Integrating Credit and Equity Markets: A Novel Benefit of Convertible Bonds

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Abstract

We show empirically that convertible bonds act as a bridging mechanism, facilitating the integration between a firm's credit and equity markets. We find that the issuance of new convertibles significantly improves cross-market integration, whereas the scheduled maturity of non-callable convertibles increases segmentation again. These patterns cannot be explained by changes in default risk or other observable firm characteristics. Consistent with the idea that convertibles attract investors seeking exposure to both markets, we show that convertible bond investors are more likely to simultaneously hold other securities from the same issuing firm. This suggests an increased presence of cross-market arbitrageurs and supports the limits-to-arbitrage explanation for the observed segmentation between credit and equity markets.

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1 Introduction

There is established evidence of significant segmentation between the stock and corporate bond markets, two of the largest markets for asset management and corporate financing (e.g., Collin-Dufresne, Goldstein, and Martin, 2001; Chen, Chen, and Li, 2023). Since stocks and bonds are both contingent claims on the firm's underlying asset value, structural credit-risk models predict that bond and stock returns should be highly correlated due to common risk factors in the asset value process (e.g., Merton, 1974). However, a large body of empirical research shows only weak return co-movement between stocks and straight bonds at both the aggregate and the firm levels, indicating a low degree of integration between the credit and equity markets. When markets are segmented, asset prices in different markets may become disconnected following non-fundamental local shocks and depend more on the balance sheet conditions of financial intermediaries (e.g., Gromb and Vayanos, 2002; Greenwood, Hanson, and Liao, 2018). For firms, such cross-market segmentation can lead to suboptimal financing choices in response to supply shocks across asset classes (e.g., Stein, 1996; Baker and Wurgler, 2000). More broadly, theoretical evidence suggests that cross-market segmentation can impose welfare losses due to capital misallocation (Guasoni and Wong, 2020). Despite these important implications, the existing literature offers limited guidance on how to improve the integration between the credit and equity markets. This paper aims to fill this gap.

We investigate empirically whether and how convertible bonds (hereafter, convertibles or CB) help bridge the segmentation between these two markets. Convertibles grant bondholders the option to convert their bonds into a specified number of common equity shares. This embedded option exposes investors to both stock- and bond-specific valuation shocks. This dual exposure implies that convertibles could naturally provide integration mechanisms to align return dynamics across stocks and straight bonds at the firm level.

We measure cross-market segmentation by examining the return synchronicity between an issuer's stock and straight bonds. Following the methodology of Kapadia and Pu (2012) to quantify stock-bond co-movement at the firm-quarter level, we first document that stock-bond co-movement is significantly higher for firms with convertibles outstanding, and that it increases following the issuance of new convertibles. The estimated effect is economically sizable—a 24% increase relative to the sample average—and remains robust after controlling for changes in the firm's leverage, default risk, and other well-studied characteristics. Notably, this effect is mostly pronounced in the post-global financial crisis (GFC) period, when stock-bond co-movement is substantially lower on average, which is likely due to the diminished presence of hedge funds as cross-market arbitrageurs in the corporate bond market post-GFC.[1]

Recognizing that the issuance of convertibles is an endogenous capital structure decision, potentially subject to various selection biases, we turn to a more credible identification strategy. Specifically, we examine changes in stock-bond co-movement around the *pre-specified* maturity dates of *non-callable* convertible bonds. These maturity dates are fixed at the time of issuance and are thus plausibly exogenous to time-varying firm fundamentals, both observed and unobserved, at the time of maturity. Moreover, because these maturity dates are publicly known well in advance, any impact they might have on firms should already be incorporated into stock and bond prices before the CB maturities actually take place. Therefore, if convertibles simply proxy for unobserved firm characteristics—rather than actually reducing the segmentation between equity and credit markets—we would expect no systematic change in stock-bond co-movement around their scheduled maturities.

Our empirical results reject this null hypothesis. We find a 27–33% decline in stock-bond co-movement following the scheduled maturity of non-callable convertible bonds, relative to a matched control group of firms with similar characteristics that still have convertibles outstanding. This decline suggests that the integration facilitated by convertibles diminishes once they mature, leading to a re-segmentation of equity and credit markets. This effect is again more pronounced after the GFC and remains robust after accounting for changes in leverage, default risk, and other observable issuer characteristics. To validate whether the maturity events are indeed exogenous to firm fundamentals, we examine a large set of firm characteristics—including bond yield spreads, distance-to-default, credit ratings—and find no significant differences around convertible bond maturity dates. These

[1]For instance, as shown in Figure 1 of Koijen and Yogo (2023), hedge funds—classified as the residual category—hold corporate bonds at historically low levels in the post-GFC period. We present similar statistics for hedge funds and broker-dealers in Figure 2 below.

findings support the credibility of our identification strategy.

We further strengthen our causal interpretation with two placebo tests. First, we find no change in stock-bond co-movement around the issuance of convertible preferred stocks—securities that also include equity conversion features but are not related to the credit market. Second, we observe no difference around the maturity of non-callable straight bonds, which implements the same identification strategy with fixed maturity dates but the security lacks an equity-linked component. These null results suggest that the increase (decline) in stock-bond co-movement is uniquely associated with the issuance (maturity) of convertible bonds. Taken together, this evidence supports the view that convertibles actively facilitate the integration of equity and credit markets, rather than simply reflecting broader capital structure adjustments within a single asset market.

Furthermore, we investigate the mechanisms behind the effect of convertibles on stock-bond co-movement. We hypothesize that the hybrid structure of convertibles attracts *generalist investors*, those who have expertise in and seek exposure to both the equity and credit markets. This idea builds on the theoretical framework of Hanson et al. (2018), which models segmented asset markets with both generalists and specialists. In this framework, generalists play a key role in facilitating cross-market arbitrage and aligning valuations across asset classes. Thus, an increased presence of generalists following convertible issuance can improve cross-market integration by reducing the limit-to-arbitrage across markets.

Empirically, we find support for this mechanism. We show that institutional investors are significantly more likely to increase their holdings of a firm's straight bonds after initiating positions in its convertible bonds. Specifically, the probability that an investor holds the issuer's straight bonds increases by 30% following their investment in convertibles. Conversely, divestment from convertibles is associated with an 18% drop in the likelihood of holding the same issuer's straight bonds. Moreover, in line with a greater presence of generalist investors during periods when convertibles are outstanding, we also observe improvements in the trading environment of the firm's straight bonds: liquidity increases, trading activity intensifies, and return volatility declines. All of these effects are mostly pronounced in the post-GFC period, when many hedge funds—the traditional primary cross-market arbitrageurs—retreated from the corporate bond market. These findings support the view that convertibles expand the investor base in segmented equity and credit markets, thus reducing frictions and synchronizing valuations between stocks and straight bonds.

Our main contribution is to demonstrate that convertible bonds increase the synchronicity between stock and corporate bond returns, which, in contrast to the predictions of structural credit risk models, are empirically only weakly related. This insight adds to the literature on credit-equity market segmentation, which has direct implications for portfolio allocation, asset pricing, and risk management. The low co-movement between stock and bond returns has traditionally been attributed to three broad mechanisms. First, the weak integration may arise from non-overlapping risk factors that are priced in the credit market but not in the equity market, and vice versa (e.g., Schaefer and Strebulaev, 2008; Chordia, Goyal, Nozawa, Subrahmanyam, and Tong, 2017). Second, a low stock-bond correlation can result from wealth transfers between shareholders and bondholders when there are unexpected changes in a firm's volatility and capital structure (e.g., Anderson and Sundaresan, 1996; Chen, 2010). Third, the lack of integration may stem from limits to cross-market arbitrage, as convergence trades between the equity and credit markets are not riskless and require capital. When cross-market mispricing occurs, arbitrageurs may restrict their capital deployment because of financing constraints (Gromb and Vayanos, 2002; Brunnermeier and Pedersen, 2008), limited attention (e.g., Duffie, 2010), as well as liquidity and other associated costs (e.g., Pontiff, 1996, 2006; Duarte et al., 2006). These frictions prevent timely correction of price discrepancies, leading to a prevalent and persistent segmentation between the two markets. Our findings are in line with the third channel and provide evidence that convertible bonds are instrumental in reducing cross-market arbitrage frictions by attracting generalist investors with expertise and exposure in both markets.

A closely related paper is Augustin, Jiao, Sarkissian, and Schill (2019), who document that cross-listings in multiple equity markets are associated with an improvement in credit-equity integration through a reduction of informational frictions. Like their study, our paper sheds some new light on the question of how to reduce firm-level segmentation between credit and equity markets. However, our findings differ in the underlying economic mechanism. While Augustin et al. (2019) highlight the role of cross-listings in mitigating information asymmetries, we show how convertible bonds help reduce limits to cross-market arbitrage by expanding the investor base. More importantly, cross-listing in global equity markets is typically only feasible for the largest multinational firms, making it an impractical option for smaller enterprises. In contrast, issuing convertibles provides a more accessible strategy for all types of companies to facilitate cross-market integration.

