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Many hands make light work: Evidence from China’s anti-epidemic bonds

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ABSTRACT

Based on China’s anti-epidemic bond data, this paper investigates stock market reactions to the anti-epidemic bond issuance announcements during the COVID-19 pandemic. We find that anti-epidemic bond issuance significantly increases the cumulative abnormal return (CAR) compared with conventional bond issuance.

1. Introduction

Since early 2020, the outbreak and rapid spread of the novel coronavirus (COVID-19) has plunged the global economy and posed great threats to the survival of enterprises that face production and consumer demand shut-down, even many enterprises go broke due to insufficient liquidity, shortage of supply and other market problems. To address the epidemic and support enterprises in coping with difficulties, China has formulated a series of market-based policies for epidemic prevention and control. One of the most effective market-based policies is anti-epidemic bonds, which are used as a new refinancing tool to alleviate financing constraints, and the cumulative bond issue exceeds 2.31 trillion RMB from 2020 to 2021, making China the world’s largest anti-epidemic bond market. According to the relevant policies of China, anti-epidemic bonds have faster issuance speed and focus on supporting enterprises in severely affected areas and industries. Meanwhile, the funds raised must be used in portion for epidemic prevention. Thus, anti-epidemic bonds can effectively replenish the liquidity of issuers and be conducive to epidemic prevention and control.

Therefore, as a key market-based epidemic control policy, how the capital market reacts to anti-epidemic bonds during the pandemic shock is especially important but still neglected by scholars. Given that the epidemic prevention situation remains grim worldwide, it is necessary to evaluate the effect of anti-epidemic bonds to stimulate market vitality and achieve the epidemic control goal as soon as possible. Nozawa and Qiu (2021) document that the rising default risk of firms that face cash shortfalls due to the outbreak is a key concern among the major issues facing the economy; thus, liquidity support offered by anti-epidemic bonds can mitigate risk and instill confidence in the market.

Based on the above, our study focuses on a nascent rise in anti-epidemic bonds in China and examines the stock market reaction of anti-epidemic bonds. First, we calculate the abnormal stock returns by a market model at bond issuance announcements and find that stock market reactions are statistically more active for anti-epidemic bond issuance announcements than for conventional bond issuance announcements. Second, we dissect channels through which market investors provide support to anti-epidemic bonds. Mechanism test results show that anti-epidemic bonds can enhance enterprises’ ability to resist risks during the pandemic. Last, we find that the CAR of anti-epidemic bonds is significantly heterogeneous between different severity degrees of epidemic situations, and equity investors expect a higher valuation of the “anti-epidemic” flag during the outbreak.

The relevant literature that investigates the effect of financial policy on the bond market during the COVID-19 pandemic mainly focuses on quantitative easing monetary policy (O’Hara and Zhou, 2021; D’Amico et al., 2020; Nozawa and Qiu, 2021). This paper...
contributes to the nascent literature by exploiting the market-based epidemic control policy in the largest developing economy, which also suffers the outbreak first. This paper also complements international findings about stock market reactions to special bonds, such as green bonds (Wang et al., 2020), and new perspectives about bond spillover effects on the stock market (Reboredo, 2018) by dissecting stock market reactions to anti-epidemic bond issuance announcements.

2. Sample and data

2.1. Sample selection

Determined by the issuance of the first anti-epidemic corporate bond in February 2020, the anti-epidemic corporate bond sample data are from February 2020 to December 2021. We collect all bond data with an anti-epidemic flag and match the bond characteristics, firm information and stock trading data from the Wind database. The initial anti-epidemic bond sample comprises 800 bonds. To examine the reaction of the stock market, we focus on bonds issued by listed companies in the Chinese stock market. There are 179 anti-epidemic bonds issued by 122 listed corporates among the initial sample. For these anti-epidemic bond issuers, we extract all conventional bond issuance announcements from 2018 to 2021 and then delete convertible bonds, exchangeable bonds, subordinated bonds, commercial bank bonds and negotiable certificates of deposit. At last we remove bonds with issuance date interval less than 10 days. The final sample consists of 85 anti-epidemic bonds and 381 conventional bonds from 74 listed corporate issuers.

