

Overpricing in Municipal Bond Markets and the Unintended Consequences of the Administrative Solutions: Evidence from China

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Abstract

China allows local governments to issue real municipal bonds since 2014. However, many of the municipal bonds were issued with a yield equal to or even lower than that of treasury bonds, showing an obvious overpricing. To resolve the overpricing problem in the primary market of municipal bonds, the regulatory authority set a lower bound for the issuing yield spread. In this paper, we explore the reasons for the overpricing of municipal bonds and investigate the impacts of the pricing restrictions. We find that municipal bonds issued in provinces where bond underwriters hold more shares in local treasury cash management and where SOEs are more important in the local economy have a lower issuing yield spread, a larger pricing difference between the primary and secondary markets, and worse liquidity after issuance. The results are consistent with the interpretation that bond underwriters bid up the primary market prices in exchange for other benefits from local governments. We also find that after the enforcement of lower bound restrictions, even bonds which are not supposed to be constrained by the lower bounds are priced at the boundary. The primary market of municipal bonds loses price discovery entirely. More importantly, risky bonds, which are now even more “overpriced”, have longer maturity, suggesting that local governments take advantage of the “mispricing” in their issuance choices. These findings offer important policy implications: Administrative restrictions intending to solve mispricing problems may cause even more serious mispricing.

Keywords: Municipal bonds, Overpricing, Price discovery, Marketization

JEL Classifications: G18, G12, G24, H74

1. Introduction

In recent years, resolution of the local government debt problem, especially the implicit debt problem, has become one of the most important tasks in preventing and eliminating major risks in China. The long-term mismatch between financial and administrative powers, soft budget constraints, together with the cover-up of local government financing vehicles¹ (LGFVs) and other channels, have made local governments accumulate more and more implicit debt, of which specific scale is unknown. To improve the transparency of local government debt, the Chinese authority approves municipal bonds² as the only financing channel for local governments in 2014³. This announcement “opens the front door and blocks the side door” for local government debt, hence the rapid development of the municipal bond market. By the end of 2020, the outstanding municipal bonds in China reached 25 trillion RMB (3.8 trillion USD), taking up 22% of the China’s total bond market.

However, while transparentizing the local government debt, the development of the municipal bond market witnesses a new problem: overpricing in the primary market. In the early stage of the market, the yields to maturity (YTM) of many municipal bonds at issuance are even lower than those of treasury bonds with the same maturities, resulting in a price distortion, in which the bond yield fails to match the risk.

To address the overpricing issue, the Chinese regulatory authorities have taken a series of measures, among which the most direct measures are the lower bounds on the issuing yield spread set by the Ministry of Finance in 2018 and 2019. Specifically, in August 2018, the Ministry of Finance required the municipal bond’s issuing yield to be at least 40 bps higher than the average treasury rate of the same maturity within five days prior to issuance⁴. In January 2019, the lower

¹ LGFVs are established as the financing platforms of local governments in China. They usually exist in the form of investment companies into which local governments inject their public welfare assets and reserve land. By issuing corporate bonds with implicit guarantees from local governments, LGFVs help local governments access the bond market circumventing the regulations. The bonds issued by LGFVs are known as “cheng-tou-zhai” in Chinese, which literally translates to “city investment bonds”. We refer to them using the term “LGFV bonds” in this paper, which is parallel to “municipal corporate bonds” in Chen, He & Liu (2020), and “Chengtou bonds” in Ang, Bai & Zhou (2019) and Gao, Ru & Tang (2020).

² The term “municipal bonds” in this paper refers to “di-fang-zheng-fu-zhai” in Chinese, which literally translates to “local government bonds”. This type of bonds is directly issued by local governments. Before local governments are allowed to issue municipal bonds in 2014, they can establish LGFVs and have LGFVs issue corporate bonds. In some papers, the bonds issued by LGFVs are named as municipal bonds. However, we differentiate these two types of bonds in this paper, with “municipal bonds” referring to bonds directly issued by local governments and “LGFV bonds” referring to bonds issued by LGFVs.

³ See the amended Budget Law of China in 2014 and the Opinions of the State Council on Strengthening the Management of Local Government Debt.

⁴ <https://www.reuters.com/article/china-local-bondsyield-spread-0815-wedn-idCNKBS1L00LJ>.

bound was changed to be at least 25 bps higher⁵. These pricing restrictions quickly affected the municipal bond pricing in the primary market. Figure 1 shows the issuing yield spread (i.e., issuance spread) of municipal bonds over the five-day average of treasury rates with the same maturity since 2015. The horizontal axis is the issuance date of municipal bonds, while the vertical axis is the issuance spread (%). The two vertical lines correspond to the specific dates when pricing restrictions were implemented in 2018 and 2019 respectively. The red and blue dots respectively denote the two types of municipal bonds, i.e., general bonds and special bonds. It is shown that the issuance spreads of municipal bonds undergo significant changes due to pricing restrictions. Before the 2018 pricing restriction, the issuance spreads of municipal bonds showed great cross-sectional variations, with the lower being around 0 and the higher reaching over 80 bps. However, after the lower bound of 40 bps issuance spread was put forward in 2018, the issuance spreads of municipal bonds concentrated around 40 bps. Not only bonds with issuance spreads lower than 40 bps almost disappeared, but also the number of bonds with issuance spreads over 40 bps decreased sharply. After the lower bound of 25 bps was proposed in 2019, the issuance spreads of municipal bonds converged to around 25 bps, albeit some being above 25 bps. Figure 2 shows the pricing difference between the primary and secondary markets (i.e. the difference of yield spreads in the secondary market over issuance spreads in the primary market) over time. It is revealed that after pricing restrictions, the pricing difference between the primary and secondary markets was more concentrated around 0, especially in the period when the pricing restriction was 40 bps.

[Figure 1]

[Figure 2]

Based on this, our paper focuses on the pricing of municipal bonds to address three specific questions: (1) What drives the overpricing in the primary market? (2) Do pricing restrictions alleviate the overpricing issue? (3) Do pricing restrictions impair the price discovery of the primary market? If so, what is the further influence?

Correspondingly, our findings are threefold. First, we find that bond underwriters bid up the primary market prices in exchange for other indirect benefits from local governments. Municipal bonds issued in provinces where bond underwriters hold more shares in local treasury cash management and where SOEs are more important in the local economy have a lower issuing yield spread, a larger pricing difference between the primary and secondary markets, and worse liquidity

⁵ http://www.xinhuanet.com/fortune/2019-01/30/c_1124061586.htm.

after issuance. Second, pricing restrictions ease the overpricing of municipal bonds. After the restrictions, the issuance spreads and after-issuance liquidity of municipal bonds are less relevant to the indirect benefits that bond underwriters can get from local governments. Third, pricing restrictions impair the price discovery in the primary market. The correlation between issuance spreads and risk characteristics is significantly reduced after pricing restrictions. After the enforcement of lower bound restrictions, even bonds which are not supposed to be constrained by the lower bounds are priced at the boundary. Further, we find that riskier issuers issue municipal bonds of longer maturities after pricing restrictions, suggesting that local government takes advantage of the “mispricing” in their issuance choices. Nevertheless, the price discovery of LGFV bonds, as the implicit local government debt, does not suffer.

The contributions of this paper are as follows. First of all, this paper explores the overpricing of municipal bonds in the primary market and its driving factors. This extends the issuance overpricing literature from China’s corporate debt securities (Ding, Xiong & Zhang, 2020) to municipal bonds. More importantly, the results of this paper show that local governments, as bond issuers, reward bond underwriters with special resources. The indirect benefits from local governments drive underwriters to bear a lower issuance spread while underwriting the municipal bonds. Compared to the literature which emphasizes that the state-owned enterprises in China enjoy great advantages in external financing over private sectors due to implicit government guarantees (Brandt & Zhu, 2000; Cull & Xu, 2000, 2003; Brandt & Li, 2003; Song, Storesletten & Zilibotti, 2011; Cull, Li, Sun & Xu, 2015; Cong, Gao, Ponticelli & Yang, 2019) and that more generally, political relationships affect corporate financing globally (Khwaja & Mian, 2005; Faccio, 2006; Leuz & Oberholzer-Gee, 2006; Claessens, Feijen & Laeven, 2008; Li, Meng, Wang & Zhou, 2008; Boubakri, Guedhami, Mishra & Saffar, 2012; Zeume, 2017), our findings provide more direct evidence about local governments’ role of lowering financing costs. Secondly, this paper demonstrates the unintended consequences of regulatory pricing restrictions on municipal bond pricing. While mitigating the overpricing issue, pricing restrictions lead to the unintended consequences of worse price discovery and less efficient capital allocation. Finally, this paper focuses on municipal bonds, which constitute the explicit local government debt. Although a couple of papers discuss China’s implicit local government debt with LGFV debts (Liu, Lyu & Yu, 2017; Ang, Bai & Zhou, 2019; Chen, He & Liu, 2020; Huang, Pagano & Panniza), Chinese municipal bonds are still underexplored. Moreover, by examining whether there is a spillover

effect of municipal bond pricing restrictions on the LGFV bonds, this paper uncovers that there is no substitution effect between the explicit and implicit local government debt for investors. The findings of this paper provide important policy implications for deepening the marketization of bond markets in emerging economies: Administrative restrictions intending to solve mispricing problem may cause even more serious mispricing.

2. Institutional Background

The problem of local government debt in China originated from the reform of the tax-sharing system in 1994. The reform changed the distribution of fiscal power between the central and local governments. Since then, the fiscal power of local governments has difficulty in meeting the demands of their administrative power. However, as the amended Budget Law in 1995 prohibited local governments from bond issuance, local governments thus could only raise money through LGFVs and other channels. LGFV bonds, as part of the implicit local government debt, therefore emerged. On the other hand, the unprofitability of public welfare projects made the financing demands of local governments continue to expand under the soft budget constraints. Consequently, local government debt accumulated at a rapid pace, and remained opaque and little monitored by the market, which became “the Sword of Damocles” hanging over the Chinese financial system.

To resolve the risk of local government debt, China’s central government approved municipal bonds as the only financing channel for local governments in the amended Budget Law in 2014 and other documents (e.g., the Opinions of the State Council on Strengthening the Management of Local Government Debt). By authorizing local governments to issue bonds, this announcement aimed at guiding local government debt from the original implicit channels to the open market. Under this financing mechanism, governments of provinces and municipalities⁶ can directly issue municipal bonds with the approval of the State Council. According to the purpose of funds and the source of repayments, municipal bonds are categorized into general bonds and special bonds. General bonds are issued for unprofitable public welfare projects and shall be repaid mainly from general public budget revenues. Special bonds are issued for profitable public welfare projects and shall be repaid with government funds or special revenues.

⁶ Besides provincial governments in provinces and municipalities, five cities specifically designated in the state plan (including Dalian, Qingdao, Ningbo, Xiamen, Shenzhen) are authorized to issue municipal bonds as well.

Since then, the municipal bond market has developed rapidly. Figure 3 shows the outstanding balance of municipal bonds and LGFV bonds from 2014 to 2020. It is shown that the outstanding balance of municipal bonds has increased substantially since 2014, exceeding 25 trillion RMB (3.8 trillion USD) by the end of 2020. Meanwhile, the outstanding balance of LGFV bonds increased slightly and even remained stable from 2016 to 2019, reaching 10 trillion RMB (1.5 trillion USD) after a significant increase in 2020. This trend demonstrates that the development of the municipal bond market reduces the local government's implicit debt expansion through LGFVs to a certain extent.

[Figure 3]

However, while promoting the transparency of local government debt, the introduction of municipal bonds also brings a new problem: overpricing in the primary market. The YTM at issuance of municipal bonds is very low, similar to that of treasury bonds or even lower. In 2014, 10 provinces and municipalities (including Shanghai, Zhejiang, Guangdong, Shenzhen, Jiangsu, Shandong, Beijing, Qingdao, Ningxia, and Jiangxi) were included in the pilot program of self-issued and self-repaid municipal bonds. On June 23, 2014, Guangdong took the lead in issuing the municipal bonds of three maturities, and their issuance interest rates were equivalent to the treasury rates of the same maturities. Shandong followed shortly afterward, and the pricing of its municipal bonds issued on July 11, 2014, showed a price distortion. The YTM at issuance were about 20 bps lower than the treasury rates. In 2015, the municipal bond market was gradually improved, and the YTM at issuance was no longer lower than that of treasury bonds. However, the phenomenon of low issuance spreads still existed for municipal bonds. According to Figure 1 and Figure 2, during the period from 2015 to August 2018, the issuance spread of many municipal bonds was 0 (17.8%), and the pricing difference between the primary and secondary markets was positive for most municipal bonds (79.9%).

