Deregulation and the Cost of Public Debt

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Deregulation and the Cost of Public Debt

Abstract

We assess the impact of deregulation on firms' costs of issuing public debt. Using a difference-in-difference estimation approach, we find robust evidence that the at-issue yield spreads decline in the aftermath of deregulation. The declines are both economically and statistically significant. We also find that the impacts of deregulation on bond issue costs are long-lasting and show up in different phases of the deregulated period. These impacts exhibit substantial cross-sectional variations. Long maturity bonds, those with speculative credit ratings, and those with large principal amounts experience much greater yield reductions after deregulation. Moreover, firms with low profitability, low operating efficiency, small product market shares, high financial leverage, and facing severe financial distress and financing constraints also experience larger reductions in bond issue costs from deregulation. Our results signal that enhanced efficiency outweighs intensified competition, both affiliated with deregulation, to drive down the cost of issuing public bonds in the deregulated industries.

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1. Introduction

Beginning in the 1970s and continuing through the 1990s the United States undertook a series of initiatives that substantially reduced regulatory constraints affecting several major industries. Such deregulation had wide ranging effects on these industries. Numerous studies have presented evidence on how deregulation has affected prices, output, wages, employment, profits, and other industry attributes.[1] However, little is known about the effects of industry deregulation on firms' financing costs. In this paper, we examine the impact of deregulation on firms' costs of public debt.[2]

By deregulation of an industry we mean the removal or lessening of government imposed restrictions on entry, exit, product characteristics and output rates, and pricing within that industry. Hence, deregulation may affect financing costs through two main channels.

One main channel is through enhanced efficiency in the wake of industry deregulation. Part of the enhanced efficiency is through cost reduction. A large portion of deregulatory initiatives pertains to reducing or eliminating regulatory mandates that prevent firms from withdrawing from unprofitable lines of business. For example, prior to the Airline Deregulation Act of 1978 the Civil Aeronautics Board controlled the airfares and route structures of US air carriers, and after the Act, airlines have been able to optimize their route structures and product pricing; Railroads were affected similarly by the Railroad Revitalization and Reform Act of 1976. Deregulation also enables firms in those industries to reduce their operating costs as firms now have incentives to adopt new technology to optimize operations, reduce labor costs as firms

[1] Winston (1993) provides a summary of this evidence.
[2] According to Eckbo, Norli, and Masulis (2007), during the 1980-2003 period, U.S. corporations conducted almost twice as many bond issues as equity issues, and collected five times more proceeds from public debt offerings than from equity issues.

find it easier to negotiate with labor, and reduce overcapacity [e.g., Rose (1987), Morrison and Winston (1995), and Weiss and Wruck (1998)].

Part of the enhanced efficiency is through revenue improvement. Deregulated firms are able to adopt sophisticated pricing practices for price discrimination and optimal price setting, thereby increasing revenues [e.g., Morrison and Winston (1995)]. Deregulation also enhances incentives for firms in those industries to innovate and better cater to customer preferences than otherwise, which also increases revenue. For example, the airline industry adopted and increased the use of "hub-and-spoke" routings and improved scheduling practices. Moreover, as deregulation promotes higher productivity growth and faster technological innovation, deregulated firms enjoy higher growth potential and higher valuations [e.g., Nickell (1996)], which can increase their debt capacity and lower their financial leverage. Furthermore, relative to being regulated, deregulated firms can attract better quality management and gain greater operating freedom and flexibility in responding more effectively to external disturbances such as a recession or large unanticipated changes in factor prices or interest rates [e.g., Kole and Lehn (1999)]. In summary, the elimination of inefficient mandates would reduce costs and increase revenue, which in turn would reduce default risks and tend to lower yield spreads of public debts.

The other main channel through which deregulation may affect financing costs is through intensified competition after reducing barriers to entry and thus potentially increasing the turnover of firms operating in an industry. The Motor Carrier Act of 1980 is a case in point. According to McMullen and Stanley (1988) the number of US motor carriers increased from 16,874 in 1978 to 33,823 in 1985. This is despite the exit of more than 6,000 carriers from the industry during the period from 1978 through 1985. However, the impact of intensified competition within the industry on yield spreads of public debts may be mixed.