2.2. Event study method

The event study method (ESM) is widely used in financial studies to identify the impacts of a certain event (Afik et al., 2019). Following Dutordoir et al. (2014), we use the estimation period of [-50, -6] prior to the first announcement date of a bond issue (t=0) and use [-5, 5] as the event window. We calculate cumulative abnormal return (CAR) using a market model (with Shanghai and Shenzhen 300 index as the market factor). The average abnormal return (AAR) and cumulative abnormal return (CAR) are calculated based on the existing literature (Keele and Dehart, 2011). The model is as follows:

\[ R_{kt} = \alpha_i + \beta_i R_{mt} + \epsilon_{kt} \quad (1) \]

where \( R_{kt} \) is the return rate of the market index, \( R_{it} \) is the actual return rate of the individual stock, \( \alpha_i \) and \( \beta_i \) are the estimated parameters, and the residual is the abnormal return (AR). Based on each stock’s AR, we calculate the cumulative abnormal return (CAR).

2.3. Model specification

To isolate the impact of anti-epidemic labels on market reactions, we perform rigorous multivariate regressions to examine the stock market response to anti-epidemic bond issuance. Following Godlewski et al. (2013), we construct a multivariate regression model as follows:

\[ CAR_{i,(t1,t2)} = \alpha_i + \beta_1 \text{Antiepi} + \sum j \text{Firm Characteristics}_{j,i} \]
\[ + \beta_k \sum k \text{Bond Characteristics}_{k,i} + \epsilon_i \quad (2) \]

where \( CAR_{i,(t1,t2)} \) refers to the CAR of bond \( i \) with event window \((t1,t2)\). \( \text{Antiepi} \) is a dummy variable equal to 1 if the bond is an anti-epidemic bond and 0 otherwise. The literature on bond issuance shows that bond and firm characteristics may affect equity investors’ reactions (Spiess and Affleck-Graves, 1999; Bradshaw et al., 2006; Godlewski et al., 2013). Following previous studies, the set of firm-level control variables and bond-level characteristics is provided in Table 1. Firm-specific control variables are lagged using the fiscal year prior to the bond issuance announcement date.

The coefficient \( \beta_1 \) is the main element of interest in the regression model (2). We argue that anti-epidemic bond issuance will deliver a positive signal to shareholders about extra liquidity and anti-epidemic activities. Thus, we expect the coefficient \( \beta_1 \) to be positive and statistically significant.

Next, to verify the risk-resistance mechanism, we examine whether issuing anti-epidemic bonds can enhance a firm’s risk-resistance capacity. We measure firm risk via the beta coefficient during the outbreak of COVID-19. According to the literature (Barton, 1988), the beta coefficient can more objectively measure the market risk that enterprises are facing from the perspective of investors. To capture the determinants of the firm’s beta coefficient, we employ a regression as follows:

\[ Beta_n = \alpha_n + \beta_1 \text{Antiepi} + \sum j \text{Firm Characteristics}_{j,n} + \epsilon_n \quad (3) \]

where \( Beta_n \) refers to the beta coefficient of firm \( n \) during the outbreak of COVID-19. We calculate the beta coefficient over the period from the lockdown time of January 23, 2020, to some days later. \( \text{Antiepi} \) is a dummy variable equal to 1 if a firm issued anti-epidemic bonds during the calculated period and 0 otherwise. Firm-specific control variables are the same as model (2).

Table 1: Variable definitions.