In order to alleviate the overpricing of municipal bonds in the primary market, the regulatory authorities have issued several announcements emphasizing the marketization of municipal bond pricing and reducing the distortions of non-marketization factors on the pricing of municipal bonds (Documents Caiku No. 61 [2018], Caiku No. 72 [2018] and Tingzi No. 33 [2019]). Document Caiku No. 61 [2018] requires that “to facilitate the market-based pricing of municipal bond issuance... Local financial departments are not allowed to intervene in the pricing of municipal bonds by guiding bidding or negotiating interest rates during issuance. ... Members of the

municipal bond underwriting syndicate shall participate in the underwriting of municipal bonds in strict accordance with the principle of marketization and scientifically set the bidding price ...”. Document Caiku No. 72 [2018] insists that “underwriters shall take into consideration such factors as the interest rates of treasury bonds and policy-based financial bonds with the same maturity, and the valuation of municipal bonds in the secondary market, to determine the bidding price. Local financial departments shall not use fiscal deposits to make the underwriters overbid”. Tingzi [2019] No. 33 states that “local governments and their departments are strictly prohibited from directly or indirectly placing pressure on financial institutions with ranking, fiscal deposits, and credit targets”. More directly, the Ministry of Finance implemented the pricing restrictions on municipal bonds in 2018 and 2019. On August 14, 2018, the pricing restriction required the municipal bond’s YTM at issuance to be at least 40 bps higher than the average treasury rate of the same maturity within five days prior to issuance. On January 29, 2019, the pricing restriction changed from at least 40 bps higher to at least 25 bps higher.

3. Literature Review and Hypotheses

Existing literature has studied multiple factors that affect municipal bond pricing, including local government debt, fiscal conditions, the relationship between underwriters and local governments, and liquidity. For municipal bonds issued in countries other than China, Von Hagen, Schuknecht & Wolswijk (2011) study the municipal bonds in the European Union and find that there is a positive relationship between bond yield spreads and debt ratios. Eichengreen & Bayoumi (1994) focus on municipal bonds in the United States, revealing that issuance spreads are significantly correlated with the fiscal restrictions of local governments. Butler (2008) uncover that the close relationship with local governments allows underwriters to offer more competitive prices at issuance. Besides, Schwert (2017) decomposes municipal bond spreads into default and liquidity components and shows that default risk accounts for 74% to 84% of the average spread. For Chinese LGFV bonds, debt ratios, fiscal conditions, local real estate GDP, and political risks are found to affect the local government financing costs (Liu, Lyu & Yu, 2017; Ang, Bai & Zhou, 2019). As for the price distortion of Chinese municipal bonds, literature mostly explores the reasons from the perspective of the relationship between underwriters and local governments, since political connections pose significant impacts on capital pricing and allocation in China (Brandt & Zhu, 2000; Cull & Xu, 2000, 2003; Brandt & Li, 2003; Li, Meng, Wang & Zhou, 2008; Song,

Storesletten & Zilibotti, 2011; Cull, Li, Sun & Xu, 2015; Cong, Gao, Ponticelli & Yang, 2019). Liu (2017) proposes that the price distortion of municipal bond pricing is the result of the game between local governments and bond underwriters. Wang (2018) extends the Bikhchandani-Huang model in the bond auction theory and proposes that local governments influence the bidding behavior of bond underwriters through their control over fiscal deposits and other resources. This is consistent with the empirical evidence in Ba, Li & Zhang (2019) that local governments indirectly influence the pricing of municipal bonds by placing fiscal deposits in the underwriting banks. Besides literature, regulatory requirements which prohibit local governments from putting pressure on bond underwriters with ranking, fiscal deposits, and credit targets, also demonstrate that local governments encourage bond underwriters to lower their bidding interest rate by offering indirect benefits. In addition, Ding, Xiong & Zhang (2020) attribute the issuance overpricing of China's corporate debt securities to indirect benefits of future business. Therefore, we propose:

Hypothesis 1: Without pricing restrictions, the greater the indirect benefits that bond underwriters can get from local governments, the higher the prices of municipal bonds in the primary market.

Existing literature has not yet discussed the impacts of pricing restrictions on municipal bonds. However, in terms of the lower bound logic, the issuance spreads of municipal bonds shall be no lower than the bound, which is higher than some multiple bonds' issuance spreads before the restrictions. Therefore, this should significantly constrain the bond underwriters from aggressively bidding down the yield spreads to gain indirect benefits from local governments. In addition, literature on IPO underpricing and regulatory pricing restrictions in China also gives us some enlightenment. The price-earnings (P/E) ratio cap regulation contributes significantly the IPO underpricing in China (Cheung, Ouyang & Tan, 2009; Ritter, 2011; Chen, Ke, Wu & Yang, 2018). This reflects that the regulatory pricing restrictions impose significant impacts on China's capital market pricing, and pricing ceilings bring down asset prices. Considering that the lower bound of issuing yield spread is equivalent to the upper bound of bond issuing prices, the pricing restrictions set by the Ministry of Finance should lower the bond issuing prices as well, thereby reducing the overpricing in the primary market. Therefore, we propose:

Hypothesis 2: After pricing restrictions, the correlation between the primary market prices of municipal bonds and indirect benefits that underwriters can get from local governments decreases significantly.

Effects of pricing restrictions on price discovery have been studied in the stock market context. For the primary stock market, Song & Tang (2019) find that the first-day trading price limit damages the pricing efficiency of new issues. For the secondary stock market, existing literature shows that the trading price limit deteriorates the secondary market efficiency (Kim & Rhee, 1997; Chen, Chiou & Wu, 2004; Chan, Kim & Rhee, 2005), resulting in volatility spillover, delayed price discovery, and trading interference. Besides, the relationships between other types of restrictions (such as short-selling constraints and book-building constraints) and price discovery are adequately discussed in the literature. Miller (1977), and Harrison & Kreps (1978) propose that the short-selling constraints prohibit the capitalization of negative information into stock prices, which therefore hinders the price discovery of the market and generates overvaluation. Empirical evidence supports their theory (Bris, Goetzmann & Zhu, 2007; Chang, Cheng & Yu, 2007; Saffi & Sigurdsson, 2011; Beber & Pagano, 2013; Chang, Luo & Ren, 2014). Regulatory constraints on book building are also found to impair price discovery (Chang, Chen, Kao & Wu, 2014). Furthermore, as shown in Figure 1, the issuance spreads of municipal bonds converge to the lower bound after pricing restrictions, with only a few deviating from that. The cross-sectional variation across municipal bonds significantly dies away. Therefore, we propose:

Hypothesis 3: After pricing restrictions, the correlation between the primary market prices of municipal bonds and risk characteristics decreases significantly.

Price discovery of financial markets improves the efficiency of resource allocation (Wurgler, 2000). If the pricing restrictions harm the price discovery of municipal bonds in the primary market, it should have an impact on the local governments' subsequent decisions on municipal bond issuance. For local governments, the main issuance decision at their discretion is to determine the amount and maturity of municipal bonds. When risk characteristics are no longer effectively priced, local governments with higher risks can issue municipal bonds at an interest rate lower than their original financing costs and tend to issue bonds that the market overvalues most (Flannery, 1986). Therefore, issuing bonds with a larger amount and a longer maturity becomes an arbitrage opportunity for riskier local governments to take advantage of the inefficiency. Therefore, we propose:

Hypothesis 4: After pricing restrictions, local governments with higher risks issue municipal bonds with a larger amount and a longer maturity.

Pricing in bond markets affects each other, so spillovers may occur if pricing restrictions impair the price discovery of municipal bonds. Municipal bonds are the explicit debt of local governments, while LGFV bonds are their implicit debt, both of which should relate to each other. Therefore, the deterioration of price discovery in the municipal bond primary market may also affect the price discovery in the primary market of LGFV bonds. Therefore, we propose:

Hypothesis 5: After pricing restrictions, the correlation between the primary market prices of LGFV bonds and risk characteristics decreases significantly.

4. Empirical Design

4.1 Model Specification and Variable Construction

To test Hypothesis 1, we examine the relationship between the primary market prices and indirect benefits using municipal bonds issued before the pricing restrictions. Specifically, we employ the following model:

$$Y_{i,t} = \beta_1 \cdot Benefit_i + \gamma_1 \cdot BondCtrls + \theta_1 \cdot IssuerCtrls + \alpha_t + \epsilon_{i,t}, \quad (1)$$

where the dependent variable, $Y_{i,t}$, denoting the primary market price, is captured by three measures respectively, i.e., the issuance spread, the pricing difference between primary and secondary markets (the difference of yield spreads in the secondary market over issuance spreads in the primary market), and liquidity after issuance. First, the issuance spread *ISpread* is measured as the difference between the YTM at issuance of the municipal bond and the average treasury rates of the same maturity in the five days prior to issuance. It reflects the absolute level of the primary market price. The lower the spread, the higher the bond price in the primary market. Second, the pricing difference *Overprc* is measured as the difference between the secondary-market yield spread in the week of first trade and the issuance spread, reflecting the primary market price relative to the secondary market price. The greater the pricing difference, the higher the bond price in the primary market. Considering the low trading frequency of municipal bonds, calculating pricing difference with the first-week yield that occurs within a short period after issuance as in the IPO literature will greatly reduce our sample size and representativeness. Therefore we define the pricing difference with the first-week yield that occurs within one year after issuance for main tests, and keep the pricing difference which is measured with the first-week yield that occurs within three months after issuance for robustness check. Third, the liquidity shortly after issuance also

mirrors the price in the primary market relative to that in the secondary market. When the price in the primary market is higher than that in the secondary market, investors in the secondary market are reluctant to buy bonds from the investors in the primary market, which consequently leads to poor liquidity in the secondary market shortly after issuance. To be specific, the liquidity of bonds shortly after issuance is measured as the number of weeks from issuance till the first trade occurs within three months after issuance *FirstWeek*, the number of weeks with trades within three months after issuance *SumWeek*, and the ratio of total trading volume to the outstanding amount within three months after issuance *Turnover*⁷. A smaller *FirstWeek*, a smaller *SumWeek*, and a lower *Turnover*, signal worse liquidity in the secondary market shortly after the bond issuance.

Benefit_i, as the variable of interest in Model (1), denotes the indirect benefits that bond underwriters can get from local governments. Considering the indirect benefits that bond underwriters can get from local governments include fiscal deposits and deposits from state-owned enterprises (SOEs), we respectively use the share of fiscal deposits that bond underwriters get in the local treasury cash management and the proportion of state-owned economy in the local economy to measure these two types of indirect benefits. To be specific, for benefits of fiscal deposits, we manually collect the bid-winning results from the treasury cash management announcements of each province, and calculate the fiscal deposit share of the corresponding province that is won by underwriters for each municipal bond. The higher the deposit share, the greater benefits that underwriters can get from local fiscal deposits. For the benefits of SOE deposits, we employ the province-level sales share of state-owned industrial enterprises in domestic industrial enterprises *SalesShr* and the province-level profit share of state-owned industrial enterprises in domestic industrial enterprises *ProfitShr*. The higher the share, the greater benefits that underwriters can get from local SOE deposits. Therefore, the coefficient β_1 describes the correlation between primary market prices and indirect benefits.

Besides, we include the bond characteristics *BondCtrls* and issuer characteristics *IssuerCtrls* as independent variables to control for fundamental risks. The bond characteristics include the natural logarithm of 1 plus bond maturity *LnTerm*, and the natural logarithm of 1 plus issue amount *LnIssueAmt*. As all municipal bonds are rated AAA at issuance, there is no need to control for bond ratings. The issuer characteristics include the local debt ratio *Debt* (the ratio of debt balance

⁷ If the bond is not traded within three months after issuance, *FirstWeek* is censored at 14 weeks, *SumWeek* is censored at 0, and *Turnover* is censored at 0.

to comprehensive fiscal revenues), the local fiscal self-sufficiency ratio *FiscalSelf* (the ratio of general budget revenue to general budget expenditure), the local fiscal dependence on land *Land* (the ratio of government funds to local fiscal revenues), and the local GDP growth rate *GDPGrowth*. α_t is the year fixed effect, and $\epsilon_{i,t}$ is the residual.