Increased competition reduces profit margins and increases default risks, which would lead to higher costs of debt [e.g., Bolton and Scharfstein (1990), Winston (1993), Mazzeo (2002), Seim (2006), and Hoberg and Phillips (2010a, 2010b)]. Moreover, competition could increase fire sale risks and reduce liquidation values, especially through weakening potential industry buyers with the greatest synergy at a time when a fire sale is the most likely [e.g., Shleifer and Vishny (1992), Pulvino (1998), Ramey and Shapiro (2001), Gavazza (2011), and Ortiz-Molina and Phillips (2014)].[3] This, also, would tend to increase the cost of debt. Competition, however, also increases innovation, total factor productivity, and the viability of remaining firms. This may reduce the cost of debt for firms in the industry [e.g., Averch and Johnson (1962), Haskel, Pereira, and Slaughter (2007), Olley and Pakes (1996), Nickell (1996), and Aghion et al. (2008)].

Deregulation may affect the cost of debt for strong firms within an industry differently than for weak firms. If the enhanced efficiency channel dominates, strong firms would have smaller reductions in yield spreads, as they have less potential to improve efficiency than weak firms.

If the intensified competition channel dominates, the prediction is less clear. On one hand, strong firms with ample financial resources or highly efficient production could adopt predatory strategies to reduce rival firms' profitability and market share and to signal that they are tough competitors [e.g., Bolton and Scharfstein (1990), Brander and Lewis (1986), Campello (2006), Fresard (2010), and Tesler (1966)]. Strong firms may become aggressive to hasten the exit of their weaker rivals. This line of reasoning suggests that deregulation that leads to

[3] Although asset sales are central to firms' restructuring processes [e.g., Maksimovic and Phillips (1998)], lower liquidation value leads to higher cost of debt [e.g., Benmelech, Garmaise, and Moskowitz (2005) and Benmelech and Bergman (2009)]. Note that liquidation value is particularly important when contracts are incomplete and transaction costs exist [e.g., Harris and Raviv (1990), Aghion and Bolton (1992), Hart and Moore (1994), and Bolton and Scharfstein (1996)].

intensified competition would tend to increase the cost of debt for weak firms more than for strong firms.

Weak firms being squeezed out of the industry experience real costs, especially at the time of heightened competition. For example, as mentioned above, competition could increase fire sale risks and reduce liquidation values by weakening other firms within the industry that are probably the potential buyers with the greatest synergy at a time when fire sales are the most likely to occur. Yet asset sales are central to firms' restructuring processes [e.g., Maksimovic and Phillips (1998)]. Also, this additional pressure from strong rivals may prevent weak firms from fully exploiting investment opportunities, further exacerbating the risks of the weak firms [e.g., Froot, Scharfstein, and Stein (1993), and Haushalter, Klasa, and Maxwell (2007)]. Moreover, customers may avoid dealing with a company that is likely to go bankrupt [Titman (1984)]. The forgoing analysis also suggests that deregulation would have a larger effect on the cost of debt for weak firms than their stronger competitors.

On the other hand, the above mentioned pressure on weak firms also means that to survive they may be forced to adjust dramatically to increased competition. This pressure may also prompt weak firms to take actions that they would not take otherwise [e.g., Jensen (1989)].[4] Being weak implies opportunities for large improvements. The information generated by additional competition could also enable weak firms to identify poorly performing CEOs [e.g., Holmstrom (1982), Nalebuff and Stiglitz (1983), Hart (1983), and Scharfstein (1988)] and force them out to signal that they are resilient competitors and thus discourage predation by stronger rivals [Dasgupta, Li, and Wang (2014)].

[4] For example, Perotti and Spier (1993) show that high debt levels could help extract wage concessions from unions. Brander and Lewis (1986) show that the option like payoff of leveraged equity may incentivize highly leverage firms to compete more aggressively.

Industry competitiveness is sometimes assessed using measures of concentration such as the Herfindahl-Hirschman Index. Concentration, however, is an endogenously determined equilibrium outcome in an industry and its relationship to competitiveness is ambiguous [See, e.g., Demsetz (1973), Schmalensee (1989), Sutton (1991), Aghion et al. (2001), Symeonidis (2002), Raith (2003), and Karuna (2007)]. In our empirical analysis we focus on *exogenous* shocks that result in *changes* in both product market competition and potentially burdensome regulatory mandates. We examine how these shocks affect the cost of debt. Specifically, following prior research, we exploit deregulations in five industries (Entertainment, Petroleum and natural gas, Telecommunications, Transportation, and Utilities) as a quasi-natural experiment that increases the competition from domestic rivals and reduces regulatory mandates. Deregulations avoid the endogeneity issue to the extent that they are not endogenously driven by firm specific conditions [e.g., Ovtchinnikov (2010) and Zingales (1998)].

