\_{i,t}$, (1)

where *TERM,i,t* denotes the spread in country *i* on day *t*, *α,* $γ\_{ΔCC}$, and *γc* are estimated coefficients, and $ε\_{i,t}=u\_{i}+v\_{i,t}$ is the composite random disturbance term, which consists of two components, the unobserved country-specific effect, $u\_{i}$, and the idiosyncratic shock term, $v\_{i,t}$. *ΔCCi,t* is our main predictor, i.e., the change in the number of COVID-19 infections. Our choice of the number of cases (over COVID-19 deaths) is informed by Ashraf (2020). However, our findings are robust to the inclusion of fatalities. *Kc,i,t* represents the set of control variables: quantified sovereign rating score (*CRED*), adjusted duration of the index portfolio (*DUR*), its convexity (*CX*), and market value (*MV*) in U.S. dollars. Furthermore, to disentangle the effects of government interventions from COVID-19 itself, we incorporate also both the broad Government Response Index(*GVT*) by Hale et al. (2020), as well as its components, which reflect containment, closure, and health policies (Containment and Health Index, *CTNT*) and economic support interventions (Economic Response Index, *ECON*).[[3]](#footnote-3) Additionally, following Hilscher and Nosbusch (2010), we include a set of global variables that influence sovereign bond markets: CBOE Volatility Index (*VIX*), default spread (the yield difference of Baa and Aaa-rated corporate bonds, *DEF*), TED spread (the difference between the three-month U.S. LIBOR rate and the three-month T-Bill rate, *TED*), and the U.S. 10-year government bond yield (*YLD*).

 The year 2020 witnessed an unprecedented scale of unconventional monetary policy measures implemented by central banks worldwide. These measures sought i) to provide liquidity to the market, and ii) to ensure financial stability during the extraordinary circumstances. Whereas the consequences of these actions are already partly reflected in the local short-term rates and should rather lead to flattening than steepening of the yield curve, we introduce an additional control variable to account for the role of monetary policy.

Our principal monetary policy measure entails the relative rate of change in the central bank balance sheet total assets (*CBTA*). Arguably, changes in total assets can measure the stance of both conventional (e.g., open market operations) and unconventional monetary policy (e.g., quantitative easing), the latter can be regarded as a more effective policy measure during the COVID-19-induced business cycle recession, when the former is exhausted by the central bank, as short-term rates hit the zero-lower bound and can cause a liquidity trap, a deflationary spiral and thus can limit the central bank's capacity to stimulate the economy and financial markets. The data on the central bank total assets are obtained from Bloomberg, which sourced them directly from local central banks and the International Monetary Fund (IMF). Since the data are recorded on a weekly or monthly basis, we use interpolation to transform into daily data. Specifically, we employ linear, forward, cubic, spline, piecewise cubic Hermite, inverse distance weighted, and nearest neighbor interpolation methods. The use of a range of different interpolation techniques assures the robustness of our research findings. In Table 1, we only provide the coefficient estimates of *CBTA*, obtained by means of linear interpolation. The results obtained with the other interpolation methods, which are available from the authors upon request, remain are qualitatively similar.

Finally, we also include weekday dummies to control for seasonality (Barth and Bennett 1975). Tables A2 and A3 display data information and statistical properties, respectively.

Following the Hausman tests, we employ the random-effects method. For robustness, we consider several alternative specifications, which are summarized at the end of Section 3.

**3. Results**

Results are summarized in Table 1. We find that COVID-19 infections exert a positive and significant effect on *TERM*. This effect remains robust to the model specifications that comprise the primary (1) or extended (2) set of bond-related variables, the global business cycle stance (3-4), or weekday seasonality effects (5).

*[Insert Table 1 here]*

Notably, the effect of COVID-19 is not subsumed by the impact of government interventions. The policy responses, measured either as a comprehensive government response index (4-5) or by its components (containment and closer or economic stimuli, 6), do not appear to influence *TERM* significantly. Thus, any variation of *TERM* results from the pandemic itself and not from the government policy responses.