For Hypothesis 2, based on Model (1), we use Model (2) to compare the correlation between the primary market prices and indirect benefits before and after pricing restrictions:

$$Y_{i,t} = \beta_1 \cdot Benefit_i + \beta_2 \cdot Restr \times Benefit_i + \gamma_1 \cdot BondCtrls + \theta_1 \cdot IssuerCtrls + \alpha_t + \epsilon_{i,t}, \quad (2)$$

where *Restr* is the dummy variable of whether there is a pricing restriction. If the bond is issued after August 14, 2018, *Restr* takes the value of 1. Otherwise, it takes 0. The remaining variables are defined as Model (1). Therefore, the coefficient β_1 reflects the correlation between the bond prices in the primary market and indirect benefits before pricing restrictions, while the coefficient β_2 reflects the change of correlation between the bond prices in the primary market and indirect benefits after pricing restrictions. If the signs of β_2 and β_1 are opposite, this indicates that the pricing restrictions weakens the price-benefit correlation. Similar to the test of Hypothesis 1, three measures, i.e., the issuance spread, the pricing difference between the primary and secondary markets, and the liquidity after issuance, are adopted as dependent variables to describe the municipal bonds pricing in the primary market. Likewise, the fiscal deposit share of bond underwriters, the sales share of SOEs, and the profit shares of SOEs, are adopted as measures of indirect benefits.

To test Hypothesis 3, we employ the following model based on Model (2), to compare the correlation between the primary market prices and risk characteristics before and after pricing restrictions:

$$Y_{i,t} = \beta_1 \cdot Benefit_i + \beta_2 \cdot Restr \times Benefit_i + \gamma_1 \cdot BondCtrls + \gamma_2 \cdot Restr \times BondCtrls + \theta_1 \cdot IssuerCtrls + \theta_2 \cdot Restr \times IssuerCtrls + \alpha_t + \epsilon_{i,t}, \quad (3)$$

where the dependent variable, $Y_{i,t}$, denoting the primary market pricing, is captured by two measures respectively, i.e., the issuance spread, and the pricing difference between primary and secondary markets⁸. The other variables are defined as Model (2). Therefore, the coefficient γ_1

⁸ Since Hypothesis 3 focuses on the price discovery and has no direct relationship with the liquidity in the secondary bond market, the test of Hypothesis 3 does not examine the liquidity after issuance.

reflects the price discovery of bond risk characteristics in the primary bond market before pricing restrictions, and the coefficient γ_2 compares the correlation between primary market prices and bond risk characteristics before and after pricing restrictions. Similarly, the coefficient θ_1 reflects the price discovery of the primary bond market on issuer risks before pricing restrictions, and the coefficient θ_2 compares the correlation between primary market prices and issuer risk characteristics before and after pricing restrictions. If Hypothesis 3 stands, the decline of price discovery in the primary market should correspond to a weaker correlation between the issuance spreads and risk characteristics, and a stronger correlation between the pricing difference and risk characteristics. Therefore, when the dependent variable is the issuance spread, the sign of the coefficient γ_2 (θ_2) should be opposite to that of the coefficient γ_1 (θ_1). When the dependent variable is the pricing difference between primary and secondary markets, the signs of the coefficients γ_2 and θ_2 should be aligned with the pricing of the corresponding risk characteristics. In other words, if the risk characteristic is a positive (negative) risk indicator⁹, the coefficient of its interaction term with pricing restrictions should be positive (negative).

For the test of Hypothesis 4, Model (4) is examined to explore the further impacts of pricing restrictions on local governments' issuance decisions about the amount and maturity of municipal bonds when price discovery is deteriorated:

$$Y_{i,t} = \theta_1 \cdot IssuerCtrls + \theta_2 \cdot Restr \times IssuerCtrls + \alpha_t + \epsilon_{i,t}, \quad (4)$$

where the dependent variable $Y_{p,t}$ is the natural logarithm of 1 plus the monthly municipal bond issue amount $LnTotalAmt$ for province p, and the natural logarithm of 1 plus the monthly issue amount-weighted bond maturity $LnvwTerm$ for province p. The other variables are defined as Model (5). Thus, the coefficient θ_1 reflects the correlation between the issuance decisions of local governments and their risk characteristics before pricing restrictions, while the coefficient θ_2 compares the correlation before and after pricing restrictions. If Hypothesis 4 holds, the coefficient θ_2 should be significantly positive for positive risk indicators and significantly negative for negative risk indicators.

Lastly, for Hypothesis 5, we use the issuance spreads of LGFV bonds as the dependent variable and re-examine Model (3). If the Hypothesis 5 holds, the sign of the coefficient γ_2 should

⁹ Positive risk indicators in this paper refer to risk characteristics that are of higher values if the risk is higher, e.g., the local debt ratio. Conversely, negative risk indicators refer to risk characteristics that are of lower values if the risk is higher, e.g., the local fiscal self-sufficiency ratio.

be opposite to that of the coefficient γ_1 , and the sign of the coefficient θ_2 should be opposite to that of the coefficient θ_1 .

4.2 Sample and Data

This paper takes the general municipal bonds and special municipal bonds publicly issued by local governments from 2015 to October 2020 as our sample. To take into account the difference between provincial governments and governments of cities specifically designated in the state plan, we exclude bonds issued by those cities. The issuance and weekly trading data of municipal bonds, together with the local debt, fiscal and economic data, are from the Wind database. The industrial enterprises data are from the CSMAR database. We fill in the missing local data based on the public disclosure from the National Bureau of Statistics and local financial departments. We manually collect the data of the bid-winning banks and their winning amount in the local treasury cash management according to the announcements of local financial departments. In addition, in the test of Hypothesis 5, we involve the issuance data of LGFV bonds, which are obtained from the Wind database.

Table 1 reports the summary statistics of variables. The continuous variables are winsorized at the 5% level¹⁰. Panel A of Table 1 is the summary statistics of the municipal bond sample. After excluding municipal bonds without underwriter information, the sample size of municipal bonds is 5196. The issuance spreads are 0.256% on average, with great difference among municipal bonds. The minimum issuance spread is 0.002%, that is, the YTM of municipal bonds at issuance is similar to the treasury rate of the same maturity, while the maximum is 0.512%. Among the municipal bonds that are traded within one year after issuance, the secondary-market yield spreads are 0.355% on average, 0.075% higher than the average of issuance spreads. This reflects the issuance overpricing issue of municipal bonds. In terms of the liquidity within three months after issuance, more than a quarter of the municipal bonds has no trades, and the average number of weeks with trades is only 1.620 weeks. Some bonds are more liquid and are traded in 14 weeks, in other words, they are traded every week for the first three months after issuance. The average turnover rate of municipal bonds is 21.7%, with the turnover rate of the most active municipal

¹⁰ As the secondary-market yield data has many abnormal observations which may be induced by missing information about interest repayments, we delete the extreme outliers at the 1% level and use the remaining observations with the 5% level of winsorization to calculate the first-week yield spread.

bonds reaching 120.8% which indicates that the total amount of transactions exceeds its issuance amount.

The share of fiscal deposits that is won by underwriters of municipal bonds in the local treasury cash management is 66.7% on average, with the lowest being 50.2% and the highest being 88.2%. This indicates that bond underwriters win a large share of fiscal deposits in the corresponding provinces. The sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises is 33.1% (36.7%) on average, with great variation across provinces. The lowest sales (profit) share is 12.3% (12.5%), whereas the highest sales (profit) share is 62.9% (68.6%). Therefore, the dependence on state-owned economy varies significantly across different provinces.

As for bond characteristics, the average maturity of municipal bonds is 9.374 years, and the average issuance amount is 4.237 billion RMB (about 0.65 billion USD). As for issuer characteristics, the average local debt ratio is 87.7%, the average fiscal self-sufficiency ratio is 48.7%, the average local fiscal dependence on land is 61.5%, and the average local GDP growth rate is 8.0%. In the municipal bond sample, 55.4% of the bonds are issued after pricing restrictions.

Panel B of Table 1 reports the summary statistics of the LGFV bond sample. In order to be similar to the characteristics of municipal bonds, the sample of LGFV bonds we use is the LGFV bonds issued by LGFVs in provincial capitals. Considering the great difference between enterprise bonds, corporate bonds, and medium-term notes due to factors such as market segmentation, and most of the LGFV bonds issued by LGFVs in provincial capitals are medium-term notes, we use the medium-term notes issued by LGFVs in provincial capitals as our final LGFV bond sample. After excluding bonds without underwriter information, the final sample contains 1061 medium-term notes. In the sample, the average issuance spread is 1.706%, much higher than the average issuance spread of 0.256% for municipal bonds. Therefore, there is a significant pricing difference between the explicit local government debt and the implicit local government debt in the bond market. This implies that investors do not take LGFV bonds as substitutes for municipal bonds. On average, the fiscal deposit share that is won by LGFV bond underwriters in the local treasury cash management is 7.9%, much lower than the share that is won by municipal bond underwriters. This is partly due to the fact that there is usually only one lead underwriter for LGFV bonds, while municipal bonds are usually underwritten by multiple lead underwriters. However, even considering the share of each underwriter, the winning share of LGFV bond underwriters is still

relatively lower. The bond ratings¹¹ of LGFV bonds at issuance are 2.516 on average, with more than half rated AAA. The average maturity of LGFV bonds is 4.310 years, shorter than that of 9.374 years for municipal bonds. The average issuance amount of LGFV bonds is 1.238 billion RMB (about 0.19 billion USD), much lower than that of municipal bonds of 4.237 billion RMB (about 0.65 billion USD). Therefore, LGFV bonds differ significantly from municipal bonds, with shorter maturities, smaller issuance amount and higher issuance spreads.

[Table 1]

5. Empirical Results

5.1 The Reason of Overpricing

For Hypothesis 1, we first examine the relationship between issuance spreads of municipal bonds and indirect benefits when pricing restrictions are not implemented. Results are shown in Table 2, where Columns (1)–(3) report the results of general municipal bonds and Columns (4)–(6) report the results of special municipal bonds. As suggested in Hypothesis 1, the coefficients of indirect benefits are significantly negative. To be specific, before the pricing restrictions, an increase of 10% in the fiscal deposit share of municipal bond underwriters, relates to a decrease of 1.84 bps in issuance spreads for general bonds and a decrease of 2.75 bps in issuance spreads for special bonds. As the average issuance spread is 25.6 bps for municipal bonds, the decrease of issuance spreads induced by the increase of fiscal deposit share is economically significant. Similarly, an increase of 10% in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises, relates to a decrease of 1.67 bps (1.20 bps) in issuance spreads for general bonds and a decrease of 2.47 bps (2.21 bps) in issuance spreads for special bonds. Thus, the decrease of issuance spreads brought by the increase of SOE deposit share is economically significant as well. These results indicate that without pricing restrictions, the greater the indirect benefits that bond underwriters can get from local governments, the lower the issuance spreads of municipal bonds, that is, the higher the primary market price.

[Table 2]

We next examine the relationship between the primary market prices and indirect benefits from the perspective of the pricing difference between primary and secondary markets. The results

¹¹ Bond ratings take the value of 1 for AA, 2 for AA+, and 3 for AAA.

are shown in Table 3. The coefficients of indirect benefits are significantly positive. When pricing restrictions are not implemented, an increase of 10% in the fiscal deposit share of municipal bond underwriters, relates to an increase of 1.37 bps in pricing difference for general bonds and an increase of 2.54 bps in pricing difference for special bonds. Similarly, an increase of 10% in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises, relates to an increase of 1.66 (1.31) bps in pricing difference for general bonds and an increase of 1.77 (1.66) bps in pricing difference for special bonds. As the pricing difference averages 7.5 bps for municipal bonds, the increase of pricing difference induced by indirect benefits are economically significant. These results demonstrate that without pricing restrictions, greater indirect benefits lead to higher pricing difference between primary and secondary markets, which indicates the more pronounced overpricing in the primary market.

[Table 3]

Besides, Table 4 examines the relationship between the primary market prices and indirect benefits from the perspective of the liquidity within three months after issuance. Panel A, B, and C of Table 4 respectively measure the liquidity with the number of weeks from issuance till the first trade occurs *FirstWeek*, the number of weeks with trades *SumWeek*, and the ratio of total trading volume to the outstanding amount *Turnover*. As the liquidity measures are censored, Tobit models are estimated in Table 4. In Table 4(A), the coefficients of indirect benefits are significantly positive. These results reveal that before pricing restrictions, an increase of 10% in the fiscal deposit share that is won by municipal bond underwriters, relates to 1.33 more weeks for general bonds and 1.83 more weeks for special bonds until the first trade occurs. Similarly, an increase of 10% in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises, relates to 1.01 (0.67) more weeks for general bonds and 1.86 (1.55) more weeks for special bonds until the first trade occurs.