Taking advantage of the different timing of the deregulations across industries involved in deregulations, as well as the industries that do not have any deregulation events, we adopt a difference-in-difference (Dif-in-Dif) approach for estimation. We find that deregulation leads to a significant drop in public bonds' at-issue yield spreads. This basic result is consistent with the notion that deregulation tends to strengthen industry borrowers by lessening regulatory burdens and that this more than offsets increases in firm mortality risks arising from heightened competition. The drop in yield spreads is especially large for long maturity bonds, bonds with speculative credit ratings, and for large issues. The reduction in yield spreads is more pronounced also for firms with potentially severe financial constraints. Young firms, highly leveraged firms, and firms with multiple debt issues experience greater reductions in yield spreads. Moreover, yield spread reductions are positively related to the Kaplan-Zingales (1997)

measure of financial constraints and to Ohlson's (1980) O-score predictor of firm bankruptcy. Similarly, yield spread reductions are negatively related to Altman's (1968) Z-scores.[5] We also find that firms with low profitability (ROA and profit margin), low productivity (total asset turnover and total factor productivity (TFP)), and small market shares (assets, revenue, and employees) experience more significant declines in the at-issue yield spreads after deregulation. Taken together, our results indicate that, between the two intended consequences of deregulation exercises, enhanced efficiency appears to outweigh intensified competition, thereby lowering the cost of issuing bonds in the deregulated industries.

The paper closest in spirit to ours is Valta (2012). Valta (2012) uses HHI measures, along with tariff cuts as exogenous competition shocks, to examine the impact of competition on the cost of bank loans. He finds that the cost of bank loans is higher for firms in more competitive industries, especially those in which small firms face financially strong rivals, and in illiquid industries with intense strategic interactions.

Our paper complements Valta (2012) in several respects. We study the effects of deregulation on five nonmanufacturing industries, whereas Valta (2012) examines the effects of import tariff reductions on manufacturing industries only. According to the U.S. Bureau of Economic Analysis, the five industries that we consider combined constitute a portion of U.S. GDP at least as large as manufacturing industries. Further, the tenor of competition in these industries may differ from that in the manufacturing industries.

In addition, tariff cuts and deregulations differ in some respects. While both foster competition, deregulation also reduces government mandates on firms within an industry. Moreover, tariff cuts and deregulations promote competition in different ways. Tariff cuts reduce

[5] Higher O-scores correspond to a higher default risks while higher Z-scores indicate lower default risks. Hence, the results for both measures show that after deregulation yield spreads fell more for financially weak firms.

the competitive advantage of domestic firms and lower barriers to entry for foreign firms, whereas deregulation may lower barriers to entry for potential domestic and foreign entrants alike and stimulates competition among existing firms in the affected industries.

Further, Valta's sample is over the 1992-2007 period, with the sample for tariff cuts lasting from 1992 to 2005. We investigate deregulation events and their aftermath from the 1970s to 2011. The impact of deregulation may take a long time to fully play out before the affected industries reach a new equilibrium. Our relatively long sample period allows us to better understand the short-term and long-term effects of deregulation.

Finally, Valta (2012) focuses on bank loans and we study public bonds. The two debt instruments are different and are used by firms with different characteristics.[6] Relative to bank loans, public bonds tend to have more diffused ownership and less intensive monitoring by individual investors. Also, they have higher renegotiation costs and greater liquidity than bank loans. It is, therefore, plausible that yield spreads in bond markets may react to competitive shocks differently than those in loan markets.

The rest of our paper is organized as follows. Section 2 describes the research design and sample construction. Section 3 presents the empirical results. Section 4 concludes the paper.

