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Was Illinois Debt Disproportionately Penalized by the Market During the COVID-19 Pandemic?

University of Illinois System

INSTITUTE OF GOVERNMENT AND PUBLIC AFFAIRS

Task Force on the Impact of the COVID-19 Pandemic

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BACKGROUND

For many, their perception of the world changed dramatically in March 2020. On March 13, President Donald Trump signed Proclamation 9994, declaring a national emergency because of the coronavirus and associated COVID-19 illness.[1] There were just over 500 cases reported that day nationwide, with only a handful in Illinois. Just two weeks later, the nation was experiencing more than 17,000 cases per day, with Illinois accounting for about 500 of those cases.[2]

Naturally, there was much uncertainty and panic during the early days of the pandemic about the finances of state and local governments. The question we ask in this paper is whether Illinois bond issuers paid a relatively higher price for its perceived precarious fiscal position entering the COVID-19-induced economic downturn.

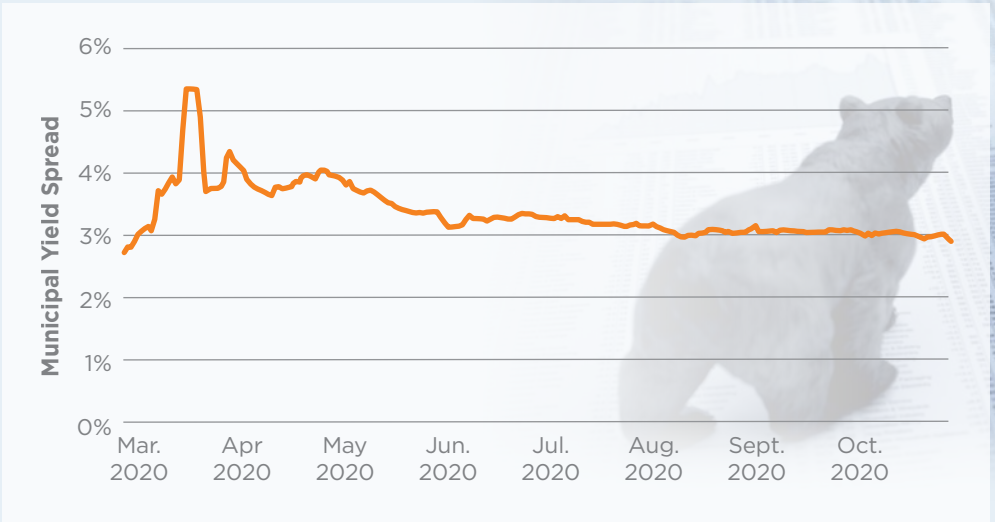
With such a sudden and dramatic effect on relative risky bond yields, it would not be surprising if there were differential effects on bonds of different rating categories. As we will see in the literature review, there is precedent for this belief. Lower-rated bond issuers, like the state of Illinois and some other state and local governments, tend to suffer more during uncertain times. Yields rise, essentially penalizing issuers in states with poor economic and financial conditions. This happens not just with statewide issuers, but municipal issuers within that state. This creates a "negative externality" for municipal governments. We will try to measure the extent to which this happened during the early stage of the pandemic.

Among the many effects of the virus, financial markets experienced a significant degree of turmoil during the early weeks of the pandemic. The chaos started earlier than the official proclamation. On Feb. 19, the Standard & Poor's 500 index, a broad measure of stock market investments, reached a pre-pandemic peak. Nine days later, the index had lost 12.8% of its value. The market rebounded briefly, then plunged again. By March 20, just one month after the peak, the index had dropped 31.8%. The effects in the bond market, the subject of this paper, were equally as dramatic. On Feb. 19, the yield on the 30-year U.S. Treasury bond stood at 2.02%. As market participants fled risk-exposed assets and bought safe assets such as T-bonds, yields plunged. This is sometimes referred to as the "flight to quality" effect. The yield on the 30-year Treasury bond briefly fell below 1% on March 9.[3] The "spreads" on bonds in other markets (the difference between yields in a given market and Treasury securities), including the corporate bond market and the municipal bond, widened dramatically during this period.