[Table 4(A)]

In Table 4(B), the coefficients of indirect benefits are significantly negative. The results show that before pricing restrictions, an increase of 10% in the fiscal deposit share that is won by municipal bond underwriters, relates to 0.30 fewer traded week for general bonds and 0.30 fewer traded week for special bonds. Similarly, an increase of 10% in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises, relates to 0.24 (0.17) fewer traded week for general bonds and 0.33 (0.27) fewer traded week for special bonds. Considering the

number of weeks with trades averages 1.62 for municipal bonds, the decline of traded weeks induced by indirect benefits is economically significant.

[Table 4(B)]

In Table 4(C), the coefficients of indirect benefits are significantly negative. The results show that before pricing restrictions, an increase of 10% in the fiscal deposit share that is won by municipal bond underwriters, relates to a decrease of 2.84% in turnover general bonds and a decrease of 3.79% for special bonds. Similarly, an increase of 10% in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises, relates to a decrease of 1.90% (1.21%) in turnover for general bonds and a decrease of 4.56% (3.53%) in turnover for special bonds. Considering the turnover rates of municipal bonds are 21.7% on average and half of them are below 2.4%, the decline of the turnover rate induced by indirect benefits is of great economic significance. Therefore, the tests of different liquidity measures consistently show that without pricing restrictions, greater indirect benefits lead to lower liquidity shortly after issuance, which indicates the more pronounced overpricing in the primary market.

Taken together, it is shown that indirect benefits that bond underwriters can get from local governments lead to the issuance overpricing of municipal bonds. If no pricing restriction is implemented, the greater the indirect benefits that bond underwriters can get from local governments, the higher the price of municipal bonds in the primary market. That is, Hypothesis 1 is true.

[Table 4(C)]

5.2 Pricing Restrictions and Overpricing

For the test of Hypothesis 2, we first conduct the analysis from the perspective of issuance spreads of municipal bonds. The results are shown in Table 5. The coefficients of indirect benefits are all significantly negative, while the coefficients of the interaction terms of pricing restrictions and indirect benefits are all significantly positive. This shows that indirect benefits do play a role in lowering the issuance spreads of municipal bonds without pricing restrictions, but their role is weakened after pricing restrictions are implemented. To be specific, for general bonds, a 10% increase in the fiscal deposit share that is won by municipal bond underwriters leads to a 1.52 bps decrease in issuance spreads when there is no pricing restriction, but only a 0.46 bp decrease in issuance spreads when pricing restrictions are implemented. Pricing restrictions reduce the effects of indirect benefits from fiscal deposits to as much as 30% of its original effect. Similarly, when

there is no pricing restriction, a 10% increase in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises leads to a 1.35 (0.99) bps decrease in the issuance spreads of general bonds, but only a 0.41 (0.39) bp decrease after pricing restrictions. Pricing restrictions mitigate the effect of indirect benefits from SOE deposits to about 30% to 40% of its original effect. Pricing restrictions have a similar effect on the issuance spreads of special bonds. Therefore, after pricing restrictions, the negative correlation between municipal bond issuance spreads and indirect benefits is greatly weakened.

[Table 5]

As shown in Table 6, we next test Hypothesis 2 from the perspective of pricing difference between primary and secondary markets. The coefficients of indirect benefits are all significantly positive, while the coefficients of the interaction terms of pricing restrictions and indirect benefits are all significantly negative. This indicates that indirect benefits do increase the pricing difference between primary and secondary markets when pricing restrictions are not implemented, while this effect of indirect benefits is weakened after pricing restrictions. To be specific, for general bonds, when no pricing restriction is implemented, a 10% increase in the fiscal deposit share that is won by municipal bond underwriters leads to an increase of 1.33 bps in the pricing difference. However, after pricing restrictions, it only lead to a 0.10 bp increase of pricing difference. Pricing restrictions moderate the effects of indirect benefits from fiscal deposits on pricing difference to 8% of its original effect. Similarly, when no pricing restriction is implemented, a 10% increase in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises leads to a 1.42 (1.19) bps increase in the pricing difference of general bonds, but only a 0.25 (0.35) bp increase after pricing restrictions. Pricing restrictions reduce the effect of indirect benefits from SOE deposits to about 16% to 29% of its original effect. Pricing restrictions have a similar effect on the pricing difference of special bonds. Therefore, after pricing restrictions, the positive correlation between municipal bond pricing difference and indirect benefits is greatly weakened.

[Table 6]

Besides, we also test Hypothesis 2 from the perspective of liquidity shortly after issuance in Table 7. The Panel A, B, and C of Table 7 respectively measure the liquidity with the number of weeks from issuance till the first trade occurs *FirstWeek*, the number of weeks with trades *SumWeek*, and the ratio of total trading volume to the outstanding amount *Turnover*. As the liquidity measures are censored, Tobit models are estimated in Table 7.

In Table 7(A), the coefficients of indirect benefits are significantly positive, while the coefficients of the interaction terms between pricing restrictions and indirect benefits are significantly negative. This indicates that indirect benefits do inhibit the liquidity of municipal bonds shortly after issuance in the absence of pricing restrictions, while the inhibiting effect of indirect benefits on the liquidity is weakened or even eliminated after pricing restrictions. To be specific, for general bonds, when no pricing restriction is implemented, a 10% increase in the fiscal deposit share that is won by municipal bond underwriters leads to 1.16 more weeks until first trading occurs. Nevertheless, after pricing restrictions, the 10% increase only brings 0.22 more week until first trading occurs. Pricing restrictions reduce the effects of indirect benefits from fiscal deposits to only 19% of its original effect. Similarly, when no pricing restriction is implemented, a 10% increase in the sales (profit) share of state-owned industrial enterprises in domestic industrial enterprises leads to 0.96 (0.71) more week until first trading occurs. Nevertheless, after pricing restrictions, the effect of indirect benefits no longer exists. This suggests that pricing restrictions eliminate the role of indirect benefits from SOE deposits on constraining the liquidity shortly after issuance. Results are similar for special bonds, but the inhibiting effect of indirect benefits on the liquidity is just weakened and not yet eliminated. Table 7(B) and Table 7(C) also provide consistent results using the other two liquidity measures. All of the results show that after pricing restrictions, the correlation between the liquidity shortly after issuance and indirect benefits is greatly weakened.

[Table 7(A)]

[Table 7(B)]

[Table 7(C)]

Based on the above results, it is shown that pricing restriction significantly reduces the effect of indirect benefits on raising the prices of municipal bonds in the primary market. After pricing restrictions, the correlation between the primary market price of municipal bonds and indirect benefits that underwriters can get from local governments decreases significantly. In other words, Hypothesis 2 holds.

5.3 Pricing Restrictions and Price Discovery

For Hypothesis 3, we first focus on the changes in the correlation between issuance spreads and risk characteristics after pricing restrictions. As shown in Table 8, the coefficients of bond maturity, issuance amount, and local debt ratio are significantly positive, while the coefficients of

local fiscal self-sufficiency ratio and GDP growth rate are significantly negative. The signs of coefficients are consistent with the principle that the higher the risk, the higher the issuance spreads. Therefore, in the absence of pricing restrictions, the primary market realizes the effective price discovery. Focusing on the coefficients of the interaction terms of pricing restrictions and risk characteristics, we find that their signs are contrary to the signs of coefficients of corresponding risk characteristics. For example, Column (2) shows that when there is no pricing restriction, an increase of one standard deviation (26%) in the local debt ratio leads to an increase of 2.42 bps ($= 26\% \times 9.3$ bps) in the issuance spreads of general bonds. After pricing restrictions, however, an increase of one standard deviation in the local debt ratio only leads to an increase of 0.81 bps ($= 26\% \times (9.3 - 6.2)$ bps) in the issuance spreads. The correlation between issuance spreads of general bonds and local debt ratio drops to 33%. As for the relationship between issuance spreads and fiscal self-sufficiency ratio, when there is no pricing restriction, an increase of one standard deviation (16.9%) in local fiscal self-sufficiency ratio leads to a decrease of 2.87 bps ($= 16.9\% \times 17.0$ bps) in issuance spreads of general bonds. However, after pricing restrictions, the negative correlation between issuance spreads and local fiscal self-sufficiency ratio no longer exists. This shows that no matter positive risk indicators (e.g., the local debt ratio) and negative risk indicators (e.g., the local fiscal self-sufficiency ratio), their correlation with issuance spreads is significantly weakened for general bonds after pricing restrictions. Results are similar for special bonds. Therefore, pricing restrictions harm the price discovery in the primary market of municipal bonds.

[Table 8]

To further investigate whether the impact of pricing restrictions on price discovery only applies to the provinces of which issuance spreads are low, we divide the provinces into two groups depending on their municipal bonds' issuance spreads in 2018 prior to pricing restrictions, and test their price discovery respectively. Provinces whose average issuance spreads are above (below) the median are defined as the high-spread (low-spread) provinces. It is worth notice that for low-spread provinces, their average issuance spreads are right lower than 40 bps, while for the other provinces, their average issuance spreads are higher than 40 bps. As a result, the 2018 pricing restriction directly works on the low-spread provinces. We test the relationship between issuance spreads and risk characteristics for these two groups of provinces respectively. In Table 9, Columns (1)–(3) focus on general bonds, with Column (1) testing the relationship between issuance spreads and risk characteristics for all provinces when there is no pricing restriction,

Column (2) testing the relationship for provinces with ex-ante lower issuance spreads when pricing restrictions are implemented, and Column (3) testing the relationship for provinces with ex-ante higher issuance spreads when pricing restrictions are implemented. According to the significance and magnitude of the coefficients of risk characteristics in each column, we find that when there is no pricing restriction, risk characteristics are efficiently priced in the primary market of municipal bonds. Nevertheless, after pricing restrictions, the significance and magnitude of coefficients of risk characteristics are greatly weakened, and some coefficient signs are even reversed, no matter in the provinces directly affected by the pricing restrictions with lower issuance spreads or the provinces with higher issuance spreads. Columns (4)–(6) of Table 9, which focus on special bonds, provide similar results. Thus, pricing restrictions harm the price discovery not only in provinces that are directly affected by pricing restrictions with lower issuance spreads, but also in provinces with higher issuance spreads. The lower bound of issuance spreads given by regulation is no longer the concept of lower bounds in practice, but becomes the reference of issuance spreads for municipal bonds. Both the provinces that originally enjoy low issuance spreads and the provinces that originally bear high issuance spreads take the lower bound as the basis for their subsequent municipal bond pricing.

[Table 9]

Moreover, we investigate the changes of the correlation between the pricing difference and risk characteristics after pricing restrictions. The results are shown in Table 10. If pricing restrictions harm the price discovery in the primary market, the correlation between pricing difference and risk characteristics should be significantly enhanced. As shown in Table 10, the interaction terms of pricing restrictions and positive risk indicators, such as bond maturity and local debt ratio, are significantly positive. Meanwhile, the interaction terms of pricing restrictions and negative risk indicators, such as fiscal self-sufficiency rate and GDP growth rate, are significantly negative. Therefore, the price discovery that cannot be realized effectively in the primary market is reflected in the pricing difference between the primary and secondary markets.

[Table 10]

These results imply that pricing restrictions deteriorate the price discovery in the primary market, consistent with Hypothesis 3. Based on this, we test Hypotheses 4 to 5, to explore the further impacts after price discovery gets worse.

In Table 11 and Table 12, we examine the impacts on local governments' issuance of municipal bonds. Specifically, Table 11 compares the correlation between the total issuance amount and risk characteristics before and after pricing restrictions, while Table 12 compares the correlation between the amount-weighted bond maturity and risk characteristics before and after pricing restrictions. As reported in Table 11, the coefficients of local debt ratio and fiscal self-sufficiency ratio are significantly positive, indicating that local governments with more debt and better fiscal conditions issue more municipal bonds. This shows that the issuance of municipal bonds is both driven by demand and constrained by repaying capability. Local governments with more debt have a stronger demand to issue bonds, while for local governments with stronger finances, they have more capacity to issue debt. Both of them encourage local governments to issue more municipal bonds. The coefficients on interaction terms of pricing restrictions and risk characteristics are insignificant, but the coefficient is positive for the interaction terms of pricing restrictions and positive risk indicators (e.g., local debt ratio), and the coefficient is negative for the interaction terms of pricing restrictions and negative risk indicators (e.g., fiscal self-sufficiency ratio and GDP growth rate). This indicates that after pricing restrictions, the decision of local governments on the issuance amount of municipal bonds is not been significantly affected, but there is still a tendency for provinces with higher risks to issue more municipal bonds. The result that issuance amount of municipal bonds is not been significantly adjusted after pricing restrictions, may be related to the amount control and budget management of municipal bonds. According to Guofa [2014] No. 43, "the issuance amount of municipal bonds shall apply to quota management, and shall not exceed the approved quota. The quota, including general bonds and special bonds, shall be determined by the State Council and submitted to the National People's Congress or its standing committee for approval". Therefore, the issuance amount of municipal bonds may not actively respond to the primary market price.