2. Research Design and Sample Construction

2.1. Research Design

We assess the effects of deregulation, a series of events that are arguably exogenous to

[6] See, e.g., Fama (1985), Berlin and Loeys (1988), Diamond (1991), Rajan (1992), Chemmanur and Fulghieri (1994), Houston and James (1996, 2001), Johnson (1997), Bolton and Freixas (2000), Cantillo and Wright (2000), Park (2000), Hadlock and James (2002), and Denis and Mihov (2003). Indeed, during the 1992-2007 period under Valta's study, the firms in our study are much larger than those in Valta's: average total assets of the bond-issuing firms in our study is 19.6 billion dollars while that of the firms with bank loans in Valta's study is 3.46 billion dollars. Other firm characteristics are quite similar between our sample and Valta's.

individual firms, on the cost of bond issues. We examine deregulated industries as well as industries not directly affected by deregulation during our sample period of 1970-2011. The five deregulated industries are Entertainment, Petroleum and natural gas, Telecommunications, Transportation, and Utilities. According to Viscusi, Harrington,and Vernon (2005) and Ovtchinnikov (2010), the first year and the last year of major deregulation events for the five industries are respectively 1980 and 1984 for Entertainment, 1978 and 1992 for Petroleum and natural gas, 1979 and 1996 for Telecommunications, 1976 and 1995 for Transportation, and 1988 and 1999 for Utilities. One distinct feature of the events is that the passages of deregulatory initiatives are staggered across the five industries.[7]

Our research design centers on estimating the parameters of the following equation:

$$Yldsprd_{i,j,t} = \alpha_j + \gamma_t + \beta * Deregyr_{j,t} + \delta * X_{i,j.t} + \varepsilon_{i,j.t,} \quad (1)$$

where subscripts *i*, *j*, and *t* index bond issues, firms, and years, respectively. *Yldsprd* is the bond's at-issue yield spread (i.e., the at-issue yield of the bond less the yield of the Treasury debt with the closest maturity in the offering month). α and γ denote firm- and year-fixed effects, respectively. *Deregyr* is an indicator variable that equals one for the period during which a deregulation initiative is in effect in the industry in which firm *j* belongs, and zero otherwise, and *X* is a vector of control variables to be defined in Section 3.3.

Equation (1) represents a differences-in-differences (Dif-in-Dif) specification similar to the one used in Bertrand and Mullainathan (2003). The staggered introductions of deregulatory initiatives in the five industries mean that the control group in our study comprises two sets of firms: the firms in the industries that never undergo deregulation episodes during the period under study, and the firms in one of the five deregulated industries at times before the industry

[7] Each deregulation involves a series of related events evolving over a period of years. See Ovtchinnikov (2010, p. 254, Table 1) for details and specific dates pertaining to these events.

undergoes deregulation. Following Bertrand and Mullainathan (2003) and Bertrand, Duflo, and Mullainathan (2004), we calculate and report standard errors that are clustered by industry.

2.2. Sample Construction

We obtain data from several different sources. The first source is the Securities Data Corporation (SDC) New Issues database over the period of year 1970-2011. We impose the following criteria to select bond issues. We restrict the sample to straight bonds with fixed coupon rates, that is, the bonds without embedded options. Following Francis, et al. (2010), we require that all of the following information be available: issue date, maturity date, coupon rate, private placement flag, issuer CUSIP number, offering yield, and issue amount. We exclude observations with obvious recording errors such as bond issues with negative yields, issue dates after maturity date, and so on. We also exclude bond issues with private placement flag or maturity longer than 30 years. In addition, we winsorize the bond yields at the top and bottom one percentiles. Further, we exclude issues with maturity less than one year because they usually have zero coupons and face severe liquidity problems. Finally, we drop those bonds whose ratings could not be identified from the SDC. We primarily employ the Moody's bond ratings, and when such ratings are unavailable, we use the Standard and Poor's (S&P) bond ratings if available.

Since the bonds were issued with different maturities, the offering yields are not directly comparable across bonds. Thus, we adjust each bond offering yield by maturity. To calculate bond offering yield spreads, we use the risk-free term structure of interest rates drawn from the Federal Reserve Board, including the monthly Treasury benchmark yields with two, three, five, seven, ten, twenty, and thirty-year coupon bonds. We follow Kecskés, Mansi and Zhang (2013)

and use linear interpolation based on the seven available Treasury benchmark yields to construct the Treasury yields for each six-month interval from two years to 30 years. The bond at-issue yield spreads are then calculated as the bond offering yields minus the Treasury yields with the closest maturity in the offering month.

We retrieve a firm's accounting information and its stock price and return data from the Compustat Annual File and the Center for Research in Security Prices (CRSP) Monthly Stock File, respectively. We use a firm's historical SIC to assign the firm to one of the Fama-French (1997) 48-industry classifications. We exclude financial firms (SICs between 6000 and 6999) from our sample.