Our paper also adds to the vast literature on convertible bonds, which, to our knowledge, has not considered this intuitive benefit of convertibles (for example, see the review by Dutordoir, Lewis, Seward, and Veld 2014). The existing literature provides several theories with mixed empirical evidence on why companies issue convertible debt: (1) convertibles are helpful when there is disagreement about the firm risk (Brennan and Schwartz, 1988); (2) convertibles help avoid the risk-shifting problem (Green, 1984); (3) convertibles are beneficial for companies needing sequential financing (Myers, 1984); (4) convertibles can be seen as a backdoor equity for firms facing high costs of raising common equity (Stein, 1992). More recent studies focus on the role of investor demand in convertible bond issuance decisions and security designs (e.g., Grundy and Verwijmeren, 2018). However, the potential for convertible bonds to reduce segmentation between credit and equity markets has remained largely unexplored, both in the academic literature and among practitioners, as evidenced by executive interviews reported in Dong, Dutordoir, and Veld (2018). Our findings therefore also offer novel implications for how practitioners might approach and evaluate convertible bond issuance.

The paper is organized as follows. Section 2 develops the hypotheses in the theoretical context. Section 3 discusses our dataset. Section 4 presents the main empirical result on the convertibles effect in stock-bond co-movement, while Section 5 investigates the underlying economic mechanism.

2 Hypotheses development

We study an empirical link between convertible bond outstanding and individual firms' stock-bond correlation. Theoretical pricing models make equilibrium predictions about such correlation. In this section, we develop our hypotheses in the context of equilibrium models discussed in the literature and thus motivate our empirical tests.

In the classic credit risk model of Merton (1974), which features a single source of fundamental risk (i.e., firm asset value shock), the correlation between instantaneous stock and bond returns remains one, regardless of firm's leverage choice and other model parameters.[2] Within this framework, changes in capital structure—such as the issuance of new convertible bonds (CB) or the maturity of existing ones—do not affect the stock-bond correlation.

If one incorporates multiple sources of risk affecting equity and bond prices in a Merton-style framework, the correlation can drop below one. In particular, Dickerson et al. (2023) develop a credit risk model with stochastic interest rates and asset value volatility that yields a positive relation between the firm's default risk and stock-bond correlation and find empirical support for such relation. Within this framework, the stock-bond correlation is expected to increase following the issuance of new CBs and to decrease following the maturity of existing CBs. This is because CBs mechanically affect the issuer's leverage and thereby the default risk (all else equal). We confirm that the distance to default and other measures of firm risk significantly drive stock-bond correlation in our sample. If this is the only channel through which convertibles affect stock-bond correlation, explicitly controlling for default risk should explain away the CB effects. However, as we show later, the effects of CBs remain robust after controlling for distance to default and rating × quarter fixed effects.

In our view, the most compelling framework linking CB float to stock-bond co-movement is the segmented asset markets model featuring generalist and specialist investors. When investors specialize in certain classes of securities (i.e., exclude other securities from investment universe), security prices may deviate from cross-asset no-arbitrage conditions. Anecdotal evidence from practitioner investors and institutional ownership data on stocks and corporate bonds suggest that there are many specialized investors, e.g., equity mutual funds not holding any corporate debt and, likewise, corporate bond funds not holding any

[2]Indeed, take the firm asset value process $\mathrm{d}V = rV\mathrm{d}t + \sigma V\mathrm{d}W^Q$, where W^Q is a martingale under the risk-neutral measure. Denote with $E = E(V,t)$ and $B = B(V,t)$ respectively firm's stock and bond price. Then, by Ito's lemma, $\mathrm{d}E = \mu_E(V,t)\mathrm{d}t + \sigma_E(V,t)\mathrm{d}W^Q$ and $\mathrm{d}B = \mu_B(V,t)\mathrm{d}t + \sigma_B(V,t)\mathrm{d}W^Q$, where $\mu_E, \sigma_E, \mu_B,$ and σ_B are deterministic functions of V and t. Then, the stock-bond correlation $\rho\left(\frac{\mathrm{d}E}{E}, \frac{\mathrm{d}B}{B}\right)$ is trivially one as quadratic covariance between $\frac{\mathrm{d}E}{E}$ and $\frac{\mathrm{d}B}{B}$ coincides with the square-root of the product of their variances.

public equity. This is when generalist arbitrageurs step in and restore market efficiency. In a model of partially segmented markets a-là Hanson et al. (2018) with stock price-dividend ratios and corporate bond yields loading on both a common firm-specific shock and segment-specific supply shocks, the greater the fraction of generalist investors in such an economy, the lower the market segmentation is, and the more stock and bond prices correlate.[3]

We hypothesize that the float of convertibles increases the presence of generalist investors and thereby reduces the segmentation between stock and bond market. These generalists may be, for instance, investment funds running capital structure (stock-bond) arbitrage with positions in stocks and straight and convertible bonds, or dealers short-selling convertibles and hedging exposure with straight bonds and stocks or stock options. To empirically test the role of this mechanism, we use institutional ownership data to examine whether investors' holdings of a firm's straight bonds are correlated with their investment in the same firm's convertible bonds.

3 Data and Measurement

3.1 Data sources and summary statistics

Our data come from different sources. We obtain information about convertible and straight bonds from Mergent FISD, bond transactions from Enhanced TRACE, bond ownership from eMAXX, stock prices from CRSP, and issuing firms' characteristics from Compustat. Our final sample consists of 80,586 firm-quarter observations from 2,254 unique firms, covering the period from 2002Q3 to 2023Q2.

Table 1 reports sample summary statistics. To determine whether a firm has convertible bond outstanding in a given quarter, we rely on convertible debt (*dcvt*) from Compustat, and construct a dummy variable, CD, which equals 1 if a firm reports a positive *dcvt* in a given quarter.[4] On average, 11% of our sample firms have had convertibles outstanding.

[3]Notably, some theoretical models link a decrease in market segmentation not only with stronger securities co-movement, but also with improvements in social welfare (Guasoni and Wong, 2020).

[4]When examining the effects of new convertible bond issuances and the maturity of existing ones, we rely on data from Mergent to identify convertible bonds outstanding. Compustat and Mergent may

Table 1: Summary statistics

This table reports the summary statistics of our sample. Appendix A provides detailed definitions of all variables. All continuous variables are winsorized at the 1% and 99% levels.

				Percentile				
	N	Mean	SD	10th	25th	50th	75th	90th
Segmentation (Kapadia and Pu, 2012)	80,586	-0.23	0.42	-0.77	-0.54	-0.25	0.10	0.35
Convertible debt (CD, dummy)	80,586	0.11	0.31	0	0	0	0	1
Convertible debt to total assets (CD/TA, %)	80,586	0.91	0.98	0.14	0.34	0.64	1.14	1.87
Market value of equity (MVE, $mn)	78,865	15,346	23,747	537	1,663	4,993	16,490	47,733
Market to book ratio (MB)	78,628	0.91	0.98	0.14	0.34	0.64	1.14	1.87
Stock volatility	80,306	0.36	0.30	0.16	0.21	0.29	0.42	0.63
Leverage ratio	70,815	0.35	0.21	0.11	0.21	0.32	0.46	0.61
Return on assets (ROA)	77,549	0.02	0.03	0.00	0.01	0.02	0.03	0.04
Asset tangibility	72,257	0.32	0.28	0.01	0.08	0.23	0.55	0.76
Distance to default (DD, years)	69,104	7.70	4.63	2.23	4.15	7.12	10.58	13.98
Investment grade (IG, dummy)	80,586	0.53	0.50	0	0	1	1	1
Credit rating	72,399	10.00	3.65	6	8	9	13	15
Yield spread (%)	68,897	3.14	3.73	0.74	1.11	1.94	3.76	6.26
BPW bond illiquidity (bps)	63,003	47.92	48.12	9.64	19.60	34.80	59.90	101.28
Bond bid-ask (bps)	66,758	77.91	69.18	21.32	32.96	55.05	97.36	165.97
MMI bond illiquidity (bps)	63,003	85.47	63.39	33.59	46.07	66.78	101.20	156.68
Investors' bond turnover (% month)	69,356	5.53	2.64	2.77	3.64	4.94	6.78	9.17
Bond daily trading volume (bps of size)	69,966	5.71	5.02	0.82	2.31	4.46	7.49	12.03
Bond daily return volatility (bps)	63,003	98.08	85.08	35.39	49.37	72.68	112.28	182.49

Figure 1 also shows the proportion of sample firms with outstanding convertibles over time, which declined from approximately 15% before the global financial crisis of 2008-2009 (GFC) to around 5% in 2023. This decline is associated with lower interest rates post-GFC, allowing many firms to finance through straight debt.

Detailed definitions of the control variables are presented in Appendix A. All of the continuous dependent variables are winsorized at the 1% and 99% levels. The measurement of cross-market segmentation is explained in the next section.