| Variable       | Definition                                                                 |
|----------------|---------------------------------------------------------------------------|
| CAR            | Cumulative abnormal return calculated using a market model (with Shanghai and Shenzhen 300 index as the market factor) over the event window. |
| Antiepi        | A dummy variable equals to 1 for anti-epidemic bond, and 0 for conventional bond. |
| Antiepi_issue  | A dummy variable equals to 1 for anti-epidemic bond issuers, and 0 for other listed firms. |
| Size           | Natural logarithm of the book value of total assets.                        |
| Leverage       | Total debt divided by total assets, reported in percentage.                |
| RDA            | Net profits divided by total assets, reported in percentage.               |
| ShareConcent   | The proportion of all common shares held by top five shareholders, reported in percentage. |
| Soe            | A dummy variable equals to 1 for state-owned firm, and 0 for private firm. |
| BondSize       | Bond issuing volume (in CNY billions).                                    |
| Maturity       | Maturity of bond, using years as a unit.                                   |
| Coupon         | Coupon rate of bond, reported in percentage.                              |
| Rating         | A count variable of credit rating, where 8 represents AAA, 7 represents AA+, 6 is AA, 5 is AA-, 4 is A+, 3 is A, 2 is A-, 1 is BBB and 0 otherwise. |
| Callable       | A dummy variable equals to 1 if a bond is callable and 0 otherwise.       |
| Putable        | A dummy variable equals to 1 if a bond is putable and 0 otherwise.        |
| Beta           | Firm’s beta coefficient of during the outbreak of COVID-19.               |

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where \( Beta_n \) refers to the beta coefficient of firm \( n \) during the outbreak of COVID-19. We calculate the beta coefficient over the period from the lockdown time of January 23, 2020, to some days later. \( \text{Antiepi} \) is a dummy variable equal to 1 if a firm issued anti-epidemic bonds during the calculated period and 0 otherwise. Firm-specific control variables are the same as model (2).
Table 2
Summary statistics for anti-epidemic and conventional bonds.

| Variable | N | Mean | Median | Std. Dev. | Min | Max |
|----------|---|------|--------|-----------|-----|-----|
| Panel A: Firm characteristics |
| Size | 74 | 22.445 | 22.324 | 1.117 | 18.355 | 25.208 |
| Leverage | 74 | 62.718 | 64.498 | 13.805 | 23.078 | 92.461 |
| ROA | 74 | 3.264 | 2.402 | 2.906 | −2.639 | 17.739 |
| ShareConcen | 74 | 57.066 | 56.310 | 15.422 | 24.990 | 91.920 |
| ShareInst | 74 | 53.416 | 53.892 | 22.005 | 0.000 | 91.152 |
| Soe | 74 | 0.622 | 1.000 | 0.465 | 0.000 | 1.000 |
| Panel B: Bond characteristics |
| Anti-epidemic bonds |
| BondSize | 85 | 1.010 | 0.650 | 0.937 | 0.080 | 5.800 |
| Maturity | 85 | 2.279 | 2.000 | 2.817 | 0.082 | 24.016 |
| Coupon | 85 | 3.721 | 3.380 | 1.208 | 1.820 | 6.800 |
| Rating | 85 | 3.264 | 2.402 | 2.906 | −2.639 | 17.739 |
| Callable | 85 | 0.024 | 0.000 | 0.152 | 0.000 | 1.000 |
| Putable | 85 | 0.153 | 0.000 | 0.362 | 0.000 | 1.000 |
| Conventional bonds |
| BondSize | 381 | 1.423 | 1.000 | 1.286 | 0.001 | 10.500 |
| Maturity | 381 | 2.954 | 3.000 | 2.178 | 0.082 | 26.326 |
| Coupon | 381 | 3.977 | 3.850 | 1.377 | 0.000 | 10.000 |
| Rating | 381 | 3.264 | 2.402 | 2.906 | −2.639 | 17.739 |
| Callable | 381 | 0.050 | 0.000 | 0.218 | 0.000 | 1.000 |
| Putable | 381 | 0.181 | 0.000 | 0.386 | 0.000 | 1.000 |
| Panel C: Equality Tests |
| Differences in Means | Differences in Medians |
| BondSize | −0.413*** (0.005) | −0.350*** (0.002) |
| Maturity | −0.675** (0.015) | −1.000*** (0.000) |
| Coupon | −0.256 (0.114) | −0.470*** (0.003) |
| Rating | −0.350*** (0.000) | −1.000*** (0.000) |
| Callable | −0.026 (0.291) | 0.000 (0.290) |
| Putable | −0.028 (0.539) | 0.000 (0.538) |

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Fig. 1. Changes in CAR in [−5, 5] for anti-epidemic and conventional bond issuances.