By early April, broad speculation had taken hold about how long the economy might be exposed to COVID-19-related risk, and models began to be produced of the effects on the economy. The issue with these models was what could be called an extreme level of uncertainty. In one paper, used in an earlier report[4] from IGPA's Task Force on the Impact of the COVID-19 Pandemic, the estimates ranged from a drop in GDP for 2020 of 1¾% to 8%.[5] The range of qualitative effects would be tremendous, from a relatively mild recession to a devastating fall in output and employment.

Estimates of state revenue losses were in the range of $42 billion in the second quarter of 2020 and $160 billion from the third quarter of 2020 through the second quarter of 2021.[6] The Cleveland Fed estimated the decline in Illinois state revenues to be around $1.7 billion in the state's 2020 fiscal year alone.[7] Numerous commentators voiced the fear of increased numbers of municipal bankruptcies, and institutional holders of municipal bonds began dumping bonds. Research by Yi Li and colleagues shows that there was an unprecedented outflow of municipal securities from mutual funds around the beginning of the COVID-19 pandemic in the United States and that this caused differences in pricing between bonds held in these mutual funds and those not held in the funds.[8] All of this caused the "municipal yield spread"—the difference between yields on risky municipal debt and riskless U.S. Treasury securities—to widen dramatically. During March, the spread between the S&P Municipal Bond Index (a broad measure of municipal bond yields) and 10-year Treasury bond interest rates nearly doubled,

Figure 1. Municipal Yield Spread, March 2 - October 31, 2020



Note: The Municipal Yield Spread is the difference between the yield on the S&P Municipal Bond Index (Standard & Poor's, 2021b) and the 10-year Treasury Constant Maturity yield. The top marginal tax rate was used to adjust the municipal bond index for the preferential tax treatment of municipal bond interest. See Board of Governors of the Federal Reserve System (US), "Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity," FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/DGS10. Accessed April 1, 2021.

going from 2.73% to 5.35% before falling to 3.75% at the end of the month (Figure 1). To put this in perspective, the spread at the start of the month was just below the average yield spread for the prior five years (2.77%). The elevated yield spread indicated the extremely high level of risk that investors perceived in municipal bonds.

The outcomes for risky stock investments and municipal bonds somewhat diverged after March. The stock market went on a record rally to match the record sell-off in March. By early August, the S&P 500 had regained its pre-pandemic peak level. However, as Figure 1 shows, the yield spread remained elevated through the start of autumn.

LITERATURE REVIEW

There is evidence in the research literature that municipal yield spreads change over the economic cycle and in response to fiscal shocks. Much of the negative change in yield spreads for higher default risk credits is associated with the risk aversion of municipal investors.[9] Research by Earl D. Benson and others back in 1981 found that yield spreads varied over the economic cycle. In general, yield spreads between lower-rated and AAA-rated bonds narrowed during economic expansions and increased during downturns, and the divergence was greater as default risk increased.[10] This indicates that during economic downturns lower-rated bonds are penalized, and the lower the rating, the greater the penalty. These findings confirm the results of financial economic models that suggest the importance of markets imposing "fiscal discipline" on issuers.[11]

In general, yield spreads between lower-rated and AAA-rated bonds narrowed during economic expansions and increased during downturns, and the divergence was greater as default risk increased.[10]

Jun Peng and others found evidence in 2014 of increased perceived risk in the municipal market during the financial crisis shock.[12] Lower-rated issuers paid a risk premium penalty relative to higher-rated issuers. They argued that this penalty shows that at the time of a fiscal shock, it is more important than ever to maintain "the best possible bond rating."

Several studies have analyzed the impact of the COVID-19 pandemic on securities markets. Researchers Tao Li and Jing Lu found in 2020 that COVID-19 related shocks had a significant effect on municipal new issuance volume and offering yields.[13] Specifically, county-level confirmed COVID-19 related death counts and emergency declarations increased offering yields and decreased the probability of new issue volume. Li and Lu also found weaker investor demand during the early days of the pandemic for municipal bonds sold in "fiscally challenged states," compared to bonds sold in states in better fiscal health.