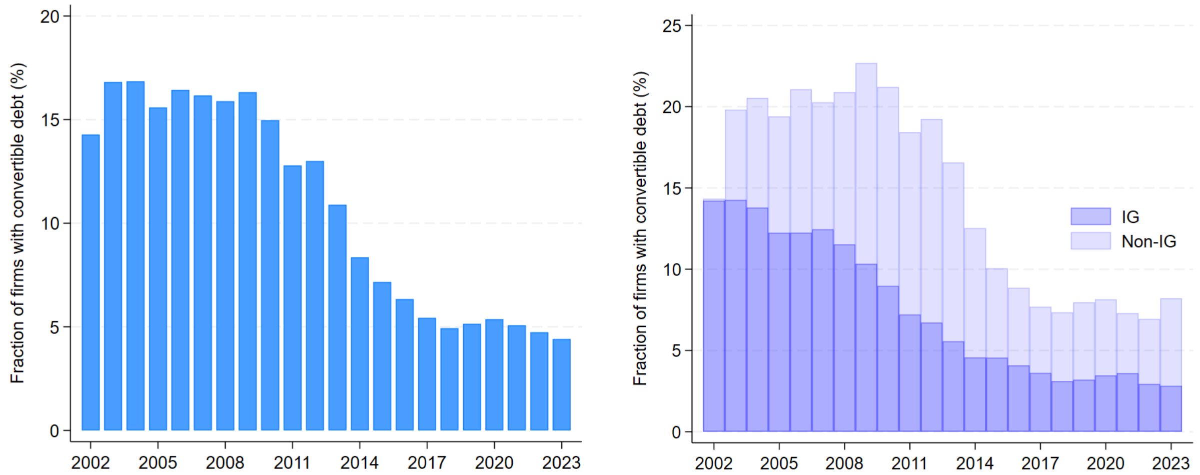
3.2 Measuring cross-market segmentation

To measure the time-varying segmentation between credit and equity markets at the individual firm-level, we use the metric of stock-bond price change synchronicity of Kapadia

show slight discrpepancies because many convertible bonds are initially placed privately and only become publicly traded after a year. As a result, such bonds may appear in annual reports and thus in Compustat, but may not yet be recorded as outstanding bonds in Mergent.

Figure 1: Fraction of sample firms with convertible bond outstanding

Panel (a) plots the proportion of our sample firms with convertible debt, as reported in Compustat, from 2002 to 2023. Panel (b) breaks this down by investment grade (IG) and non-IG firms.



(a) All firms **(b)** IG versus non-IG firms

and Pu (2012). Specifically, we start at the bond-firm-week level. For each outstanding straight bond j of firm i in week s, we first calculate an excess weekly bond return $r^B_{i,j,s}$.[5] For this, we subtract from the return of bond j calculated with the latest daily volume-weighted average transaction prices from TRACE in weeks s and $s-1$ the weekly return of an analogous synthetic risk-free bond (same promised cash flow schedule as for bond j but priced with the Treasury discount curve, as in Gilchrist and Zakrajšek 2012). Thus, $r^B_{i,j,s}$ is the return driven by changes in the yield spread of bond j rather than its total yield. Then, we weight weekly excess returns of all bonds of firm i by their outstanding amounts to evaluate firm's i weekly excess debt return $r^B_{i,s}$.[6]

[5]We only use corporate debentures (bond type code 'CDEB' in Mergent FISD) in this calculation. Corporate debentures are typically large (in USD offering amount) bond issues which, in the last 20 years, represent almost 90% of total bond outstanding amount in the sample of US bond issuers. The remaining part is split among multiple small bond issues (typically labelled as 'notes'), which are very infrequently traded and exhibit large idiosyncratic price volatility.

[6]If bond j of firm i is not traded in either week s or $s-1$, we treat $r^B_{i,j,s}$ as missing, i.e., $r^B_{i,s}$ is the size-weighted average return of *traded* bonds of firm i in week s. If none of the bonds of firm i are traded in week s, then $r^B_{i,s}$ is missing. One can alternatively assume zero return instead of missing bond excess return observations (at either bond or firm level). Our results are robust to these alternative assumptions.

We pair firm's i weekly excess debt return with its weekly stock return, $r^E_{i,s}$ from CRSP. In Kapadia and Pu (2012), a high level of debt-equity market integration relates to debt and equity prices moving synchronously, i.e., debt and equity returns being of the same sign: $r^B_{i,s} \cdot r^E_{i,s} > 0$. In contrast, cross-market segmentation is identified by stock-bond divergencies, i.e., $r^B_{i,s} \cdot r^E_{i,s} < 0$.

Now consider a quarter t consisting of weeks $s = 1, \ldots, S$. Stock-bond divergencies discussed above may occur at weekly, two-week, ..., S-week frequencies within a quarter. Different frequencies may carry different information. For example, a divergence in week s return may disappear when aggregated across weeks s and $s+1$. Define $\tau \in \{1, 2, \ldots, S\}$ a return-measurement frequency. For given τ, there is $k = 1, \ldots, S + 1 - \tau$ distinct measurement periods (overlapping, for frequencies above one week). Call $r^B_{i,\tau,k} = \Pi_{s \in k}(1 + r^B_{i,s}) - 1$ and $r^E_{i,\tau,k} = \Pi_{s \in k}(1 + r^E_{i,s}) - 1$ cumulative debt and equity returns within period k at observation frequency τ. Following Kapadia and Pu (2012), we then define a firm-quarter metric of stock-bond return commonality as:

$$\hat{\kappa}_{i,t} = \sum_{\tau=1}^{S} \sum_{k=1}^{S+1-\tau} 1\left(r^B_{i,\tau,k} \cdot r^E_{i,\tau,k} < 0\right), \tag{1}$$

where $1(c)$ is an indicator function that takes the value of 1 if condition c is satisfied. The formula above simply counts all possible one-week, two-week, etc., divergencies within a quarter. We define the firm-quarter level cross-market segmentation as the Kendall correlation:

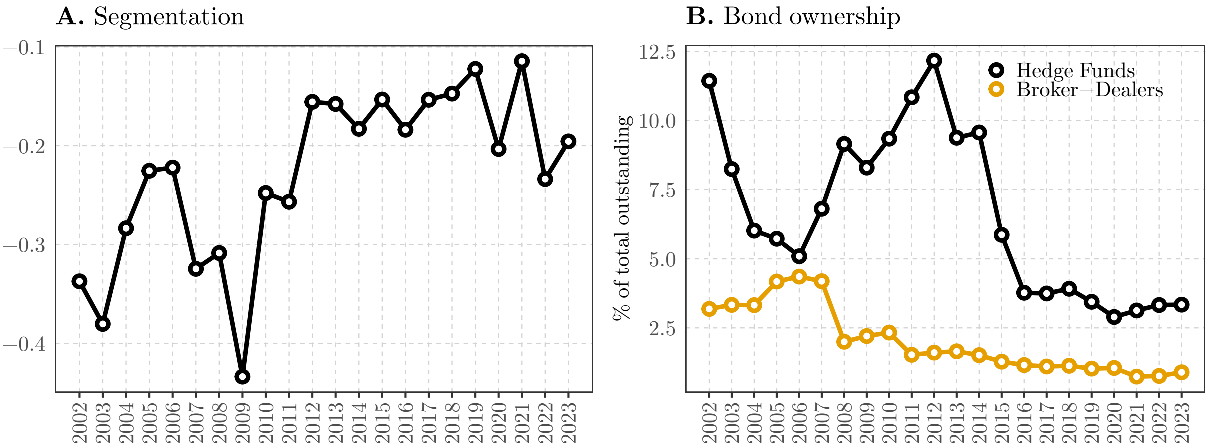
$$\text{Segmentation}_{i,t} = \frac{4\hat{\kappa}_{i,t}}{S_{i,t}(S_{i,t} + 1)} - 1. \tag{2}$$

Note that this variable takes value between -1 (i.e., complete integration – stocks and bonds comove in all possible observations at different freqiencies within a quarter and $\hat{\kappa} = 0$) and $+1$ (i.e., complete segmentation – stocks and bonds diverge in all instances and $\hat{\kappa} = \frac{S^2+S}{2}$). Thus, in any given quarter t, we identify firm A's stock and bond markets as more integrated than those of firm B if $\text{Segmentation}_{A,t} < \text{Segmentation}_{B,t}$. As shown in Table 1, the mean (median) value of segmentation is -0.23 (-0.25), which is far from -1 and implies a significant level of cross-market segmentation as documented in prior studies (Collin-Dufresne et al., 2001; Kapadia and Pu, 2012; Chen et al., 2023).

It is noteworthy that our measure indicates a significantly higher degree of credit-equity market segmentation in the post-GFC period, as illustrated in Panel A of Figure 2.