Along similar lines, the role of unconventional monetary policies, measured with the relative rate of change in central bank balance sheets (7-8) also does not appear to alter the overall positive effect of changes in COVID-19 infections on the term premium on investment in Treasury securities. The *ΔCC* coefficient remains positive and significant. Interestingly, the inclusion of the monetary variables in specifications (7)-(8) yields at least two additional insights. First, the swelling of central bank balance sheets (*CBTA*) helps to shrink the term spread. This finding is broadly consistent across the seven interpolation techniques and is intuitive, as quantitative easing and purchases of long-run bonds exert downward pressure on yields, effectively flattening the yield curve in the sovereign bond market. This finding agrees with the composite premium of multidimensional risk.

Second, controlling for central bank policies also reveals the soothing effect of government economic policies. This may be interpreted as a stabilizing impact of the economic interventions that alleviate the concerns about the economy's future state.

Our findings are validated by several robustness checks. First, we incorporate the difference in deaths instead of infections. Second, we experiment with bond maturities ranging from 2 to 30 years. Third, we employ fixed effects and pooled OLS as alternative estimation methods. None of these robustness checks qualitatively affects our overall conclusions. For brevity, we do not report the results, which are available upon request.

**4. Concluding Remarks**

We study the impact of COVID-19 on the sovereign bond yield spreads around the world. We demonstrate that the change in the number of infections widens the spread. Moreover, the government responses to COVID-19 do not materially influence the spreads.

Our conclusions are consistent with the composite premium of multidimensional risk, which implies that the term premium should increase in response to changes in the reported COVID-19 infections through higher perceived levels of the risk and uncertainty of investments in the sovereign bond market. The balance of demand and supply forces leads to an increase of the term spread, which makes the yield curve steeper. Furthermore, our findings do not lend support to the behavioural perspective, which predicts a negative effect term premium effect of COVID-19 infections. We also find that an increase in the relative rate of change in the central bank balance sheet total assets exerts a negative effect on the term spread.

Our findings matter for fixed-income investors with an international mandate. Specifically, we provide insights into risks and opportunities arising from COVID-19. Also, our results bear policy implications. Policy-makers should undertake stringent actions to curb the spread of the disease. While these actions do not generally affect the spreads, an uncontrolled pandemic may translate into higher debt financing costs.

Future studies on the topics discussed could be extended to new developments affecting the global pandemic and potentially the bond market. Consideration of the emergence of the vaccines, new coronavirus strains, novel policies, and fresher data could provide further valuable insights.

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**Table 1.** *COVID-19 and Term Spreads: Panel Regression Results*