[Table 11]

As shown in Table 12, the coefficient on the interaction term of pricing restrictions and local debt ratio is significantly positive, while the coefficient on the interaction term of pricing restrictions and fiscal self-sufficiency ratio is significantly negative. This reflects that after pricing restrictions, local governments' decision on the bond maturity of municipal bonds undergoes a significant change. Riskier provinces issue bonds of longer maturities. Therefore, part of Hypothesis 4 is valid. Although the price discovery deterioration brought by pricing restrictions

does not significantly affect the decision of local governments on the issuance amount of municipal bonds, it has significant impacts on their choice of bond maturities. After pricing restrictions, municipal bonds of longer maturities are allocated to provinces with higher risks, therefore the resource allocation efficiency of the municipal bond market decreases. In the case of effective resource allocation, investors demand higher term premium for issuers with higher risks, thus restricting the issuance of long-term bonds by riskier issuers. However, the term premium no longer exists after pricing restrictions hurt the price discovery. Therefore, riskier provinces no longer bear the term premium, and prefer to issue longer-term bonds at the same cost of capital. In this way, they successfully arbitrage to meet their financing needs. Consequently, long-term funds flow to provinces with higher risks, which is not conducive to the prevention and resolution of local government debt risks.

[Table 12]

We further examine the possible spillover effects of pricing restrictions on LGFV bonds in Table 13. The interaction term coefficients of pricing restrictions and risk characteristics are almost insignificant. Even if the interaction term coefficient between pricing restrictions and the bond maturity is significantly negative, the coefficient of the bond maturity itself is also significantly negative. The interaction term coefficient between pricing restrictions and local debt ratio is significantly positive, but the coefficient of local debt ratio itself is also significantly positive. Therefore, the price discovery in the primary market of LGFV bonds is not harmed or even enhanced to some extent by pricing restrictions, that is, Hypothesis 5 is not true. This indicates that investors do not take municipal bonds and LGFV bonds as substitutes. Combined with the significant difference between the issuance spreads of municipal bonds and LGFV bonds shown in Table 1, we can see that the issuance spreads required by investors for municipal bonds are much lower than those for LGFV bonds. This also makes the lower bounds of issuance spreads for municipal bonds non-binding for the primary market price of LGFV bonds.

[Table 13]

6. Conclusion

With a focus on the overpricing of municipal bonds in the primary market, this paper studies the reason of overpricing, as well as the impacts of pricing restrictions proposed to curb the overpricing. We first reveal that indirect benefits that bond underwriters can get from local

governments lead to the overpricing of municipal bonds in the primary market. A higher winning share of bond underwriters in the local treasury cash management tender and a higher proportion of state-owned economy in the local economy, significantly contribute to a lower issuance spread of municipal bonds, a larger pricing difference between the primary and secondary markets, and worse liquidity after issuance. Next, although pricing restrictions alleviate the overpricing issue, they seriously damage the price discovery of municipal bonds in the primary market. More importantly, risky bonds, which are now even more “overpriced”, have longer maturity, suggesting that local government takes advantage of the “mispricing” in their issuance choices.

The results of this paper have important policy implications for guiding the marketization of municipal bond pricing and promoting the high-quality development of the municipal bond market. The original intention of the regulatory authorities to put forward the pricing restrictions is to change the price distortion of municipal bonds in the primary market, so as to promote the marketization of municipal bond pricing. However, pricing restrictions “treat the symptoms rather than the root cause”, and even lead to more serious mispricing, i.e., the disappearance of price discovery. Therefore, in order to better realize the marketization of Chinese municipal bond pricing, we should not simply intervene in the price through administrative means, but should treat the overpricing issue from the reason instead. We should discourage the indirect benefits which drive bond underwriters to bear the low issuance spreads so that fundamentally bring the municipal bond market back to reasonable pricing and promote the sound development of local government debt.

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Table 1 Summary statistics**(A) Municipal bonds**

VARIABLES	N	Mean	SD	Min	P25	P50	P75	Max
ISpread	5196	0.256	0.123	0.002	0.244	0.250	0.301	0.512
Overprc	3602	0.075	0.116	-0.103	0.000	0.052	0.124	0.356
YSpread	3602	0.355	0.119	0.152	0.268	0.345	0.437	0.602
FirstWeek	5196	6.802	6.680	0	0	5	14	14
SumWeek	5196	1.620	2.417	0	0	1	2	14
Turnover	5196	0.217	0.351	0	0	0.024	0.280	1.208
CRN	5196	0.667	0.098	0.502	0.608	0.666	0.731	0.882
SalesShr	5196	0.331	0.158	0.123	0.206	0.273	0.488	0.629
ProfitShr	5196	0.367	0.181	0.125	0.221	0.311	0.530	0.686
Term	5196	9.374	6.755	3	5	7	10	30
IssueAmt	5196	42.37	42.39	1.530	8.768	26.13	63.00	147.5
Debt	5196	0.877	0.260	0.528	0.691	0.808	1.017	1.484
FiscalSelf	5196	0.487	0.169	0.250	0.376	0.438	0.619	0.825
Land	5196	0.615	0.270	0.131	0.407	0.560	0.842	1.036
GDPGrowth	5196	0.080	0.039	0.000	0.060	0.082	0.100	0.160
Restr	5196	0.554	0.497	0	0	1	1	1

(B) LGFV bonds

VARIABLES	N	Mean	SD	Min	P25	P50	P75	Max
ISpread	1061	1.706	0.676	0.801	1.172	1.572	2.139	3.161
CRN	1061	0.079	0.057	0	0.030	0.066	0.122	0.187
Rating	1061	2.516	0.658	1	2	3	3	3
Term	1061	4.310	1.194	3	3	5	5	7
IssueAmt	1061	12.38	6.928	4	7	10	15	30

Table 2 Issuance spreads and indirect benefits

VARIABLES	General Bond			Special Bond		
	(1)	(2)	(3)	(4)	(5)	(6)
	ISpread	ISpread	ISpread	ISpread	ISpread	ISpread
CRN	-0.184*** (-5.17)			-0.275*** (-7.28)		
SalesShr		-0.167*** (-5.85)			-0.247*** (-8.59)	
ProfitShr			-0.120*** (-4.91)			-0.221*** (-8.69)
LnTerm	0.062*** (6.74)	0.063*** (6.92)	0.063*** (6.85)	0.059*** (5.00)	0.057*** (4.86)	0.057*** (4.88)
LnIssueAmt	0.029*** (6.99)	0.025*** (5.90)	0.026*** (6.25)	0.004 (1.31)	0.004 (1.08)	0.004 (1.20)
Debt	0.097*** (6.92)	0.069*** (4.99)	0.074*** (5.38)	0.127*** (7.78)	0.105*** (6.54)	0.113*** (7.01)
FiscalSelf	-0.163*** (-7.14)	-0.234*** (-9.04)	-0.231*** (-8.61)	-0.205*** (-8.75)	-0.285*** (-11.16)	-0.303*** (-11.49)
Land	-0.016 (-0.78)	-0.064*** (-2.77)	-0.049** (-2.15)	0.082*** (3.58)	0.008 (0.30)	0.011 (0.46)
GDPGrowth	-0.322*** (-2.73)	-0.365*** (-3.11)	-0.343*** (-2.90)	-0.469*** (-3.48)	-0.619*** (-4.67)	-0.583*** (-4.40)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.485	0.489	0.484	0.497	0.506	0.506
Observations	1203	1203	1203	1114	1114	1114

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 3 Pricing difference and indirect benefits

VARIABLES	General Bond			Special Bond		
	(1) Overprc	(2) Overprc	(3) Overprc	(4) Overprc	(5) Overprc	(6) Overprc
CRN	0.137*** (3.22)			0.254*** (5.31)		
SalesShr		0.166*** (4.73)			0.177*** (4.30)	
ProfitShr			0.131*** (4.30)			0.166*** (4.77)
LnTerm	-0.026** (-2.35)	-0.027** (-2.41)	-0.027** (-2.40)	-0.048*** (-3.20)	-0.050*** (-3.28)	-0.049*** (-3.21)
LnIssueAmt	-0.005 (-0.96)	-0.001 (-0.18)	-0.001 (-0.28)	-0.001 (-0.30)	-0.001 (-0.12)	-0.001 (-0.29)
Debt	-0.051*** (-3.08)	-0.028* (-1.73)	-0.029* (-1.77)	-0.061*** (-2.87)	-0.041* (-1.96)	-0.045** (-2.13)
FiscalSelf	0.068** (2.39)	0.149*** (4.49)	0.153*** (4.39)	0.166*** (5.31)	0.224*** (6.39)	0.242*** (6.71)
Land	-0.055** (-2.15)	-0.007 (-0.27)	-0.014 (-0.49)	-0.086*** (-3.02)	-0.034 (-1.05)	-0.031 (-0.98)
GDPGrowth	0.505*** (3.53)	0.539*** (3.82)	0.475*** (3.33)	0.478*** (2.87)	0.534*** (3.19)	0.483*** (2.88)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.263	0.273	0.269	0.278	0.267	0.272
Observations	884	884	884	644	644	644

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Liquidity and indirect benefits

(A) The number of weeks till the first trade occurs within three months

VARIABLES	General Bond			Special Bond		
	(1) FirstWeek	(2) FirstWeek	(3) FirstWeek	(4) FirstWeek	(5) FirstWeek	(6) FirstWeek
CRN	13.349*** (3.90)			18.285*** (4.07)		
SalesShr		10.097*** (3.59)			18.575*** (5.08)	
ProfitShr			6.749*** (2.83)			15.473*** (4.96)
LnTerm	4.668*** (5.34)	4.617*** (5.27)	4.635*** (5.28)	5.030*** (3.59)	5.003*** (3.58)	5.014*** (3.59)
LnIssueAmt	-3.431*** (-8.31)	-3.181*** (-7.63)	-3.268*** (-7.85)	-2.835*** (-7.00)	-2.764*** (-6.87)	-2.807*** (-6.96)
Debt	-8.538*** (-6.37)	-6.683*** (-5.04)	-6.984*** (-5.29)	-5.155*** (-2.64)	-3.589* (-1.87)	-4.132** (-2.16)
FiscalSelf	1.205 (0.54)	5.702** (2.21)	5.194* (1.96)	12.249*** (4.26)	18.339*** (5.72)	19.037*** (5.82)
Land	-7.093*** (-3.50)	-4.237* (-1.90)	-5.256** (-2.40)	-9.665*** (-3.52)	-3.805 (-1.27)	-4.464 (-1.51)
GDPGrowth	29.279*** (2.60)	31.890*** (2.83)	30.124*** (2.67)	43.750*** (2.76)	51.287*** (3.26)	47.871*** (3.05)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.048	0.047	0.047	0.040	0.042	0.042
Observations	1203	1203	1203	1114	1114	1114

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Liquidity and indirect benefits

(B) The number of weeks with trades within three months

VARIABLES	General Bond			Special Bond		
	(1) SumWeek	(2) SumWeek	(3) SumWeek	(4) SumWeek	(5) SumWeek	(6) SumWeek
CRN	-3.010*** (-3.16)			-2.990*** (-3.08)		
SalesShr		-2.435*** (-3.10)			-3.274*** (-4.12)	
ProfitShr			-1.651** (-2.49)			-2.689*** (-3.97)
LnTerm	-1.834*** (-7.52)	-1.824*** (-7.47)	-1.827*** (-7.48)	-1.336*** (-4.40)	-1.334*** (-4.41)	-1.336*** (-4.41)
LnIssueAmt	1.284*** (10.98)	1.225*** (10.39)	1.244*** (10.57)	0.817*** (9.23)	0.806*** (9.14)	0.814*** (9.22)
Debt	1.928*** (5.19)	1.501*** (4.09)	1.566*** (4.29)	0.888** (2.10)	0.624 (1.50)	0.720* (1.73)
FiscalSelf	-1.138* (-1.82)	-2.232*** (-3.09)	-2.124*** (-2.86)	-3.498*** (-5.57)	-4.575*** (-6.54)	-4.683*** (-6.56)
Land	1.673*** (2.97)	0.971 (1.57)	1.201** (1.97)	1.497** (2.51)	0.442 (0.67)	0.573 (0.89)
GDPGrowth	-6.017* (-1.93)	-6.553** (-2.10)	-6.075* (-1.94)	-6.067* (-1.78)	-7.219** (-2.12)	-6.631* (-1.95)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.083	0.082	0.082	0.070	0.073	0.073
Observations	1203	1203	1203	1114	1114	1114