Figure 2: Segmentation over time and typical arbitrageurs in the corporate bond market

Panel A plots the yearly average of our segmentation measure across sample firms, from 2002 to 2023. Panel B plots proxies for the aggregate corporate bond ownership of hedge funds and broker-dealers, who are typically the arbitrageurs in the corporate bond market. The proxies are sourced from the U.S. Flow of Funds accounts and represent the percentage of total corporate and foreign bond ownership. The hedge fund ownership percentage is the sum of the dedicated hedge fund series (data available starting 2012) and the household series (which included hedge funds before 2012).



The average value of segmentation rises from –0.31 before 2010 to –0.17 thereafter. This increase is likely attributed to the diminished presence of hedge funds and broker-dealers in corporate bond markets, not least due to post-crisis regulatory reforms (Adrian et al. 2017), as shown in Panel B of Figure 2. In the latter part of the post-GFC period, the hedge fund and broker-dealer corporate bond ownership are at about one-half and one-quarter of the pre-GFC level, respectively. These investors typically act as arbitrageurs, exploiting and trading away potential valuation discrepancies between equity and credit markets. While a detailed analysis of the structural drivers behind this post-GFC increase in segmentation is beyond the scope of this paper, it is important to note that our core findings are more pronounced in the post-GFC period—precisely when, in the absence of convertible bonds, there appear to be fewer generalist investors available to restore cross-market valuation synchronicity.

4 Main Results

4.1 Baseline panel regressions

We estimate the effect of convertibles on firm-level cross-market segmentation by using a panel regression of our segmentation measure on the CD dummy variable indicating whether firms have convertible debt outstanding. In column (1) of Table 2, we start without any control variables or fixed effects. The point estimate of the coefficient at CD is -0.036 ($t = -4.3$), implying that firms with convertibles have a 16% ($= \frac{-0.036}{-0.23}$) lower stock-bond segmentation relative to the average level. The estimate remains similar in magnitude (-0.031) and statistically significant ($t = -3.6$) when we add firm controls in column (2), which include firm size (the logarithm of the market value of equity), market-to-book ratio, stock volatility, leverage, ROA, tangibility, and distance-to-default, all lagged by one-quarter. Controlling for distance-to-default is particularly important as default risk has been shown to strongly predict stock-bond correlations (Dickerson et al., 2023). The loading on the CD dummy is robust to additionally including firm, rating, and quarter fixed effects in column (3) or rating $\times$ quarter fixed effects in column (4).

In column (5) of Table 2, we replace the CD dummy with a continuous variable of total convertible debt scaled by lagged total assets and still find a significant effect. This result suggests that the impact of convertibles is not only on the extensive margin but also on the intensive margin. In column (6), we examine potential differential effects of convertible debt before and after the Global Financial Crisis (GFC), which has led to structural shifts in the corporate bond market (Adrian et al., 2017). We interact the CD dummy with the indicator variables for the pre-GFC (2002–2009) and the post-GFC (2010–2023) periods, and find that the effect is concentrated in the post-GFC period.

4.2 New issuance of convertible bonds

Next, we estimate the changes in semgentation around new issues of convertible bonds. We obtain convertible bond (CB) issues from Mergent FISD, and aggregate convertible issues by each firm and quarter. For each firm, we keep issues where there is no other convertible bond issue events during the 8 quarters before and 6 quarters after the current

Table 2: Baseline panel regression analysis

The dependent variable, firm-level cross-market segmentation, is measured as the synchronicity between bond yields and stock returns. CD is a dummy variable indicating whether a firm has convertible debt according to Compustat in the given year, and CD/TA is total convertible debt scaled by lagged total assets. The other control variables are defined in Appendix A and measured at the end of the previous fiscal quarter. We cluster the standard errors by firm, and the corresponding t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Segmentation					
	(1)	(2)	(3)	(4)	(5)	(6)
CD	-0.036***	-0.031***	-0.024***	-0.023**		
	(-4.283)	(-3.580)	(-2.588)	(-2.538)		
CD/TA					-0.311***	
					(-2.839)	
CD × 2002-09						-0.009
						(-0.626)
CD × 2010-23						-0.036***
						(-3.462)
Log(MVE)		0.039***	0.038***	0.040***	0.039***	0.039***
		(14.270)	(6.524)	(6.695)	(6.684)	(6.657)
MB		-0.013***	-0.007	-0.003	-0.003	-0.003
		(-4.391)	(-1.431)	(-0.589)	(-0.546)	(-0.594)
Stock volatility		-0.005	0.023*	0.012	0.012	0.012
		(-0.549)	(1.787)	(1.012)	(0.973)	(1.003)
Leverage		0.164***	0.051*	0.041	0.043	0.041
		(9.322)	(1.903)	(1.546)	(1.593)	(1.545)
ROA		-0.459***	-0.071	-0.090	-0.090	-0.088
		(-4.230)	(-0.705)	(-0.892)	(-0.889)	(-0.868)
Tangibility		-0.005	0.001	-0.001	-0.000	-0.002
		(-0.332)	(0.029)	(-0.020)	(-0.006)	(-0.050)
DD		0.005***	-0.001	-0.002*	-0.002*	-0.002*
		(4.898)	(-0.553)	(-1.746)	(-1.672)	(-1.762)
Observations	80,586	58,262	58,262	58,262	58,262	58,262
Adjusted R-squared	0.001	0.028	0.229	0.242	0.242	0.242
Rating FE & Quarter FE	No	No	Yes	No	No	No
Firm FE	No	No	Yes	Yes	Yes	Yes
Rating × Quarter FE	No	No	No	Yes	Yes	Yes

issue-quarter. The final sample includes 1,714 issues by 1,446 unique firms.

For each quarter in which at least one new convertible bond is issued, we identify a set of control firms that have no outstanding convertible debt but match the CB issuers based on firm size (falling within the same 20-quantile of the log(MVE) distribution) and credit rating (exact same rating). We assign both CB issuers and their matched control firms to the same event-cohort g, and collect data for each firm in this cohort over a window spanning 8 quarters before to 6 quarters after the issuance quarter, i.e., $[-8, \ldots, +6]$.

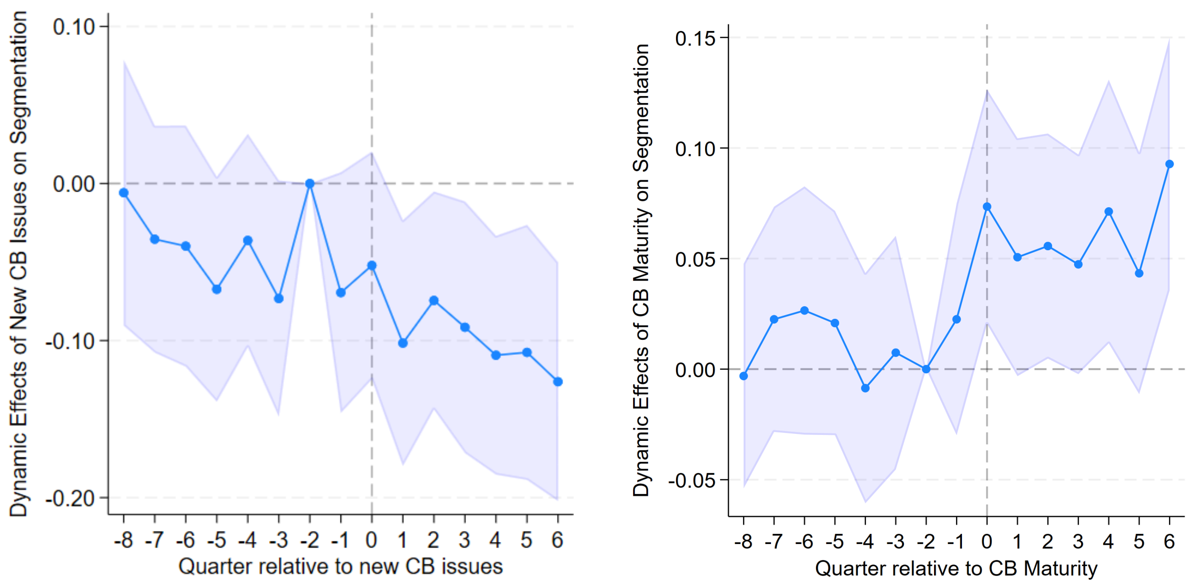
We then combine all event-cohort samples together and estimate the following regression:

$$Segmentation_{i,t,g} = \alpha_{i,g} + \alpha_{t,g} + \sum_{\tau=-8}^{6} \beta_\tau \times CB_{i,g} \times Q_{i,t,g}(\tau) + \varepsilon_{i,t,g}, \quad (3)$$

where $CB_{i,g}$ is a dummy variable indicating whether firm i is a convertible bond issuer in cohort g; $Q_{i,t,g}(\tau)$ is a dummy variable that equals 1 if quarter t corresponds to event time τ relative to the CB issuance quarter in cohort g; $\alpha_{i,g}$ and $\alpha_{t,g}$ represent cohort-firm and cohort-quarter fixed effects, respectively. We double-cluster the standard errors at the cohort-firm and cohort-quarter levels. This approach effectively implements a stacked difference-in-differences (DID) framework.