Yi Li's 2020 research analyzed municipal securities market mutual fund flows around the beginning of the COVID-19 pandemic.[14] The analysis indicated an unprecedented 16% outflow of securities from mutual funds and found that during and even after the crisis there was a significant decline in dealer liquidity. They argue that this demonstrates the fragility risk posed by mutual funds in the municipal securities market, and such fragility is higher for portfolios with a lower, rather than higher, average rating.

Default risk is a major component of the pricing of municipal bonds. Michael Schwert found in 2017 that default risk accounts for 74% to 84% of the average municipal yield spread.[15] Therefore, municipal governments perceived to have greater default risk cannot avoid paying higher premiums from negative fiscal shocks, and during economic downturns.

DATA

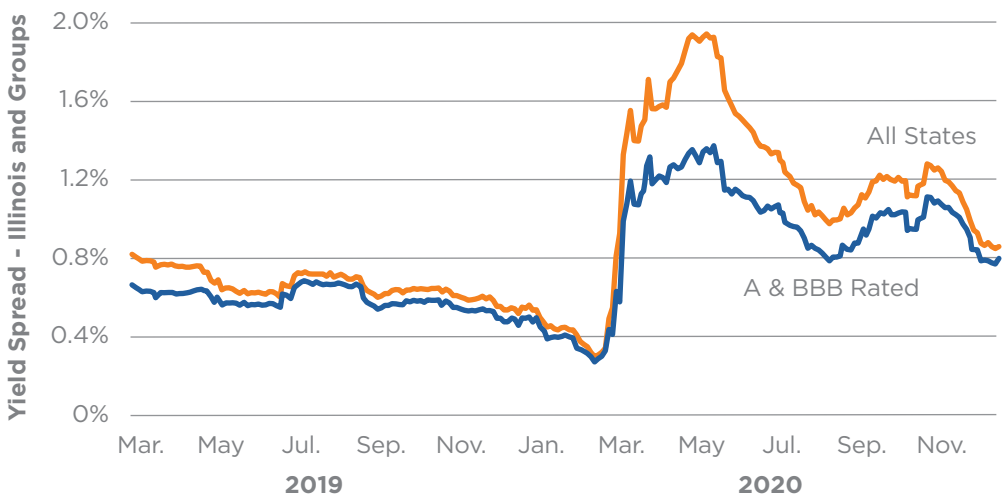
We use data from Standard & Poor's (S&P) for their Municipal Bond Indices for each of the 50 states, including Illinois. The indices are calculated by taking a weighted average yield of bond yields from issuers in each state. According to Standard & Poor's, their state municipal bond indices have an average maturity of 12.24 years and include bonds from all credit rating categories, except for defaulted bonds.[16] This is a "benchmark" yield index for the state, meaning the interest rates on a particular bond issue can be compared to it. Therefore, it can be used to proxy the interest rates that issuers in a given state can be expected to pay for debt issuance before adjusting for relative credit rating and debt maturity. There are two measures provided by Standard & Poor's—the "yield to maturity" and the "yield-to-worst." The yield to maturity represents the yield on the indices bonds to their stated maturity date. The yield-to-worst measures the yield to either the stated maturity date, or dates when the principal amount of the debt could be returned, whichever is lower. We use the yield-to-worst measure as it is a conservative yield measure. We obtained this data on a daily basis since 2011. For this study, we focus on the period starting a year before the COVID-19 outbreak started (March 1, 2019) and ending at the end of 2020 (December 31, 2020).

To control for changes in interest rates in the overall financial markets, we create a "credit spread" measure by taking the difference between the yield-to-worst measure for a state and the 10-year Treasury Constant Maturity Yield. This is a measure of the yield of U.S. Treasury securities, generally thought of as being risk-free, with a maturity held constant at 10 years. This should be a comparable yield to the S&P yield-to-worst index in terms of maturity, with the relative difference accounted for by differences in perceived risk, which we are trying to measure.[17]

As our goal with this research is to compare the relative effects of the COVID-19-related financial crisis on Illinois bonds, we create a second "quality spread" measure by taking the difference between the credit spreads of Illinois and two groups. The first group is all other states. This measure would capture the relative risk perceived by the financial markets for Illinois relative to the rest of the country. The second group consists of four states that had the next lowest credit ratings after Illinois (Pennsylvania - A+ rated from S&P, Kentucky and Connecticut - A rated, and New Jersey - BBB+ rated). These states form a comparison group of states with the most perceived risk outside of Illinois.