3. Empirical results

3.1. Descriptive statistics

Table 2 reports the characteristics of anti-epidemic bond issuers and bonds. Panel A reports the summary statistics of anti-epidemic bond issuers’ firm characteristics. Panel B reports the summary statistics of bond characteristics. The mean value of Maturity is 2.279; that is, most anti-epidemic bonds are mid-long-term financial tools. The majority of anti-epidemic bonds, approximately 3/4, are rated as AAA, and the remaining bonds are rated mainly as AA+. Panel C compares the bond characteristics of anti-epidemic and conventional bonds in means (t-test) and medians (wilcoxon test).

3.2. Event study results

Fig. 1 depicts the market reactions to the two kinds of bond issuance announcements, which are significantly different, with a large scale increase in anti-epidemic bonds’ CAR and obvious decrease in conventional bonds’ CAR.

Table 3 shows the CAR around the bond issuance announcement date and the average differences in CAR between anti-epidemic bonds and conventional bonds. As shown in the second column, the CAR for anti-epidemic bonds varies between 0.007 and 0.039, and anti-epidemic bonds yield significant positive market reactions. Apparently, anti-epidemic bonds have a higher CAR than conventional bonds, and the differences in CAR are statistically significant at any event window according to the t-statistics reported in the last column.

3.3. Regression results

Table 4 reports the baseline results. CAR is calculated over the event window [−1,1] (columns 1–3) and [−3,3] (columns 4–6). The coefficients of Antiepi are all positive and significant at the 5% or higher level. The results indicate that the “anti-epidemic”
flag can strongly induce a positive stock reaction, and the positive cumulative abnormal returns suggest that the "anti-epidemic" label attached to corporate bonds adds value to shareholders.

3.4. Robustness

In this section, considering the sensitivity of estimation periods and event windows to the empirical results, we further check the changes in CAR in different estimation periods and event windows following Yi et al. (2021). As shown in Fig. 2, the CAR of anti-epidemic bonds obviously increases around the announcement date, while the CAR of conventional bonds significantly decreases, and such changes are highly consistent with those in Fig. 1.

Then, we regress model (2) using alternative CAR calculated by using the standard Fama–French 3 and 5 factor model (Fama and French, 1993, 2015). As shown in Table 6, the coefficients of Antiepi are almost positive and significant at the 10% or higher level.

3.5. Mechanism analysis

Table 7 reports the mechanism inspection results. We use different epidemic periods to calculate Beta for each firm and regress model (3). Columns 1–4 depict the impacts of anti-epidemic bonds on firm risk during the outbreak of COVID-19. In column 1–4, we extract Beta from January 23, 2020, to 30 days, 50 days, 100 days, and 200 days later, respectively, and assign Antiepi_issue equal to 1 if a firm issues anti-epidemic bonds during the same period. The coefficient of Antiepi_issue is negative and significant. The results indicate that anti-epidemic bond issuance has a clear enhancement effect on firm’s anti-risk capacity.

Finally, we regress model (2) using alternative CAR calculated by using the standard Fama–French 3 and 5 factor model (Fama and French, 1993, 2015). As shown in Table 6, the coefficients of Antiepi are almost positive and significant at the 10% or higher level.
Table 5
The robust test using alternative CAR with different event windows and estimation periods.