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Liquidity and indirect benefits

(C) The turnover rate within three months

VARIABLES	General Bond			Special Bond		
	(1)	(2)	(3)	(4)	(5)	(6)
	Turnover	Turnover	Turnover	Turnover	Turnover	Turnover
CRN	-0.284*** (-3.09)			-0.379*** (-2.84)		
SalesShr		-0.190** (-2.49)			-0.456*** (-4.15)	
ProfitShr			-0.121* (-1.89)			-0.353*** (-3.78)
LnTerm	-0.168*** (-7.13)	-0.167*** (-7.08)	-0.167*** (-7.09)	-0.157*** (-3.73)	-0.156*** (-3.72)	-0.156*** (-3.72)
LnIssueAmt	0.062*** (5.64)	0.058*** (5.17)	0.059*** (5.34)	0.039*** (3.24)	0.037*** (3.10)	0.038*** (3.19)
Debt	0.193*** (5.36)	0.155*** (4.37)	0.161*** (4.56)	0.137** (2.35)	0.104* (1.81)	0.117** (2.04)
FiscalSelf	-0.132** (-2.17)	-0.218*** (-3.10)	-0.204*** (-2.83)	-0.451*** (-5.20)	-0.606*** (-6.25)	-0.609*** (-6.16)
Land	0.166*** (3.02)	0.114* (1.89)	0.134** (2.28)	0.222*** (2.69)	0.076 (0.83)	0.102 (1.14)
GDPGrowth	-0.386 (-1.28)	-0.445 (-1.47)	-0.413 (-1.37)	-0.758 (-1.61)	-0.909* (-1.93)	-0.832* (-1.77)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.215	0.211	0.208	0.131	0.139	0.136
Observations	1203	1203	1203	1114	1114	1114

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5 Issuance spreads and indirect benefits: Before and after pricing restrictions

VARIABLES	General Bond			Special Bond		
	(1)	(2)	(3)	(4)	(5)	(6)
	ISpread	ISpread	ISpread	ISpread	ISpread	ISpread
CRN	-0.152*** (-5.83)			-0.104*** (-6.47)		
Restr × CRN	0.106*** (5.67)			0.048*** (4.32)		
SalesShr		-0.135*** (-6.00)			-0.147*** (-9.61)	
Restr × SalesShr		0.094*** (3.77)			0.051*** (3.48)	
ProfitShr			-0.099*** (-5.18)			-0.121*** (-9.12)
Restr × ProfitShr			0.060*** (2.68)			0.028** (2.20)
LnTerm	0.025*** (4.61)	0.025*** (4.65)	0.025*** (4.66)	0.008** (2.54)	0.006* (1.87)	0.007** (2.11)
LnIssueAmt	0.020*** (6.76)	0.016*** (5.45)	0.017*** (5.65)	0.002** (1.97)	0.002 (1.30)	0.002 (1.43)
Debt	0.064*** (6.46)	0.046*** (4.58)	0.051*** (5.12)	0.038*** (6.09)	0.033*** (5.34)	0.040*** (6.49)
FiscalSelf	-0.114*** (-7.24)	-0.162*** (-8.81)	-0.160*** (-8.49)	-0.096*** (-10.63)	-0.148*** (-13.88)	-0.154*** (-14.22)
Land	-0.026** (-2.14)	-0.051*** (-3.48)	-0.044*** (-3.18)	-0.001 (-0.22)	-0.030*** (-4.30)	-0.024*** (-3.69)
GDPGrowth	-0.099 (-1.41)	-0.139** (-1.96)	-0.132* (-1.86)	-0.099** (-2.54)	-0.129*** (-3.36)	-0.125*** (-3.25)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.501	0.498	0.495	0.482	0.491	0.491
Observations	1779	1779	1779	3417	3417	3417

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6 Pricing difference and indirect benefits: Before and after pricing restrictions

VARIABLES	General Bond			Special Bond		
	(1)	(2)	(3)	(4)	(5)	(6)
	Overprc	Overprc	Overprc	Overprc	Overprc	Overprc
CRN	0.133*** (4.14)			0.095*** (3.86)		
Restr × CRN	-0.123*** (-5.80)			-0.034** (-2.24)		
SalesShr		0.142*** (4.99)			0.059** (2.30)	
Restr × SalesShr		-0.117*** (-4.06)			-0.050** (-2.19)	
ProfitShr			0.119*** (4.99)			0.064*** (2.90)
Restr × ProfitShr			-0.084*** (-3.27)			-0.038* (-1.93)
LnTerm	-0.020*** (-3.25)	-0.021*** (-3.30)	-0.021*** (-3.33)	-0.023*** (-5.14)	-0.023*** (-5.08)	-0.023*** (-5.03)
LnIssueAmt	-0.002 (-0.62)	0.002 (0.42)	0.002 (0.46)	0.000 (0.18)	0.001 (0.52)	0.001 (0.46)
Debt	-0.025** (-2.09)	-0.010 (-0.84)	-0.012 (-1.00)	0.024** (2.36)	0.024** (2.40)	0.022** (2.25)
FiscalSelf	0.011 (0.59)	0.061*** (2.64)	0.067*** (2.82)	0.066*** (4.63)	0.075*** (4.44)	0.086*** (4.92)
Land	-0.007 (-0.50)	0.015 (0.87)	0.015 (0.91)	0.011 (1.24)	0.012 (1.10)	0.016 (1.60)
GDPGrowth	0.217*** (2.59)	0.263*** (3.12)	0.238*** (2.83)	0.103* (1.74)	0.117** (1.97)	0.113* (1.91)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.285	0.281	0.279	0.155	0.152	0.153
Observations	1396	1396	1396	2206	2206	2206

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7 Liquidity and indirect benefits: Before and after pricing restrictions

(A) The number of weeks till the first trade occurs within three months

VARIABLES	General Bond			Special Bond		
	(1) FirstWeek	(2) FirstWeek	(3) FirstWeek	(4) FirstWeek	(5) FirstWeek	(6) FirstWeek
CRN	11.615*** (4.95)			8.748*** (3.73)		
Restr × CRN	-9.429*** (-5.93)			-6.369*** (-4.12)		
SalesShr		9.556*** (4.64)			10.084*** (4.25)	
Restr × SalesShr		-11.694*** (-5.45)			-4.043* (-1.82)	
ProfitShr			7.145*** (4.14)			7.223*** (3.53)
Restr × ProfitShr			-8.682*** (-4.54)			-2.497 (-1.30)
LnTerm	1.893*** (4.06)	1.857*** (3.97)	1.874*** (4.00)	2.290*** (5.15)	2.352*** (5.29)	2.297*** (5.17)
LnIssueAmt	-2.211*** (-8.32)	-1.991*** (-7.44)	-1.999*** (-7.50)	-2.407*** (-13.53)	-2.369*** (-13.40)	-2.379*** (-13.45)
Debt	-4.127*** (-4.65)	-3.012*** (-3.37)	-3.144*** (-3.56)	3.564*** (3.86)	3.924*** (4.25)	3.518*** (3.80)
FiscalSelf	-1.271 (-0.90)	1.561 (0.94)	1.372 (0.81)	-0.528 (-0.40)	2.864* (1.81)	2.628 (1.63)
Land	-2.103* (-1.95)	-1.360 (-1.06)	-1.490 (-1.24)	-2.346*** (-2.70)	-0.377 (-0.37)	-1.047 (-1.10)
GDPGrowth	1.176 (0.19)	5.354 (0.87)	4.011 (0.65)	3.367 (0.60)	4.670 (0.83)	4.245 (0.75)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.052	0.051	0.050	0.033	0.033	0.032
Observations	1779	1779	1779	3417	3417	3417

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7 Liquidity and indirect benefits: Before and after pricing restrictions

(B) The number of weeks with trades within three months

VARIABLES	General Bond			Special Bond		
	(1) SumWeek	(2) SumWeek	(3) SumWeek	(4) SumWeek	(5) SumWeek	(6) SumWeek
CRN	-3.739*** (-4.08)			-1.883*** (-2.77)		
Restr × CRN	5.633*** (9.22)			3.010*** (6.79)		
SalesShr		-3.120*** (-3.80)			-1.710** (-2.45)	
Restr × SalesShr		4.325*** (5.13)			1.622** (2.50)	
ProfitShr			-2.182*** (-3.17)			-1.183* (-1.96)
Restr × ProfitShr			3.396*** (4.53)			0.963* (1.71)
LnTerm	-1.776*** (-9.85)	-1.733*** (-9.40)	-1.740*** (-9.43)	-1.398*** (-10.88)	-1.355*** (-10.44)	-1.350*** (-10.41)
LnIssueAmt	1.093*** (10.45)	0.992*** (9.24)	0.994*** (9.31)	1.001*** (19.30)	1.011*** (19.44)	1.013*** (19.47)
Debt	0.848** (2.46)	0.524 (1.48)	0.544 (1.56)	-0.942*** (-3.50)	-1.071*** (-3.94)	-1.042*** (-3.83)
FiscalSelf	1.180** (2.15)	0.382 (0.58)	0.545 (0.82)	0.864** (2.23)	0.511 (1.11)	0.475 (1.01)
Land	1.015** (2.43)	0.770 (1.51)	0.840* (1.77)	0.758*** (3.01)	0.520* (1.74)	0.519* (1.86)
GDPGrowth	0.613 (0.26)	-0.900 (-0.37)	-0.411 (-0.17)	-1.982 (-1.21)	-1.918 (-1.16)	-1.805 (-1.09)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.088	0.081	0.079	0.074	0.071	0.071
Observations	1779	1779	1779	3417	3417	3417

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7 Liquidity and indirect benefits: Before and after pricing restrictions

(C) The turnover rate within three months

VARIABLES	General Bond			Special Bond		
	(1)	(2)	(3)	(4)	(5)	(6)
	Turnover	Turnover	Turnover	Turnover	Turnover	Turnover
CRN	-0.560*** (-4.93)			-0.303** (-2.56)		
Restr × CRN	0.790*** (10.44)			0.427*** (5.51)		
SalesShr		-0.365*** (-3.57)			-0.313** (-2.57)	
Restr × SalesShr		0.686*** (6.55)			0.196* (1.73)	
ProfitShr			-0.262*** (-3.07)			-0.208** (-1.99)
Restr × ProfitShr			0.548*** (5.90)			0.090 (0.92)
LnTerm	-0.067*** (-3.02)	-0.060*** (-2.65)	-0.063*** (-2.74)	-0.022 (-1.01)	-0.018 (-0.79)	-0.016 (-0.72)
LnIssueAmt	0.020 (1.61)	0.009 (0.67)	0.008 (0.63)	0.069*** (7.68)	0.069*** (7.78)	0.070*** (7.82)
Debt	0.144*** (3.36)	0.104** (2.36)	0.099** (2.28)	-0.117** (-2.51)	-0.136*** (-2.90)	-0.126*** (-2.67)
FiscalSelf	0.162** (2.39)	0.091 (1.12)	0.109 (1.31)	0.213*** (3.17)	0.120 (1.49)	0.117 (1.44)
Land	0.152*** (2.96)	0.163*** (2.58)	0.156*** (2.66)	0.131*** (3.00)	0.070 (1.36)	0.080* (1.66)
GDPGrowth	0.135 (0.46)	-0.124 (-0.41)	-0.043 (-0.14)	-0.345 (-1.21)	-0.344 (-1.20)	-0.326 (-1.13)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.240	0.214	0.211	0.098	0.093	0.093
Observations	1779	1779	1779	3417	3417	3417

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8 Issuance spreads and risk characteristics: Before and after pricing restrictions