Figure 2 shows the time path of the quality spread measures. Before the pandemic, the quality spread measures both between the low-rated states and other states, and Illinois and the other two groups were falling. The difference in credit spreads was only around 30 basis points (0.3%)

Figure 2. Municipal Quality Spread - Illinois & Various Groups, March 1, 2019 – December 31, 2020



by the end of February 2020. Then in March the quality spread "blew out," with Illinois bonds trading nearly 160 basis points above the rest of the states by March 25 and even further in May, widening to 195 basis points. The spread between Illinois and the other low-rated states widened to 130 basis points by late March and stayed between 120 and 130 basis points through May. This suggests that COVID-19 disproportionately affected Illinois debt. But we need to test that statistically, which we do in the next section of the paper.

METHODOLOGY & RESULTS

To test the relative yield effects of the pandemic and associated financial crisis, we build an "event study" model of the period of the crisis. We need to first define the period we are testing—called the "event window." To do this, we run what is called a "structural break test" on the yields of all state credit spreads.[18] We estimate breaks in the mean of the yields, indicating a shift to strictly higher or lower levels of yields compared to the period before the break. The results of the break test (available separately from the authors) indicate three structural breaks, one on March 12, 2020, the second on May 15, and the third on July 17. Examining Figure 2, these correspond to the start of the financial crisis (March 12), its peak (May 15), and a return to more normal yields (July 17). We, therefore, declare the event window to be March 12 – July 16.

We then build a model that would predict the quality spreads that we would expect to see across the event window, given the time path of the quality spread before the event window. The logic of this approach is shown in Figure 3. This shows the actual quality spread (in green) over the event window and the period after it for the spread between Illinois yields and those of all other states, along with the forecast quality spread (in blue) and the two standard error "confidence interval" for the quality spread. The difference