Figure 3: Cross-market segmentation around convertible bond issuance and maturity

Panel (a) and (b) of this figure plot the coefficient estimates of β_τ's from equation (3) and (5), respectively. All estimates are relative to event quarter -2, and the corresponding 90% confidence intervals are based on standard errors double-clustered by cohort-firm and cohort-quarter.



(a) New issuance of convertible bonds

(b) Maturity of non-callable convertible bonds

Panel (a) of Figure 3 plots β coefficients from regression (3), along with the corresponding 90% confidence intervals, illustrating changes in segmentation around CB issuance. We compare issuing firms to their matched control firms without outstanding CBs. Relative to pre-event quarters, cross-market segmentation tends to decline after convertible bond issuance, while the pre-trends show no significant differences between the two groups.

Table 3 reports the results of the following regression in various versions:

$$Segmentation_{i,t,g} = \alpha_{i,g} + \alpha_{t,g} + \beta \times CB\,Issue_{i,t,g} + \gamma' X_{i,t-1,g} + \varepsilon_{i,t,g}, \quad (4)$$

where $CB\,Issue_{i,t,g}$ is a dummy that equals 1 if firm i is a convertible bond issuer in cohort g and t is the issuing quarter or thereafter. $X_{i,t-1,g}$ represent the same set of firm controls as in Table 2, lagged by one quarter. We control for cohort-firm and cohort-quarter fixed effects, and double-cluster the standard errors at the cohort-firm and cohort-quarter levels.

Column (1) reports the coefficient estimate of CB Issue with fixed effects but without any control variables. The significant estimate of -0.033 ($t = -1.9$) implies that new convertible bond issues are associated with a 15% reduction in stock-bond market segmentation relative to the subsample mean of -0.226. This effect becomes stronger in both economic magnitude (to 24%) and statistical significance when controls are added in column (2) and when rating $\times$ cohort-quarter fixed effects are used in column (3).

In column (4), we find that the effect of new CB issuance is stronger during the 2010-23 period ($36\% = \frac{-0.064}{-0.179}$) than the 2002-09 period ($15\% = \frac{-0.047}{-0.306}$). Furthermore, the estimates in column (5) suggest that the reduction in segmentation is more pronounced when a firm issues convertible bonds for the first time, compared with repeated issuance.

4.3 Identification: maturity of non-callable convertible bonds

We acknowledge that a convertible bond issuance is inherently an endogenous capital structure decision, making it subject to selection effects and omitted variable bias. For example, some unobserved factors could simultaneously increase stock-bond synchronicity and influence a firm's decision to issue a new CB, potentially confounding the observed relationship.

To address such endogeneity concerns, we take advantage of the natural maturity of *non-callable* convertible bonds. Since these CBs have pre-determined maturity dates set at the time of issuance, their maturity is not influenced by unobserved time-varying firm

Table 3: Regression analysis of new CB issuance

This table reports the results of the stacked DID regressions (4). The dependent variable, firm-level cross-market segmentation, is measured as the synchronicity between bond yields and stock returns. CB Issue is a dummy that equals 1 if a firm is a convertible bond issuer in a given cohort and in the issuing quarter or thereafter. The control variables are defined in Appendix A and measured with one-quarter-lag. We double-cluster the standard errors by cohort-firm and cohort-quarter, and the corresponding t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Segmentation				
	(1)	(2)	(3)	(4)	(5)
CB Issue	-0.033*	-0.051**	-0.055***		
	(-1.865)	(-2.516)	(-2.687)		
CB Issue × 2002-09				-0.047	
				(-1.583)	
CB Issue × 2010-23				-0.064**	
				(-2.260)	
CB Issue × First					-0.057**
					(-2.436)
CB Issue × Repeated					-0.046
					(-1.314)
Log(MVE)		0.043***	0.049***	0.049***	0.049***
		(2.826)	(3.000)	(3.005)	(2.998)
MB		0.038***	0.028**	0.028**	0.028**
		(2.878)	(2.206)	(2.206)	(2.202)
Stock volatility		0.079***	0.050*	0.049*	0.050*
		(2.962)	(1.747)	(1.721)	(1.750)
Leverage		-0.036	-0.024	-0.024	-0.024
		(-0.701)	(-0.444)	(-0.435)	(-0.447)
ROA		-0.174	-0.222	-0.221	-0.222
		(-0.875)	(-1.047)	(-1.043)	(-1.045)
Tangibility		0.023	-0.020	-0.021	-0.020
		(0.314)	(-0.261)	(-0.273)	(-0.260)
DD		-0.007***	-0.008***	-0.008***	-0.008***
		(-3.360)	(-3.541)	(-3.541)	(-3.536)
Observations	25,266	19,743	19,743	19,743	19,743
Adjusted R-squared	0.274	0.286	0.298	0.298	0.298
Rating FE & Cohort-Quarter FE	Yes	Yes	No	No	No
Cohort-Firm FE	Yes	Yes	Yes	Yes	Yes
Rating × Cohort-Quarter FE	No	No	Yes	Yes	Yes

characteristics around the actual time of maturity. The non-callablility further prevents firms from endogenously retiring these bonds early. Because the maturity date is public information known in advance, it should already be priced in both the credit and equity markets before maturity. Therefore, if having CBs outstanding does not affect cross-market segmentation, we should observe no significant change in stock-bond synchronicity before and after the predetermined maturity of CBs.

To test this prediction, we first aggregate CB maturity events by each firm and quarter. For each firm, we retain its last convertible maturity quarter during our sample period, as well as the early ones where there is no other maturity events during the 8 quarters before and 6 quarters after the current maturity-quarter. This filtering results in 686 maturity events of non-callable convertible bonds from 517 unique firms.

Next, for each quarter in which at least one CB matures, we match firms with maturing CBs to control firms that are similar in firm size, share the same credit rating, and have outstanding CBs but do not experience any CB maturity during the event window. Both firms with maturing CBs and their matched control firms are assigned to the same event-cohort g, and we collect data for each firm in this cohort over a window spanning 8 quarters before to 6 quarters after the issuance quarter, i.e., $[-8, \ldots, +6]$.

Then, we stack all event-cohort samples and estimate the following stacked DID regression:

$$Segmentation_{i,t,g} = \alpha_{i,g} + \alpha_{t,g} + \sum_{\tau=-8}^{6} \beta_\tau \times Mature_{i,g} \times Q_{i,t,g}(\tau) + \varepsilon_{i,t,g}, \quad (5)$$

where $Mature_{i,g}$ is a dummy variable indicating whether firm i has a maturing CB in cohort g, and $Q_{i,t,g}(\tau)$ is a dummy variable that equals 1 if quarter t corresponds to event time τ relative to the CB maturity quarter in cohort g. We include cohort-firm and cohort-quarter fixed effects, and double-cluster the standard errors at the cohort-firm and cohort-quarter levels.

Panel (b) of Figure 3 plots β coefficients from regression (5), along with the corresponding 90% confidence intervals, showing changes in segmentation around non-callable CB maturities. Relative to pre-event quarters, cross-market segmentation increases significantly after convertible bond maturity, while the pre-trends show no significant differences between firms with maturing CBs and the control group.

Table 4 further reports the results of the following stacked DID regression in various versions:

$$Segmentation_{i,t,g} = \alpha_{i,g} + \alpha_{t,g} + \beta \times CB\,Mature_{i,t,g} + \gamma' X_{i,t-1,g} + \varepsilon_{i,t,g}, \quad (6)$$

where $CB\,Mature_{i,t,g}$ is a dummy that equals 1 if firm i has a maturing convertible bond in cohort g and t is the maturity quarter or thereafter. $X_{i,t-1,g}$ represent the same set of lagged firm controls as in Table 2 and 3.