VARIABLES	General Bond				Special Bond			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ISpread	ISpread	ISpread	ISpread	ISpread	ISpread	ISpread	ISpread
LnTerm	0.048*** (6.48)	0.057*** (7.63)	0.061*** (8.17)	0.059*** (7.92)	0.036*** (5.61)	0.062*** (9.43)	0.061*** (9.35)	0.061*** (9.41)
Restr×LnTerm	-0.036*** (-3.76)	-0.053*** (-5.30)	-0.058*** (-5.87)	-0.055*** (-5.58)	-0.029*** (-4.40)	-0.062*** (-8.76)	-0.061*** (-8.84)	-0.061*** (-8.88)
LnIssueAmt	0.024*** (7.06)	0.028*** (8.01)	0.024*** (6.93)	0.025*** (7.19)	0.004* (1.68)	0.004** (2.13)	0.004* (1.78)	0.004** (1.97)
Restr×LnIssueAmt	-0.013** (-2.23)	-0.021*** (-3.60)	-0.018*** (-3.10)	-0.018*** (-3.12)	-0.003 (-1.29)	-0.005** (-2.05)	-0.004* (-1.72)	-0.005* (-1.87)
Debt	0.065*** (5.73)	0.093*** (7.96)	0.066*** (5.84)	0.069*** (6.12)	0.087*** (9.31)	0.130*** (13.43)	0.110*** (11.90)	0.117*** (12.59)
Restr×Debt	-0.001 (-0.06)	-0.062*** (-3.07)	-0.040** (-2.09)	-0.043** (-2.17)	-0.063*** (-6.03)	-0.126*** (-11.08)	-0.107*** (-9.90)	-0.114*** (-10.25)
FiscalSelf	-0.181*** (-9.35)	-0.170*** (-8.87)	-0.240*** (-11.47)	-0.243*** (-11.33)	-0.221*** (-15.57)	-0.201*** (-14.35)	-0.276*** (-19.02)	-0.294*** (-19.91)
Restr×FiscalSelf	0.235*** (8.05)	0.175*** (5.74)	0.254*** (8.82)	0.271*** (9.24)	0.210*** (12.58)	0.165*** (9.92)	0.239*** (14.41)	0.257*** (15.22)
Land	-0.021 (-1.21)	-0.023 (-1.29)	-0.069*** (-3.66)	-0.057*** (-3.09)	0.073*** (5.30)	0.086*** (6.33)	0.016 (1.14)	0.019 (1.36)
Restr × Land	0.028 (1.19)	0.024 (1.02)	0.082*** (3.31)	0.070*** (2.88)	-0.075*** (-5.06)	-0.095*** (-6.54)	-0.026* (-1.78)	-0.029** (-2.00)
GDPGrowth	-0.370*** (-3.66)	-0.321*** (-3.22)	-0.367*** (-3.70)	-0.343*** (-3.45)	-0.581*** (-6.82)	-0.474*** (-5.68)	-0.618*** (-7.48)	-0.583*** (-7.07)
Restr×GDPGrowth	0.533*** (3.81)	0.396*** (2.85)	0.412*** (2.97)	0.406*** (2.92)	0.596*** (6.28)	0.447*** (4.79)	0.591*** (6.42)	0.556*** (6.05)
CRN		-0.207*** (-7.33)				-0.262*** (-12.80)		
Restr×CRN		0.255*** (6.22)				0.275*** (12.08)		
SalesShr			-0.176*** (-7.84)				-0.236*** (-14.74)	
Restr×SalesShr			0.227*** (6.87)				0.236*** (12.71)	
ProfitShr				-0.134*** (-6.99)				-0.212*** (-15.03)
Restr×ProfitShr				0.190*** (6.18)				0.212*** (12.65)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.518	0.534	0.538	0.534	0.518	0.542	0.549	0.549
Observations	1779	1779	1779	1779	3417	3417	3417	3417

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 9 Issuance spreads and risk characteristics: Before and after pricing restrictions
(Low-spread provinces versus high-spread provinces)**

VARIABLES	General Bond			Special Bond		
	Restr=0	Restr=1	Restr=1	Restr=0	Restr=1	Restr=1
	(1)	Low-spread	High-spread	(4)	Low-spread	High-spread
	ISpread	ISpread	ISpread	ISpread	ISpread	ISpread
LnTerm	0.062*** (6.68)	0.001 (0.21)	0.001 (0.33)	0.060*** (4.97)	-0.000 (-0.10)	0.003 (1.16)
LnIssueAmt	0.029*** (6.84)	0.004 (1.62)	0.007** (2.26)	0.004 (1.16)	0.001 (0.78)	-0.000 (-0.39)
Debt	0.081*** (5.88)	0.015 (1.58)	0.014 (1.11)	0.114*** (6.87)	-0.002 (-0.50)	0.009 (1.37)
FiscalSelf	-0.163*** (-7.03)	-0.029*** (-2.60)	0.013 (0.51)	-0.194*** (-8.08)	-0.056*** (-9.89)	-0.005 (-0.41)
Land	-0.007 (-0.32)	-0.012* (-1.76)	0.010 (0.67)	0.099*** (4.26)	-0.015*** (-5.27)	-0.008 (-1.17)
GDPGrowth	-0.360*** (-3.03)	0.089** (2.02)	-0.057 (-0.79)	-0.580*** (-4.24)	-0.037* (-1.73)	-0.007 (-0.17)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.474	0.730	0.632	0.473	0.793	0.583
Observations	1203	288	288	1114	1155	1148

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 10 Pricing difference and risk characteristics: Before and after pricing restrictions

VARIABLES	General Bond				Special Bond			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overprc	Overprc	Overprc	Overprc	Overprc	Overprc	Overprc	Overprc
LnTerm	-0.023** (-2.35)	-0.026*** (-2.64)	-0.029*** (-2.92)	-0.028*** (-2.89)	-0.035*** (-3.38)	-0.054*** (-4.86)	-0.059*** (-5.30)	-0.057*** (-5.24)
Restr×LnTerm	-0.000 (-0.02)	0.005 (0.41)	0.010 (0.84)	0.009 (0.76)	0.011 (1.06)	0.033*** (2.85)	0.037*** (3.27)	0.037*** (3.22)
LnIssueAmt	-0.003 (-0.63)	-0.005 (-1.05)	-0.002 (-0.43)	-0.002 (-0.51)	0.000 (0.05)	-0.002 (-0.41)	-0.001 (-0.23)	-0.002 (-0.42)
Restr×LnIssueAmt	-0.001 (-0.10)	0.003 (0.36)	0.002 (0.27)	0.002 (0.26)	0.001 (0.29)	0.003 (0.75)	0.003 (0.70)	0.004 (0.86)
Debt	-0.034** (-2.41)	-0.050*** (-3.42)	-0.032** (-2.24)	-0.032** (-2.25)	-0.022 (-1.46)	-0.065*** (-3.92)	-0.051*** (-3.20)	-0.054*** (-3.38)
Restr × Debt	0.019 (0.89)	0.048** (1.99)	0.040* (1.77)	0.034 (1.45)	0.055*** (3.23)	0.113*** (5.89)	0.097*** (5.33)	0.103*** (5.56)
FiscalSelf	0.071*** (2.82)	0.068*** (2.71)	0.140*** (4.92)	0.145*** (4.96)	0.176*** (7.13)	0.159*** (6.45)	0.206*** (7.92)	0.223*** (8.40)
Restr×FiscalSelf	-0.168*** (-4.79)	-0.147*** (-3.98)	-0.190*** (-5.40)	-0.196*** (-5.48)	-0.158*** (-5.67)	-0.124*** (-4.38)	-0.195*** (-6.86)	-0.211*** (-7.27)
Land	-0.054** (-2.35)	-0.055** (-2.37)	-0.013 (-0.55)	-0.018 (-0.77)	-0.077*** (-3.40)	-0.092*** (-4.06)	-0.050** (-2.10)	-0.046** (-1.97)
Restr×Land	0.056* (1.92)	0.063** (2.14)	0.036 (1.18)	0.037 (1.23)	0.086*** (3.59)	0.109*** (4.55)	0.049** (2.01)	0.051** (2.08)
GDPGrowth	0.550*** (4.25)	0.504*** (3.89)	0.539*** (4.20)	0.479*** (3.71)	0.572*** (4.14)	0.481*** (3.50)	0.534*** (3.89)	0.488*** (3.54)
Restr×GDPGrowth	-0.561*** (-3.29)	-0.489*** (-2.84)	-0.511*** (-2.98)	-0.452*** (-2.63)	-0.550*** (-3.61)	-0.434*** (-2.85)	-0.484*** (-3.19)	-0.437*** (-2.87)
CRN		0.139*** (3.84)				0.239*** (6.80)		
Restr×CRN		-0.111** (-2.20)				-0.216*** (-5.62)		
SalesShr			0.155*** (5.29)				0.155*** (5.12)	
Restr×SalesShr			-0.113*** (-2.80)				-0.205*** (-6.13)	
ProfitShr				0.123*** (4.93)				0.149*** (5.75)
Restr×ProfitShr				-0.085** (-2.28)				-0.188*** (-6.37)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.294	0.301	0.307	0.305	0.172	0.189	0.186	0.187
Observations	1396	1396	1396	1396	2206	2206	2206	2206

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 11 Further impacts: Issuance amount and risk characteristics

VARIABLES	(1) LnTotalAmt	(2) LnTotalAmt	(3) LnTotalAmt	(4) LnTotalAmt
Debt	1.255*** (4.61)	1.085*** (3.63)	1.230*** (4.31)	1.340*** (4.77)
Restr × Debt	0.432 (1.26)	0.605 (1.32)	0.281 (0.68)	0.085 (0.19)
FiscalSelf	1.330*** (3.09)	1.250*** (2.84)	1.091** (2.34)	1.343*** (2.95)
Restr × FiscalSelf	-0.606 (-1.02)	-0.498 (-0.76)	-0.662 (-1.11)	-0.529 (-0.89)
Land	0.532 (1.25)	0.555 (1.28)	0.282 (0.61)	0.552 (1.25)
Restr × Land	0.440 (0.83)	0.509 (0.95)	0.532 (0.98)	0.542 (1.01)
GDPGrowth	-2.629 (-1.05)	-2.450 (-0.98)	-2.500 (-1.00)	-2.555 (-1.02)
Restr × GDPGrowth	-0.081 (-0.03)	-0.285 (-0.09)	-0.490 (-0.15)	-0.637 (-0.20)
CRN		1.891*** (2.65)		
Restr × CRN		-0.334 (-0.39)		
SalesShr			-0.878 (-1.58)	
Restr × SalesShr			0.574 (0.79)	
ProfitShr				-0.191 (-0.41)
Restr × ProfitShr				0.841 (1.22)
Year FE	Yes	Yes	Yes	Yes
Adj. R ²	0.053	0.056	0.053	0.053
Observations	1942	1942	1942	1942

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 12 Further impacts: Bond maturity and risk characteristics

VARIABLES	(1) LnvwTerm	(2) LnvwTerm	(3) LnvwTerm	(4) LnvwTerm
Debt	-0.059 (-1.43)	-0.009 (-0.19)	-0.071 (-1.61)	-0.044 (-1.03)
Restr × Debt	0.174*** (3.69)	0.044 (0.69)	0.173*** (3.06)	0.124** (2.09)
FiscalSelf	-0.004 (-0.05)	0.055 (0.74)	-0.060 (-0.76)	-0.019 (-0.23)
Restr × FiscalSelf	-0.360*** (-3.98)	-0.478*** (-4.91)	-0.366*** (-4.05)	-0.341*** (-3.73)
Land	-0.114* (-1.68)	-0.065 (-0.96)	-0.158** (-2.19)	-0.117* (-1.66)
Restr × Land	0.127 (1.62)	0.074 (0.93)	0.130 (1.64)	0.139* (1.76)
GDPGrowth	0.110 (0.26)	0.114 (0.28)	0.143 (0.34)	0.148 (0.35)
Restr × GDPGrowth	-0.343 (-0.69)	-0.558 (-1.12)	-0.362 (-0.72)	-0.458 (-0.91)
CRN		0.020 (0.18)		
Restr × CRN		0.382*** (3.17)		
SalesShr			-0.145* (-1.69)	
Restr × SalesShr			0.025 (0.24)	
ProfitShr				-0.069 (-0.92)
Restr × ProfitShr				0.139 (1.43)
Year FE	Yes	Yes	Yes	Yes
Adj. R ²	0.540	0.547	0.540	0.540
Observations	957	957	957	957

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 13 Further impacts: Spillover effects on LGFV bonds