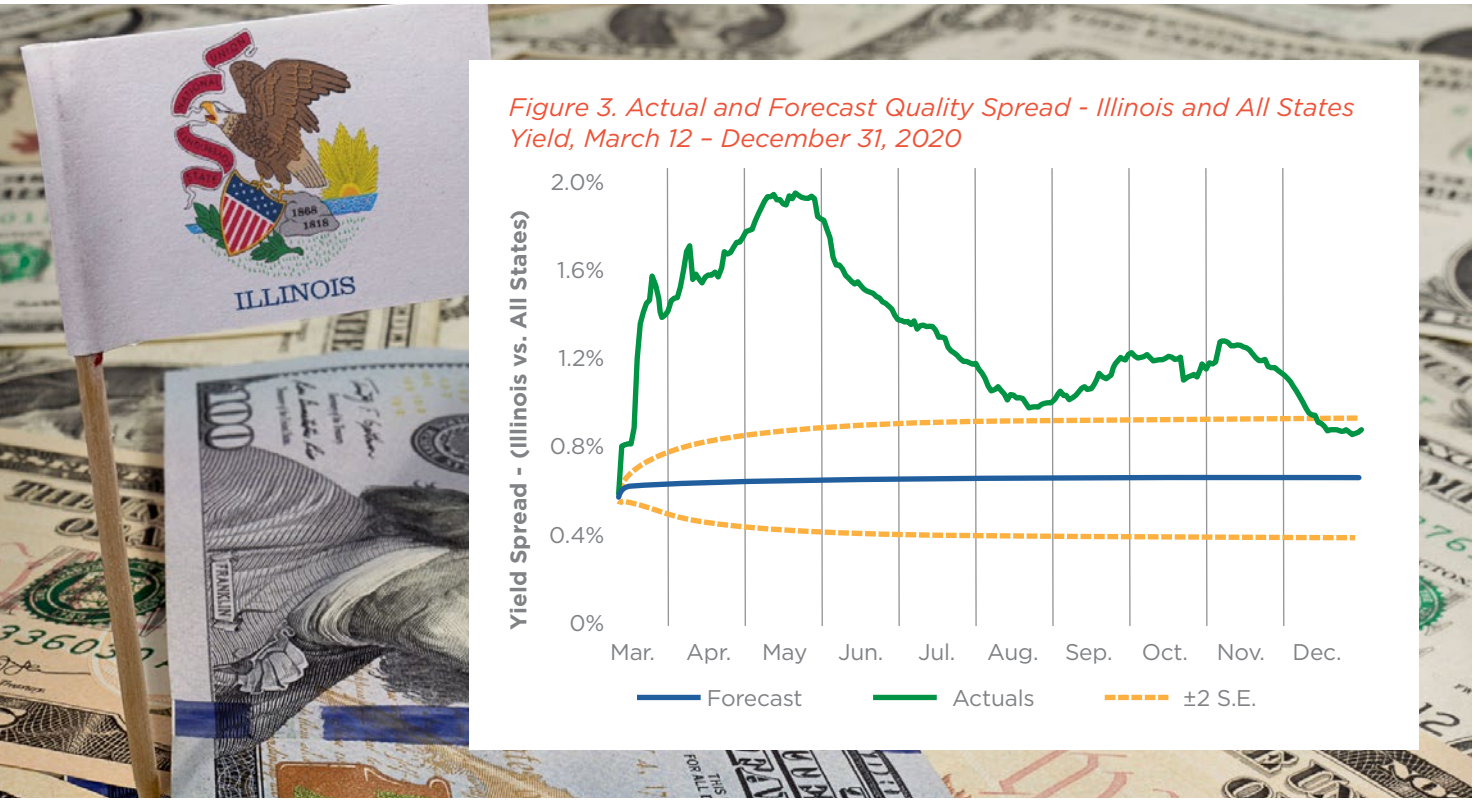


Figure 3. Actual and Forecast Quality Spread - Illinois and All States Yield, March 12 – December 31, 2020

between the actual quality spread and its forecast value (accounting for inevitable errors in forecasts—the standard error) is an estimate of the amount that Illinois debt was penalized during the COVID-19 period compared to all other state debt. It is clear that the market imposed a negative and disproportionate penalty on Illinois debt yields given that the actual value is far more than the two standard error forecast level.

To measure the average effect, we create a statistical model using a simple interrupted time series technique:

$$Quality\ Spread_t = \alpha + \beta_1 COVID_t + \varepsilon_t \quad (1),$$

where the variable COVID-19 takes the value of 1 during the event window and 0 for all other periods. The variable UNEM measures the difference between the insured unemployment rate in Illinois and the two groups of states during the week of the index observation. This would control for different economic circumstances driven by the pandemic and associated mitigation measures. The β coefficient on COVID-19 represents the average relative yield penalty imposed on Illinois debt during the event window. Table 1 shows the results of the model for the all-state quality spread variable and Table 2 for the low-rated states. In both cases, the results of the model indicate a statistically significant negative effect of COVID-19 on the quality spread (a higher quality spread suggests higher borrowing costs). For the measure comparing Illinois to all states (Table 1), the effect is estimated to have been a 79 basis-point increase in yields per day during the event window (the second row of the table in the Coefficient column shows the estimates for yield penalty). For the yield spread over lower-rated states (Table 2), the effect is estimated at 47 basis points.[19]

Table 1. Results from Estimation of Equation 1, All States Quality Spread, March 1, 2019 – December 31, 2020, n = 461

Variable	Coefficient	Std. Error	t-Statistic	Prob. t
Constant	0.0078	0.0003	61.23	0.0000
COVID-19	0.0079	0.0001	24.59	0.0000
Adjusted R-squared	0.60			
F-statistic	604.73			
Prob(F-statistic)	0.0000			

Table 2. Results from Estimation of Equation 1, A & BBB Rated States Quality Spread, March 1, 2019 - December 31, 2020, n = 461.