Table 4: Regression analysis of non-callable CB maturities

This table reports the results of the stacked DID regressions (6). The dependent variable, firm-level cross-market segmentation, is measured as the synchronicity between bond yields and stock returns. CB Mature is a dummy that equals 1 if firm has a maturing convertible bond in a given cohort and in the maturity quarter or thereafter. ΔLeverage is the mechanical change in leverage following CB maturity. The control variables are defined in Appendix A and measured with one-quarter-lag. We double-cluster the standard errors by cohort-firm and cohort-quarter, and the corresponding t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Segmentation					
	(1)	(2)	(3)	(4)	(5)	(6)
CB Mature	0.051***	0.057***	0.047***	0.039*		
	(3.533)	(3.623)	(2.997)	(1.709)		
CB Mature × ΔLeverage				-0.083		
				(-0.460)		
CB Mature × 2002-09					0.064*	
					(1.648)	
CB Mature × 2010-23					0.056***	
					(3.259)	
CB Mature × Non-Last						0.039*
						(1.662)
CB Mature × Last						0.052**
						(2.550)
Log(MVE)		0.085***	0.096***	0.095***	0.085***	0.095***
		(6.505)	(6.758)	(6.724)	(6.505)	(6.754)
MB		0.012*	0.008	0.008	0.012*	0.008
		(1.698)	(1.057)	(1.070)	(1.696)	(1.068)
Stock volatility		0.099***	0.076***	0.076***	0.099***	0.076***
		(4.137)	(2.703)	(2.699)	(4.137)	(2.707)
Leverage		0.083**	0.073*	0.073*	0.083**	0.073*
		(2.367)	(1.932)	(1.941)	(2.369)	(1.935)
ROA		-0.142	-0.083	-0.084	-0.142	-0.083
		(-1.125)	(-0.614)	(-0.621)	(-1.126)	(-0.616)
Tangibility		-0.256***	-0.265***	-0.263***	-0.256***	-0.265***
		(-4.425)	(-4.403)	(-4.382)	(-4.420)	(-4.403)
DD		-0.006***	-0.008***	-0.008***	-0.006***	-0.008***
		(-3.375)	(-4.307)	(-4.285)	(-3.374)	(-4.311)
Observations	41,955	34,217	34,217	34,217	34,217	34,217
Adjusted R-squared	0.251	0.240	0.253	0.253	0.240	0.253
Rating FE & Cohort-Quarter FE	Yes	Yes	No	No	No	No
Cohort-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating × Cohort-Quarter FE	No	No	Yes	Yes	Yes	Yes

Column (1) reports the coefficient estimate of CB Maturity with fixed effects but without any control variables. The significant estimate of -0.051 ($t = -3.5$) implies that a convertible bond maturity increases stock-bond market segmentation by 29% relative to the subsample mean of -0.174. This effect remains similar in both economic magnitude (27%-33%) and statistical significance when controls are added in column (2) and when rating $\times$ cohort-quarter fixed effects are used in column (3).

One potential concern is whether this effect is driven by a mechanical decline in leverage following CB maturities. We test this possibility in column (4) by interacting the CB Mature dummy with the ΔLeverage, which is the leverage change due to CB maturity. This interaction term would be significantly negative and absorb the effect of the standalone CB Maturity dummy, if CB maturity affects segmentation only through the change in leverage. In contrast, the coefficient estimate on the interaction term is small, insignificant, and negative, while that on CB Maturity dummy remains large and significant. Note also that this empirical result is obtained controlling for the distance-to-default, as suggested by Dickerson et al. (2023).

In column (5), we find that the effect of the CB maturity is stronger during the 2010-23 period ($36\% = \frac{0.056}{-0.154}$) than the 2002-09 period ($25\% = \frac{0.064}{-0.252}$). Furthermore, the estimates in column (6) suggest that the increase in segmentation is more pronounced when the maturing CB is the firm's last outstanding convertible, compared with cases where other convertibles remain outstanding.

To further validate whether these maturity events indeed have been already priced in and uncorrelated with other firm characteristics, we use the regression specification from column (1) of Table 4 to estimate the impact of CB maturity on firms' average bond yield spreads, distance-to-default, credit ratings, and other firm characteristics used as control variables. As reported in Table 5, apart from the expected mechanical decline in leverage, we find no significant changes in any of the other variables around CB maturities, which supports the assumptions of our identification strategy.

Table 5: Regression analysis of non-callable CB maturities on other firm characteristics

This table reports the results of the stacked DID regressions (6) with cohort-firm and cohort-quarter fixed effects, but without any control variables. We present the coefficient estimate on CB Mature for each dependent variable, double-cluster the standard errors by cohort-firm and cohort-quarter, and report the corresponding t-statistics in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	CB Mature			
Dependent variables	Coef.	(t-stat.)	Obs.	Adj. R^2
Leverage	-0.016***	(-2.859)	37,712	0.872
Yield Spread	0.020	(0.223)	39,692	0.863
DD	0.002	(0.018)	39,783	0.892
Credit rating	0.007	(0.124)	41,824	0.970
Log(MVE)	0.032	(1.134)	41,905	0.968
MB	-0.017	(-0.689)	41,902	0.922
Stock volatility	0.001	(0.118)	41,906	0.718
ROA	0.000	(0.271)	41,695	0.559
Tangibility	-0.001	(-0.378)	38,125	0.977

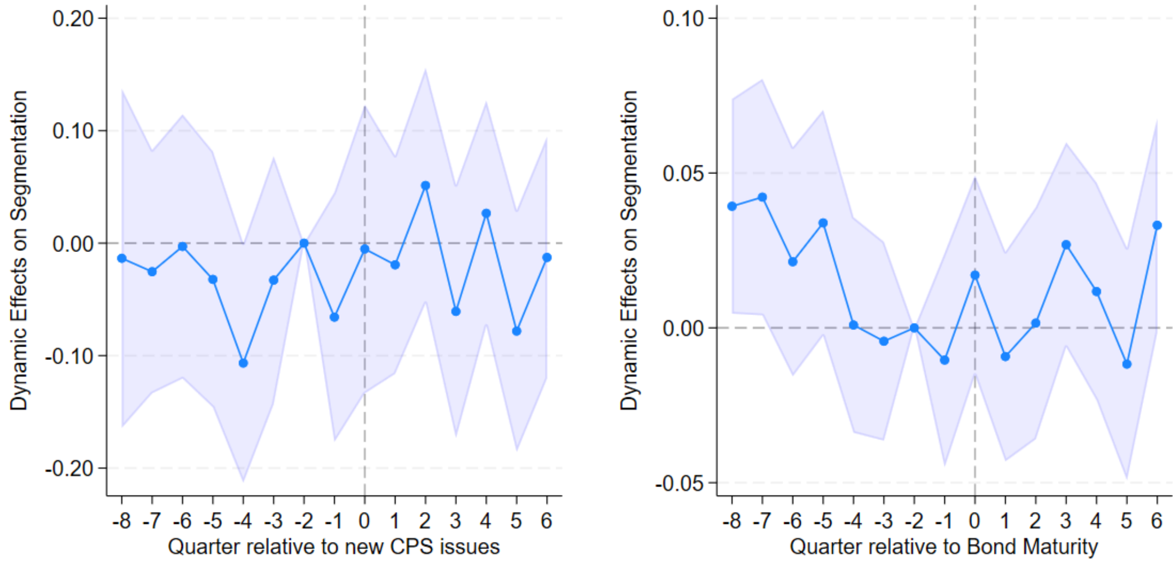
4.4 Placebo tests

Our analysis so far provides a strong support for a causal link between the presence of convertible bonds and the co-movement between firm's debt and equity valuations. Any alternative explanation would need to clear a high bar, as it must simultaneously explain the decline in stock-bond segmentation when firms issue convertible bonds (CB) and the increase in segmentation when non-callable CBs mature following predetermined schedule. Moreover, it must also explain why no other observable firm characteristics change around CB maturities (aside from the mechanical change in leverage). In this subsection, we consider two placebo tests to strengthen our findings on CB effects further.

Convertible preferred stocks. First, we estimate the changes in credit-equity market segmentation around new issues of convertible preferred stocks—a capital structure decision that, like convertible bonds, includes a conversion feature (into stocks). However, convertible preferred stocks do not create the same link between the bond and equity markets as convertible bonds do, so they would not attract additional investors who participate in both markets. Therefore, if the integration is driven by the unique dual-market

Figure 4: Placebo tests

Panel (a) plots the coefficient estimates of β_τ's from estimating equation (3) using new issuance of convertible preferred stocks. Panel (b) plots the coefficient estimates of β_τ's from estimating equation (5) using maturity of non-callable straight bonds. The shaded area represents the corresponding 90% confidence intervals.



(a) New issuance of convertible preferred stocks **(b)** Maturity of non-callable straight bonds

link provided by convertible bonds, issuing convertible preferred stocks should not affect stock-bond synchronicity.

We obtain new issues of convertible preferred stocks (CPS) by firms in our sample between 2004 and 2022 from the SDC Platinum. Following the same procedure as in Section 4.2, we retain 278 CPS issues from 263 unique firms without confounding issuance events and match CPS issuers to control firms without CPS outstanding. We then use the stacked DID regression (3) to estimate changes in cross-market segmentation around CPS issuance. Panel (a) of Figure 4 presents the estimated β coefficients along with their corresponding 90% confidence intervals. The results show no statistically significant difference between CPS-issuing firms and their matched controls at any point from 7 quarters before to 6 quarters after issuance.

Maturities of non-callable straight bonds. Second, we estimate changes in credit-equity market segmentation around the maturity of non-callable straight bonds.[7] Like non-callable convertible bonds, the maturity of non-callable straight bonds is predetermined at issuance and well-anticipated by the market. Consequently, it should already be priced into both credit and equity markets before maturity. Specifically, the market should price in the expected changes in leverage and the resulting firm riskiness following bond maturity—whether the bond is refinanced with a new issuance, maintaining leverage, or allowed to expire, thereby lowering leverage. However, unlike convertible bonds, straight bonds maturities primarily impact bond specialists rather than generalist investors who engage with both markets, implying no effect on stock-bond synchronicity.