|                      | [0, 0] | [−2, 2] | [−5, 5] | [0, 0] | [−1, 1] | [−3, 3] | [−5, 5] |
|----------------------|--------|---------|---------|--------|---------|---------|---------|
|                      | (1)    | (2)     | (3)     | (4)    | (5)     | (6)     | (7)     | (8)     |
| **Constant**         | 0.003  | 0.009 **| 0.017   | 0.001  | 0.001   | 0.001   | 0.001   | 0.001   |
| **Rating**           | −0.028** | 0.147*** | 0.322*** | 0.009  | 0.028** | 0.063*** | 0.100*** | 0.148*** |
| **Roa**              | 0.009** | 0.012*  | 0.026** | 0.033** | 0.008*  | 0.010   | 0.025** | 0.029*  |
| **Putable**          | 0.005  | 0.030   | 0.004   | 0.002  | 0.025   | 0.023   | 0.005   | 0.003   |
| **Maturity**         | −0.002 | 0.012*  | 0.014   | −0.002 | 0.004   | 0.012*  | 0.016** | 0.016*  |
| **Coupon**           | 0.163  | 0.046   | 0.061   | 0.002  | 0.002   | 0.002   | 0.007   | 0.006   |
| **Callable**         | 0.095  | 0.030   | 0.004   | 0.027  | 0.154   | 1.19    | 0.194   | 0.17    |
| **Potable**          | −0.005 | 0.006   | 0.000   | −0.002 | 0.002   | 0.002   | 0.007   | 0.006   |
| **Constant**         | −0.034 | 0.036   | 0.006   | −0.022 | 0.004   | 0.006   | 0.025   | 0.041   |
| **R2**               | 0.131  | 0.213   | 0.257   | 0.099  | 0.104   | 0.157   | 0.174   | 0.191   |

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The values in parentheses are t-values that are calculated by robust standard errors clustered at the firm level. Year FE means year fixed effect, and Ind FE means industry fixed effect.

Table 6
The robust results using alternative CAR with Fama–French models.

|                      | [0, 0] | [−1, 1] | [−3, 3] | [−5, 5] | [0, 0] | [−1, 1] | [−3, 3] | [−5, 5] |
|----------------------|--------|---------|---------|---------|--------|---------|---------|---------|
|                      | (1)    | (2)     | (3)     | (4)     | (5)    | (6)     | (7)     | (8)     |
| **Antiepi**          | 0.009** | 0.012*  | 0.026** | 0.033** | 0.008* | 0.010   | 0.025** | 0.029*  |
| **Size**             | 0.000  | −0.006  | −0.019** | −0.028** | −0.003 | −0.019** | −0.029** | −0.043** |
| **Leverage**         | 0.009  | −0.001  | −0.010  | 0.002   | 0.015  | 0.004   | −0.002  | 0.001   |
| **Roa**              | 0.027  | 0.089   | 0.097   | 0.119   | 0.028  | 0.070   | 0.116   | 0.207   |
| **Callable**         | 0.000  | 0.010   | 0.016   | 0.018   | −0.002 | −0.017  | −0.021  | −0.028   |
| **Coupon**           | 0.008  | 0.053   | 0.026   | 0.017   | 0.057  | 0.006   | 0.022  | 0.005   |
| **Maturity**         | −0.003 | 0.001   | 0.009   | 0.008   | −0.004 | −0.000  | 0.005   | 0.001   |
| **Callable**         | 0.005  | 0.019   | 0.019   | 0.012   | 0.005  | 0.034*  | 0.027   | 0.011   |
| **Potable**          | 0.002  | 0.004   | 0.024   | 0.010   | 0.002  | 0.022   | 0.032  | 0.016   |
| **R2**               | 0.124  | 0.231   | 0.78    | 1.80    | 0.117  | 1.00    | 0.70    | 0.179   |

(continued on next page)
Table 6 (continued).

|                | Fama–French 3 factor model |                | Fama–French 5 factor model |
|----------------|-----------------------------|-----------------------------|-----------------------------|
|                | [0, 0] | [−1, 1] | [−3, 3] | [−5, 5] | [0, 0] | [−1, 1] | [−3, 3] | [−5, 5] |
|                | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    | (7)    | (8)    |
| Constant       | −0.014 | 0.020  | 0.013  | 0.021  | −0.020 | −0.009 | 0.022  | 0.033  |
|                | (−0.37) | (0.37) | (0.15) | (0.16) | (−0.52) | (−0.12) | (0.20) | (0.21) |
| Year FE        | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    |
| Ind FE         | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    |
| Obs            | 423    | 423    | 423    | 423    | 423    | 423    | 423    | 423    |
| R²             | 0.088  | 0.199  | 0.235  | 0.305  | 0.146  | 0.143  | 0.193  | 0.253  |

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. CAR is calculated with an estimation period of [−300, −46]. The values in parentheses are t-values that are calculated by robust standard errors clustered at the firm level. Year FE means year fixed effect, and Ind FE means industry fixed effect.