Variable	Coefficient	Std. Error	t-Statistic	Prob. t
Constant	0.0069	0.0001	66.37	0.0000
COVID-19	0.0047	0.0002	22.01	0.0000
Adjusted R-squared	0.47			
F-statistic	484.60			
Prob(F-statistic)	0.0000			

CONCLUSIONS

Our results suggest that Illinois issuers paid a penalty in terms of higher interest rates on their debt issuance done throughout 2020, especially during the early days of the COVID-19-related financial crisis. We note that given the composition of the yield index that was used, this effect is an average effect over all issuers, local and state. In this sense, all Illinois issuers are being punished for perceptions of Illinois finances that are largely based on state fiscal conditions.

During times of crisis, lower-rated credits within debt types are penalized more than higher-rated credits. Illinois is truly paying a price now for poor fiscal management over the past several decades.

Our results are consistent with a model of "fiscal discipline" suggested by financial economists. Illinois' relatively poor fiscal condition going into the COVID-19 crisis set the stage for a collapse in confidence in Illinois issuers' ability to repay their debts. The crisis caused an increase in the perceived default risk of all debt, but more so for lower-rated issuers and even more so for Illinois issuers. In a way, our results suggest an answer to an age-old question of the relative value of maintaining or losing a credit rating (Cavallo et al., 2013).[20] During times of crisis, lower-rated credits within debt types are penalized more than higher-rated credits. Illinois is truly paying a price now for poor fiscal management over the past several decades. To put this into numbers, we use data from the Municipal Securities Rulemaking Board's Electronic Municipal Market Access database on bond issues by Illinois issuers during the event window period. State and local governments in Illinois issued just over $27.3 billion in debt during the period of analysis.[21] Note that the life of the bonds is until they reach maturity, are refunded, or are "called" if interest rates fall. If those issuers face a relative penalty of 53 basis points over what other states had to pay during that period, the cost to Illinois issuers becomes $144.9 million **per year** over the life of the bonds issued during that time. This penalty is passed on to taxpayers in the form of higher taxes, fees, and charges.

ENDNOTES

1. Executive Office of the President, *Proclamation 9994 of March 13, 2020*, 85 Fed. Reg. 15337 (3/18/2021), https://perma.cc/A8WF-LLXY.

2. COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, https://github.com/CSSEGISandData/COVID-19.

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14. Li, "Mutual Fund Fragility."

15. Michael Schwert, "Municipal Bond Liquidity and Default Risk," *The Journal of Finance* 72, no. 4 (2017): 1683–172, https://www.jstor.org/stable/26652551.

16. Standard & Poors, "Factsheet - S&P Municipal Bond Index," 2021, https://www.spglobal.com/spdji/en/indices/fixed-income/sp-municipal-bond-index/#overview.

17. Since the interest on municipal bonds is in most cases exempt from federal taxation, we adjust for tax treatment by dividing the yield-to-worst measure by 1/(1-t), where t is the highest federal tax rate. We do not correct for relative state tax rates, as some papers do, since during the timeframe of our study no state tax rate changes were observed (Tax Foundation, 2020, 2019). Therefore, the differences between state tax rates are a "fixed effect."

18. Jushan Bai and Pierre Perron, "Estimating and Testing Linear Models with Multiple Structural Changes," *Econometrica* 66, no. 1 (1998): 47–78, https://econpapers.repec.org/article/ecmemetrp/v_3a66_3ay_3a1998_3ai_3a1_3ap_3a47-78.htm.

19. In an earlier version of the paper, we used a control variable for unemployment. The results were similar for the "all states" model but the coefficient on the variable of interest for the "low-rated states" model was statistically significant at only the .06 level. A reviewer pointed out potential multicollinearity/simultaneity issues so we dropped the control variable for our final results.

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21. Municipal Securities Rulemaking Board, "Municipal Trade Statistics: State Trade Statistics" (2021), https://emma.msrb.org/MunicipalTradeStatistics/ByState.

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