Following the same procedure as in Section 4.3, we identify 2,129 non-callable straight bond maturities from 1,451 unique firms without confounding maturity events and match firms experiencing bond maturity to control firms that have straight bonds outstanding but none of them maturing. We then use the stacked DID regression (5) to estimate changes in cross-market segmentation around straight bond maturity. Panel (b) of Figure 4 presents the estimated β coefficients along with their corresponding 90% confidence intervals, showing no statistically significant difference between bond-maturing firms and their matched controls at any point from 7 quarters before to 6 quarters after issuance.

In sum, the two placebo tests find no impact on stock-bond synchronicity from the issuance of convertible preferred stocks or the maturity of non-callable straight bonds. This strengthens our interpretation that the observed integration effects are driven by convertible bonds, which connect credit and equity markets, rather than by any other capital structure decisions that relate only to a single asset market.

5 Mechanisms

The results in the previous section provide strong evidence that convertible bonds help reduce the segmentation in firm-level credit and equity markets. We now examine the underlying mechanisms. Specifically, we test whether convertible bonds attract a new

[7] Note that we do not examine straight bond issuance, as our sample selection requires firms to have outstanding straight bonds to compute stock-bond synchronicity. This constraint prevents us from constructing a control group of firms without outstanding straight bonds.

class of investors, such as convertible arbitrageurs and multi-strategy mutual funds, who actively trade both stocks and bonds. While most investors specialize in a single asset class (e.g., stocks or straight bonds), this new group of convertible bond investors help reallocate capital across markets and facilitate cross-market arbitrage. This mechanism predicts that convertible bonds should expand the investor base of straight bonds, improve their liquidity, and reduce price volatility.

5.1 Bond holdings

We begin by examining how institutional ownership of straight bonds (SBs) is correlated with the ownership of convertible bonds (CBs). Using eMAXX, which provides detailed quarterly bond holding data, we retrieve institutional ownership information for all CBs and SBs in our sample.

For each institutional investor, we aggregate its quarterly holdings of all CBs issued by a given firm and track when the investor initiates or discontinues its investment in those CBs. We then assess the likelihood that the same fund holds any SBs from the same firm in a given quarter. Panels (a) and (b) of Figure 5 plot the average probability of an investor holding any SB from the same issuer, spanning from 6 quarters before to 6 quarters after this investor starts or stops holding its CBs, respectively.

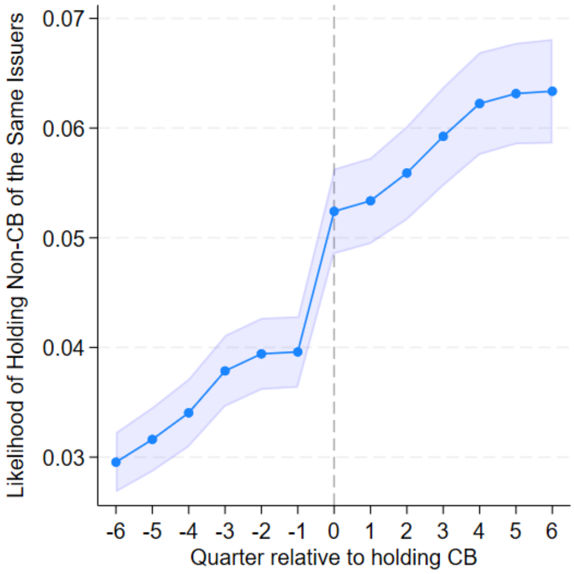
Panel (a) shows a sharp jump in the probability of an institutional investor holding the issuing firm's SBs after initiating investments in its CBs. The likelihood increases from 4% to 5.2%, a 30% relative increase. While there is a gradual buildup in SB holdings before CB investment, suggesting that investors already invested in SBs may be more inclined to add CBs, the clear discontinuity at quarter 0 provides strong evidence that investors entering CB positions are also more likely to take positions in SBs from the same issuer.

In contrast, panel (b) illustrates a sudden drop in the likelihood of an investor holding the same issuer's non-CBs after divesting from CBs, dropping from 6.8% to 5.6%, an 18% relative decrease. The absence of a pre-trend indicates that investors exiting CB positions are less inclined to keep positions in SBs from the same issuer.

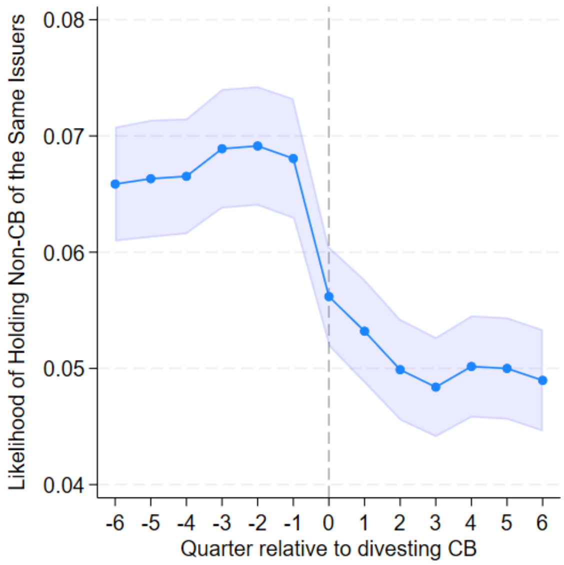
Moreover, in Table 6, we use our baseline panel regression specification in column (4) from Table 2 to estimate the effect of having convertible debt outstanding on the

Figure 5: Likelihood of CB investors holding the same issuer's straight bonds

Panel (a) and (b) plot the average likelihood of an institutional investor holding any non-convertible straight bonds (SBs) from the same issuer around the time when the fund starts or stops holding its convertible bonds, respectively. The bars represent the corresponding 90% confidence intervals.



(a) Investment of convertible bonds



(b) Divestment of convertible bonds

institutional ownership of the same issuer's straight bonds. The dependent variable is the firm-quarter level aggregated total bond ownership by all eMAXX institutions (in % of the firm's total bond outstanding amount in that quarter) in columns (1) and (9), and separately by annuities in columns (2) and (10), life insurers in (3) and (11), mutual funds in (4) and (12), property and casualty (P&C) insurers in (5) and (13), pension funds in (6) and (14), other insurers in (7) and (15), and all other institutions in (8) and (16). To allow for differential effects pre- and post-GFC in columns (9)-(16), we also use the specification in column (6) from Table 2.

We find that firms with outstanding CBs have, on average, 1.8% higher institutional ownership of their SBs. This effect becomes even more pronounced after the GFC, increasing to approximately 3%. Among different types of institutional investors, the impact is

Table 6: Regression analysis of bond ownership

This table uses the panel regression specification in column (4) from Table 2 for columns (1)-(8) and the specification in column (6) from Table 2 to estimate differential effects pre- and post-GFC in columns (9)-(16). The dependent variable is firm-quarter level aggregated total straight bond ownership by all eMAXX institutions in columns (1) and (9), and separately by all annuity investors in columns (2) and (10), life insurers in (3) and (11), mutual funds in (4) and (12), P&C insurers in (5) and (13), pension funds in (6) and (14), other insurers in (7) and (15), and all other institutions in (8) and (16). CD is a dummy variable indicating whether a firm has convertible debt according to Compustat in the given year. We include the same set of control variables as in Table 2 but suppress them for brevity. We control for firm and rating × quarter fixed effects in all specifications, cluster the standard errors by firm, and report the corresponding t-statistics in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Bond Ownership							
	Total	ANN	LINS	MUF	PINS	PNF	OINS	OTH
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CD	1.789***	0.025	0.092	1.547***	-0.023	0.198**	-0.044	-0.006
	(2.614)	(0.357)	(0.157)	(2.799)	(-0.212)	(2.277)	(-1.276)	(-0.667)
Observations	57,812	57,812	57,812	57,812	57,812	57,812	57,812	57,812
Adjusted R-squared	0.651	0.706	0.843	0.804	0.711	0.637	0.552	0.452
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
CD × 2002-09	0.375	-0.016	-0.352	0.430	0.100	0.282*	-0.039	-0.030
	(0.400)	(-0.149)	(-0.383)	(0.648)	(0.488)	(1.720)	(-0.651)	(-1.604)
CD × 2010-23	2.995***	0.059	0.471	2.500***	-0.128	0.127	-0.048	0.014**
	(3.709)	(0.768)	(0.808)	(3.617)	(-0.910)	(1.373)	(-1.523)	(1.971)
Observations	57,812	57,812	57,812	57,812	57,812	57,812	57,812	57,812
Adjusted R-squared	0.652	0.706	0.843	0.804	0.711	0.637	0.552	0.452
Controls + FE	Firm controls, Rating × Quarter FE, Firm FE							

the strongest for mutual funds. Firms with CBs outstanding have a 2.5% higher mutual fund straight bond ownership in the post-GFC period.