The table summarizes panel data regressions. The dependent variable is the spread (*TERM*), and the explanatory variables are: change in the number of COVID-19 infections (*ΔCC*), duration (*DUR*), sovereign rating (*CRED*), convexity (*CX*), market value (*MV*), VIX volatility index (*VIX*), U.S. default spread (*DEF*), TED spread (*TED*), the yield on U.S. government bonds (*YLD*), Government Response, Economic Support, and Containment and Health indexes (*GVT, ECON, CTNT*), relative rate of change in central bank total assets (*CBTA*), and weekday dummies. We use linear interpolation to obtain daily observations of the central bank total assets. Results obtained with other interpolation methods are not reported by are available from the authors upon request. *R2* is the adjusted coefficient of determination. The regressions are run using random-effects models. Coefficient standard errors (in parentheses) are robust to autocorrelation and heteroscedasticity. The asterisks \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. #Countries and #Obs. indicate the total number of countries and country-day observations available in a given specification. The coefficients for *ΔINF* and *MV* are multiplied by 100,000 and one billion, respectively. The study period is from 01/01/2020 to 12/09/2020. The research sample comprises 30 countries. The specifications (7) and (8) exclude Czechia and New Zealand due to data limitations.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ΔCC | 0.699\*\*\* | 0.688\*\*\* | 0.437\*\* | 0.394\*\* | 0.402\*\* | 0.376\*\* | 0.423\*\* | 0.403\*\* |
|  | *(0.114)* | *(0.132)* | *(0.197)* | *(0.196)* | *(0.196)* | *(0.188)* | *(0.199)* | *(0.187)* |
| DUR | 0.060 | -0.454 | 0.076 | 0.083 | 0.070 | 0.047 | 0.115 | 0.066 |
|  | *(0.098)* | *(0.930)* | *(0.679)* | *(0.687)* | *(0.692)* | *(0.665)* | *(0.720)* | *(0.693)* |
| CRED | 0.226\*\*\* | 0.237\*\*\* | 0.222\*\*\* | 0.221\*\*\* | 0.221\*\*\* | 0.221\*\*\* | 0.208\*\*\* | 0.207\*\*\* |
|  | *(0.047)* | *(0.059)* | *(0.054)* | *(0.054)* | *(0.054)* | *(0.054)* | *(0.007)* | *(0.005)* |
| CX |  | 0.029 | -0.001 | -0.002 | -0.001 | 0.000 | -0.039 | -0.037 |
|  |  | *(0.051)* | *(0.037)* | *(0.037)* | *(0.038)* | *(0.036)* | *(0.051)* | *(0.050)* |
| MV |  | 0.984 | -3.470 | -3.520 | -3.500 | -3.220 | -3.680 | -3.250 |
|  |  | *(1.580)* | *(2.570)* | *(2.590)* | *(2.590)* | *(2.600)* | *(2.550)* | *(2.580)* |
| VIX |  |  | -0.002 | -0.002 | -0.002 | -0.003 | 0.001 | -0.001 |
|  |  |  | *(0.000)* | *(0.002)* | *(0.003)* | *(0.003)* | *(0.002)* | *(0.002)* |
| DEF |  |  | 0.083 | 0.005 | 0.008 | 0.006 | 0.017 | 0.012 |
|  |  |  | *(0.000)* | *(0.070)* | *(0.133)* | *(0.134)* | *(0.136)* | *(0.137)* |
| TED |  |  | 0.075 | 0.072 | 0.072 | 0.071 | 0.068 | 0.068 |
|  |  |  | *(0.000)* | *(0.079)* | *(0.081)* | *(0.082)* | *(0.081)* | *(0.087)* |
| USD |  |  | -0.311\*\* | -0.186 | -0.189 | -0.229 | -0.140 | -0.198 |
|  |  |  | *(0.000)* | *(0.133)* | *(0.238)* | *(0.239)* | *(0.234)* | *(0.250)* |
| GVT |  |  |  | 0.003 | 0.003 |  | 0.003 |  |
|  |  |  |  | *(0.000)* | *(0.003)* |  | *(0.000)* |  |
| CTNT |  |  |  |  |  | 0.004 |  | 0.004 |
|  |  |  |  |  |  | *(0.000)* |  | *(0.000)* |
| ECO |  |  |  |  |  | -0.001 |  | -0.002\* |
|  |  |  |  |  |  | *(0.001)* |  | *(0.000)* |
| CBTA |  |  |  |  |  |  | -13.710\*\* | -13.070\*\* |
|  |  |  |  |  |  |  | *(0.000)* | *(5.819)* |
| Weekday dummies | No | No | No | No | Yes | No | Yes | Yes |
| # Obs. | 5,490 | 5,490 | 5,490 | 5,490 | 5,490 | 5,490 | 5,124 | 5,124 |
| #Countries | 30 | 30 | 30 | 30 | 30 | 30 | 28 | 28 |
| R2 | 0.496 | 0.461 | 0.523 | 0.521 | 0.520 | 0.532 | 0.550 | 0.566 |

1. Https://fred.stlouisfed.org/. [↑](#footnote-ref-1)
2. Https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker. [↑](#footnote-ref-2)
3. We also control for changes (rather than levels) in the policy response indices; this modification has no visible effect on our conclusions. [↑](#footnote-ref-3)