VARIABLES	(1) ISpread	(2) ISpread	(3) ISpread	(4) ISpread
AA+	-0.268*** (-3.47)	-0.259*** (-3.36)	-0.253*** (-3.28)	-0.242*** (-3.13)
AAA	-0.698*** (-8.07)	-0.678*** (-7.80)	-0.692*** (-8.05)	-0.685*** (-7.96)
Restr × AA+	0.668 (1.54)	0.723* (1.67)	0.176 (0.36)	0.404 (0.82)
Restr × AAA	0.714 (1.58)	0.773* (1.70)	0.227 (0.44)	0.460 (0.90)
LnTerm	-0.252** (-2.20)	-0.256** (-2.24)	-0.245** (-2.15)	-0.241** (-2.12)
Restr × LnTerm	-0.448*** (-2.96)	-0.468*** (-3.08)	-0.417*** (-2.76)	-0.415*** (-2.74)
LnIssueAmt	0.004 (0.07)	0.019 (0.36)	-0.001 (-0.01)	-0.002 (-0.03)
Restr × LnIssueAmt	-0.111 (-1.48)	-0.116 (-1.54)	-0.121 (-1.62)	-0.112 (-1.50)
Debt	0.270** (2.11)	0.263** (2.06)	0.252** (1.98)	0.213* (1.65)
Restr × Debt	0.314* (1.66)	0.305 (1.62)	0.371** (1.97)	0.341* (1.81)
Land	-0.204 (-1.30)	-0.198 (-1.26)	-0.061 (-0.34)	0.025 (0.14)
Restr × Land	-0.108 (-0.58)	-0.108 (-0.58)	0.119 (0.52)	-0.065 (-0.29)
FiscalSelf	-0.333** (-2.09)	-0.294* (-1.84)	-0.291* (-1.82)	-0.194 (-1.16)
Restr × FiscalSelf	-0.346 (-1.53)	-0.349 (-1.54)	-0.126 (-0.53)	-0.163 (-0.65)
GDPGrowth	0.016 (0.02)	0.287 (0.30)	0.066 (0.07)	-0.017 (-0.02)
Restr × GDPGrowth	0.804 (0.73)	0.606 (0.55)	0.452 (0.41)	0.682 (0.62)
CRN		-0.834* (-1.90)		
Restr × CRN		0.128 (0.21)		
SalesShr			0.327 (1.62)	
Restr × SalesShr			0.512 (1.63)	
ProfitShr				0.500** (2.54)
Restr × ProfitShr				0.165 (0.58)
Year FE	Yes	Yes	Yes	Yes
Adj. R ²	0.410	0.412	0.417	0.418
Observations	1061	1061	1061	1061

Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

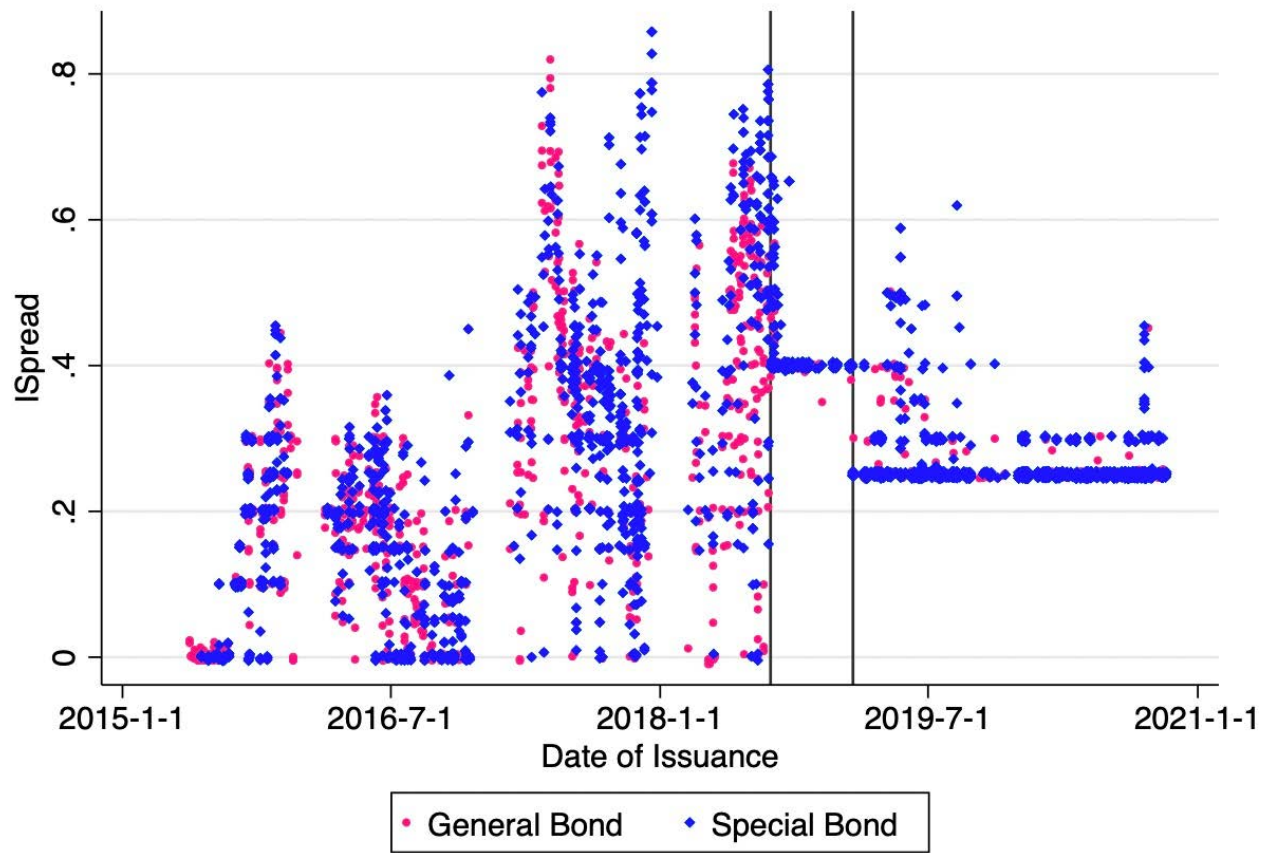


Figure 1 Issuance spreads of municipal bonds over time

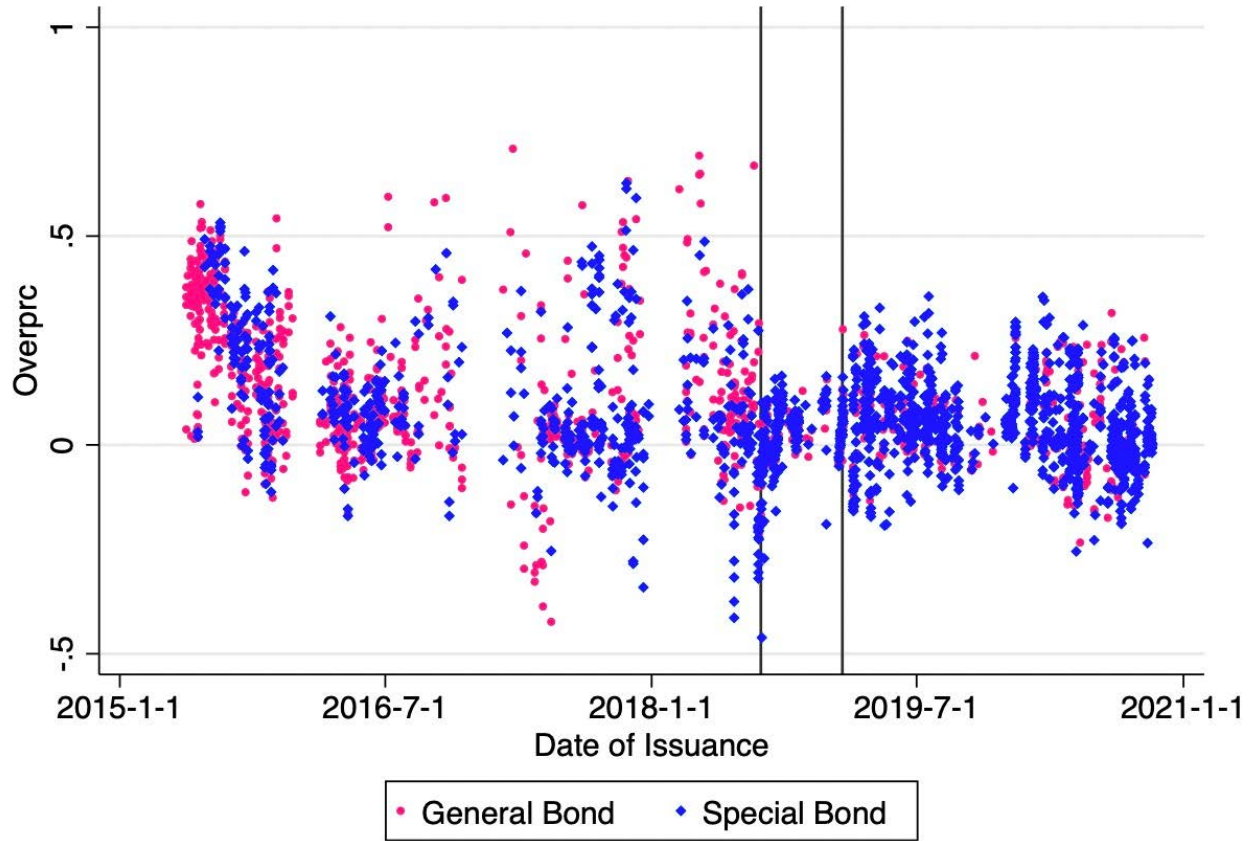


Figure 2 Pricing difference of municipal bonds over time

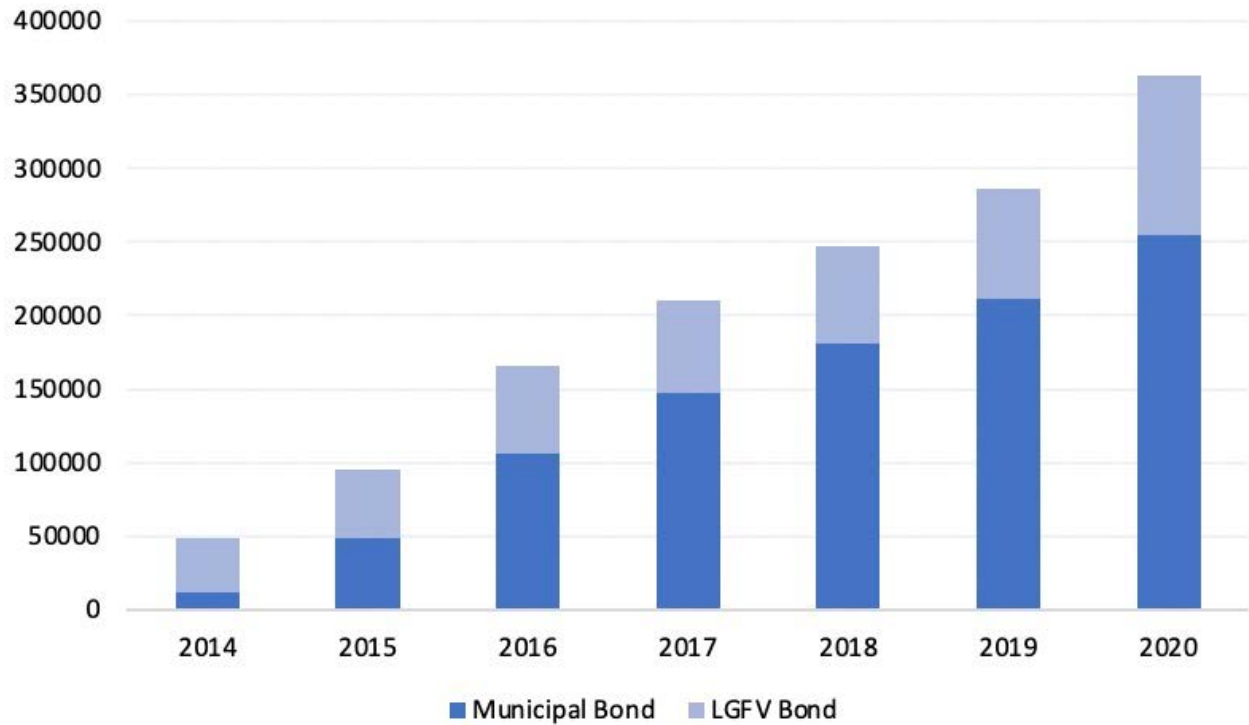


Figure 3 Outstanding amount of municipal bonds and LGFV bonds over time