These findings support the idea that convertible bonds attract new investors who are more likely to invest in straight bonds from the same issuers and to incorporate stock market signals into bond prices, and vice versa. This channel increases stock-bond synchronicity and facilitates the integration between the two markets.

5.2 Liquidity

If convertible bonds indeed attract new generalist bond investors, straight bond market liquidity and trading activity might also improve as a result. As generalists rebalance both on equity and debt market signals, they likely trade more frequently than debt market specialists. An increase in the number of investors and in bond trading frequency, other things equal, reduces transaction costs (improves liquidity) associated with OTC search-and-matching frictions. As bond prices become less exposed to OTC frictions, bond return volatility might decrease. We test these predictions empirically in Table 7.

We again use our baseline panel regression specification in column (4) from Table 2 to estimate the effect of having convertible debt outstanding on liquidity and trading activity of the same issuer's straight bonds. We aggregate liquidity and trading activity variables across the issuer's straight bonds at the firm-quarter level. Since bond liquidity is notoriously hard to measure, we employ a number of bond liquidity characteristics proposed in the literature and described in Table 2 to ensure the robustness of the results. We also present in Table 7 the results for bond riskiness (as proxied by return volatility and the distance to default). To allow for differential effects pre- and post-GFC in columns (8)-(14), we again use the regression specification from column (6) of Table 2.

We find that SBs of firms with outstanding CBs tend to have better liquidity and exhibit more trading activity. Especially post-GFC, for firms with CBs, the liquidity of their straight bonds improves by 6.2% ($= \frac{2.966 \text{ bps}}{47.9 \text{ bps}}$) in BPW liquidity, 5.4% ($= \frac{4.244 \text{ bps}}{77.91 \text{ bps}}$) in realized bid-ask spreads, and 6.2% ($= \frac{5.271 \text{ bps}}{85.47 \text{ bps}}$) in MMI illiquidity, relative to the sample averages, while trading activity increases by 0.03% ($= \frac{0.002}{5.53}$) in investors' portfolio turnover and 11% ($=\frac{0.611}{5.71}$) in trading volume. We also find evidence that having CBs reduces the return volatility of SBs by a relative 6.7% ($= \frac{6.579}{98.08}$).

It is important to note that the results on liquidity, trading activity, and return volatility are not trivial, because CB-issuing firms, post-GFC, tend to be riskier firms which did not refinance through straight bonds despite the low-interest-rate environment. As shown in column (14) of Table 7, the Merton-model implied distance-to-default is significantly smaller for firms with convertibles, especially post-GFC. The conventional prediction would be that bonds of risky firms tend to be less liquid, have lower trading activity, and

Table 7: Regression analysis of straight bond liquidity

This table uses the panel regression specification in column (4) from Table 2 for columns (1)-(8) and the specification in column (6) from Table 2 to estimate differential effects pre- and post-GFC in columns (9)-(16). The dependent variables are aggregated across all straight bonds at the firm-quarter level. 'BPW' in columns (1) and (8) is the Bao et al. (2011) bond illiquidity metric (Roll's negative covariance of intra-day transactional log-price changes). 'Bid-ask' in columns (2) and (9) is the realized bid-ask spread calculated as the difference in volume-weighted sale and purchase prices, in b.p. of the volume-weighted average price. 'MMI' in columns (3) and (10) is the market-microstructure-implied illiquidity metric of Kyle and Obizhaeva (2016) adapted to corporate bonds as in Ivashchenko and Kosowski (2024). 'Turnover' in columns (4) and (11) is the average portfolio turnover of firm's bond investors, interpreted as 'hidden liquidity' in Mahanti et al. (2008). 'Volume' in columns (5) and (12) is the average daily trading volume, in b.p. of the bond outstanding amount. 'Volatility' in columns (6) and (13) is the sample standard deviation of intra-day bond log-price changes. 'DD' is the Merton distance-to-default evaluated for individual bonds as in Gilchrist and Zakrajšek (2012). CD is a dummy variable indicating whether a firm has convertible debt according to Compustat in the given year. We include the same set of control variables, except distance-to-default, as in Table 2, and suppress them for brevity. We control for firm and rating × quarter fixed effects in all specifications, cluster the standard errors by firm, and report the corresponding t-statistics in parentheses. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	BPW (1)	Bid-ask (2)	MMI (3)	Turnover (4)	Volume (5)	Volatility (6)	DD (7)
CD	-0.425	-0.652	-1.836	0.001	0.337	-3.948*	-0.131
	(-0.307)	(-0.290)	(-1.038)	(0.759)	(1.567)	(-1.741)	(-1.624)
Observations	53,108	56,263	53,108	58,286	58,801	53,108	58,190
Adjusted R-squared	0.484	0.552	0.572	0.747	0.435	0.669	0.855
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
CD × 2002-09	2.813	3.764	2.541	-0.001	0.013	-0.597	-0.025
	(1.348)	(1.146)	(0.968)	(-0.776)	(0.046)	(-0.169)	(-0.224)
CD × 2010-23	-2.966*	-4.244*	-5.271***	0.002**	0.611**	-6.579***	-0.221**
	(-1.894)	(-1.724)	(-2.652)	(2.169)	(2.358)	(-2.603)	(-2.263)
Observations	53,108	56,263	53,108	58,286	58,801	53,108	58,190
Adjusted R-squared	0.484	0.552	0.572	0.747	0.435	0.670	0.855
Controls + FE	Firm controls, Rating × Quarter FE, Firm FE						

display higher return volatility (Bao et al., 2011). However, we find the opposite, highlighting that our main finding operates through the channel of cross-market participation by generalist CB investors. These investors mitigate the liquidity and volatility penalties usually associated with higher firm risk.

6 Conclusion

We show empirically that convertible bonds help bridge the gap between a firm's debt and equity valuations, reducing segmentation between the two markets. Our results suggest that issuing convertible bonds helps improve market integration by attracting investors who seek exposure to both equity and credit securities. When non-callable convertible bonds mature, segmentation increases again, highlighting the unique role of convertibles in market integration. These findings are consistent with the limits-to-arbitrage explanation for market segmentation, and in line with the notion that convertible bonds mitigate arbitrage frictions across markets. Overall, we document a novel and economically meaningful benefit of convertible bonds, providing both academics and practitioners with new insights on how firms could strategically use convertibles to improve market efficiency and integration.

Appendix

A Variable Descriptions

- Segmentation: firm-quarter level stock-bond correlation, calculated as described in Section 3.2.
- CD: a dummy variable that equals 1 if a firm reports a positive *dcvt* in a given quarter.
- CD/TA: total convertible debt scaled by lagged total assets, calculated using ($dcvt/at_{t-1}$).
- Log(MVE): natural logarithm of the firm's market capitalization ($prccq * cshoq$).
- MB: market to book ratio, calculated using ($prccq * cshoq/at$).
- Leverage: book leverage, calculated using ($(dlttq + dlcq)/at_{t-1}$).
- Stock volatility: annualized standard deviation of daily stock returns within a quarter.
- ROA: the operating income after depreciation divided by one-quarter lagged total assets ($oiadpq/at_{t-1}$).
- Tangibility: firm tangible asset relative to total asset ratio, calculated using ($ppentq/at_{t-1}$).
- DD: the Merton distance-to-default evaluated for individual bonds as in Gilchrist and Zakrajšek (2012).
- IG: a dummy variable equals 1 if the firm has a investment grade credit rating (BBB- or above).
- Credit rating: a scale using numbers from 1 to 22, with 1 indicating AAA and 22 indicating D.
- Yield spread: the difference in yields to maturity (YTM) between a corporate bond and a (synthetic) risk-free bond with the same promised cash flows but priced at a Treasury curve, like in Gilchrist and Zakrajšek (2012). The corporate bond YTM is

based on the volume-weighted average invoice price of TRACE transactions on the last trading day of the quarter. At the issuer level, the yield spread is size-weighted across all the issuer's outstanding bonds.

- BPW bond illiquidity: the Bao et al. (2011) bond illiquidity metric (Roll's negative covariance of intra-day transactional log-price changes).

- Bond bid-ask: the realized bid-ask spread calculated as the difference in volume-weighted sale and purchase prices, in b.p. of the volume-weighted average price.

- MMI bond illiquidity: the market-microstructure-implied illiquidity metric of Kyle and Obizhaeva (2016) adapted to corporate bonds as in Ivashchenko and Kosowski (2024).

- Investors' bond turnover: the average portfolio turnover of firm's bond investors, interpreted as 'hidden liquidity' in Mahanti et al. (2008).

- Bond daily trading Volume: the average daily trading volume, in bps of the bond outstanding amount.

- Bond daily return Volatility: the sample standard deviation of intra-day bond log-price changes, in bps.

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