Fig. 2. Changes in CAR calculated with different methods.

Table 7

The regression results of the impact mechanism.

| Beta coefficient during the outbreak | Jan. 23−30+ | Jan. 23−50+ | Jan. 23−100+ | Jan. 23−200+ |
|-------------------------------------|-------------|-------------|--------------|--------------|
|                                     | (1)         | (2)         | (3)          | (4)          |
| Antiepi_issue                       | −0.180*     | −0.136***   | −0.071***    | −0.075***    |
|                                     | (−1.72)     | (−3.88)     | (−3.29)      | (−4.07)      |
| Size                                | −0.013      | −0.014**    | 0.006        |              |
|                                     | (−0.98)     | (−5.37)     |              |              |
| Leverage                            | −0.468***   | −0.742***   | −0.774***    | −0.530***    |
|                                     | (−5.22)     | (−9.83)     | (−9.40)      | (−10.05)     |
| Roa                                 | −0.222      | −0.080***   | 0.005        | −0.048       |
|                                     | (−1.62)     | (−3.66)     | (0.08)       | (−1.17)      |
| ShareConcen                         | −0.248**    | −0.228***   | −0.070**     | −0.122***    |
|                                     | (−2.17)     | (−3.91)     | (−2.02)      | (−4.09)      |
| ShareInst                           | 0.111       | 0.087**     | 0.055**      | 0.040**      |
|                                     | (1.54)      | (2.35)      | (2.49)       | (2.12)       |
|                                     |             |             |              |              |
| Soe                                 | 0.045       | 0.059***    | 0.002        | 0.016        |
|                                     | (1.02)      | (2.87)      | (0.14)       | (1.60)       |
| Constant                            | 1.095***    | 1.988***    | 1.257***     | 0.623***     |
|                                     | (3.56)      | (12.41)     | (10.81)      | (7.01)       |
| Ind FE                              | Yes         | Yes         | Yes          | Yes          |
| Obs                                 | 3699        | 3699        | 3699         | 3699         |
| R²                                  | 0.055       | 0.120       | 0.262        | 0.177        |

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The values in parentheses are t-values; Ind FE means industry fixed effect. Since the simple ranges are all during the 2020 outbreak year, the year fixed effect is not adopted.
3.6. Heterogeneity analysis

The more severe the pandemic is, the greater the challenge to the economy and capital market. We differentiate the severity of COVID-19 in China according to epidemic data. Table 8 shows the grouped regression results of CAR. In columns 1–2 and 5–6, we split the sample into two groups using the sample median of the new confirmed cases on the issuing date. In columns 3–4 and 7–8, we split the sample into two groups using the sample median of the new confirmed cases on the three days around the issuing date. The Antiepi coefficients are almost nonsignificant or significantly negative when there are fewer newly confirmed cases but significantly positive when there are more newly confirmed cases.

4. Conclusion

This paper investigates China’s stock market reactions to anti-epidemic bond issuance announcements. Using the event study method and econometric models, we find that (1) anti-epidemic bond issuance announcements have significantly more positive CAR than conventional bonds; (2) rational investors have positive reactions to the issuance of anti-epidemic bonds due to the expectation that anti-epidemic bonds can enhance enterprises’ ability to resist risks during the pandemic; and (3) market reactions to the issuance of anti-epidemic bonds are significantly heterogeneous between different severity degrees of epidemic situations.

Given that the world continues to face COVID-19 pandemic challenges, our findings are valuable and generalizable to other countries that also seek paths out of the economic dilemma caused by the epidemic. The positive equity market reactions toward anti-epidemic bond issuance announcements in China pinpoint an effective market-based means that other economies, especially emerging markets, can adopt to reinforce the prevention and control of the COVID-19 pandemic. Meanwhile, anti-epidemic bond issuers should improve their anti-risk capacity to boost investors’ confidence. Additionally, our study also opens a new avenue for future research on other anti-epidemic securities.

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