We merge the SDC data with the other data using the issuer CUSIP, supplemented with the date information to increase the accuracy of data matching. In the data merging, we require the latest accounting information to be available at least three months prior to a bond's issue date. The gap allows for the latest financial statements to be released to the public. In the end, our final sample consists of 9,487 public bond offers during the 1970-2011 period; 3,640 of these offers are made by firms in the five deregulated industries.

2.3. Variable Definitions

In Equation (1) the key independent variable is *Deregyr*, the dummy variable indicating whether or not the industry to which the bond-issuing firm belongs has been subject to a deregulation initiative as of the bond issue date. If *Deregyr* is zero, then the industry is fully-regulated; if *Deregyr* is one, then the industry is either partially-deregulated ("*During*") or fully-deregulated ("*After*").

We follow Francis, et al. (2010) to select the control variables in our regression models.

Issuesize is issue proceeds (*Principal*) divided by total assets (*At*). *Rate* is an index for the bond's credit rating, with smaller values denoting better ratings (a value of 0 being the best rating and a value of 18 the worst rating in our sample).[8] *Tm* is a bond's time to maturity measured in years. *Pluw* is a dummy variable that equals one if a bond issue has a prestigious lead underwriter, and zero otherwise. As in Francis, et al. (2010), a lead underwriter is deemed to be prestigious if it is affiliated with one of the following eight investment banks: Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, Credit Suisse First Boston (CSFB), Lehman Brothers, JPMorgan, or Donaldson, Lufkin & Jenrette (DLJ). *Speculative* is a dummy variable that equals one if a bond's credit rating is speculative, i.e., below Moody's "Baa3" or SP's "BBB-", and zero otherwise. *Senior* is a dummy variable that equals one if the bond has a seniority feature, and zero otherwise. *Multissue* is a dummy variable that equals one if the firm makes more than one bond issue within the same calendar year of a given bond issue, and zero otherwise. *Roa* is the ratio of income before extraordinary items to total assets. *Booklev* is the ratio of total debt, the sum of short-term and long-term debts, to total assets.

For robustness checks, we also add a few other variables to the regressions. *Annret* is the firm's cumulative monthly stock returns over the twelve months preceding the bond issue and *Volatility* is the standard deviation of monthly stock returns over the preceding five years. *Firmage* is the number of years since CRSP began its coverage of a firm until the bond issue date.

We examine also whether deregulations exert differential effects on bond issue costs across various bond characteristics and firm characteristics. Those characteristics include a bond's issue size, maturity horizon, and investment-grade status, a firm's profitability and

[8] Moody's credit ratings are transformed into numerical scores as follows: Aaa = 0, Aa1= 1, Aa2 = 2, Aa3=3, …, Ca=19, and C=20. (Caa3 is the lowest rating in our sample.) S&P's ratings are converted into numerical scores similarly.

operating efficiency, a firm's market share in the industry it belongs to, and the financing constraints and financial health of a firm. For this purpose, we also include in the regression model a few interaction terms of *Deregyr* with variables measuring those characteristics, which is essentially a Dif-in-Dif-in-Dif analysis. For ease of exposition, we defer definitions of those variables to Section 3.4. Table 1 defines the key variables used in the analysis.

[Insert Table 1 around here]

2.4. Summary Statistics

Table 2 reports the summary statistics for the whole sample. Regarding the bond characteristics, the at-issue yield spread average is 1.553% with a median value of 1.170%; the average issue size is 9% of firm assets and the average principal of the bond issues is 0.473 billion dollars; the average coupon rate is 6.86% and its median value is 6%; average and median times to maturity are about 13 years and 10 years, respectively. 54.3% of the bond issues are underwritten by prestigious investment banks, 18.1% of the bonds carry speculative ratings, and 93.7% of the bond indentures contain seniority clauses. An average of 54.9% of the bond issuing firms makes multiple issues in a year. The average ROA is 4.8%, average financial leverage is around 0.34, and the average stock return during the 12 months preceding bond issues is 17.6%. The annualized stock return volatility over the five years preceding bond issues is 30%, and the average firm age is about 35 years.

[Insert Table 2 around here]

Table 3 summarizes the 3,640 corporate bonds publically offered in the five deregulated industries over the entire sample period as well as its two phases: fully-regulated period (i.e., *Deregyr* =0), and deregulated (or partially deregulated) period (i.e., *Deregyr* =1).

[Insert Tables 3 around here]

Table 3, Panel A shows the summary characteristics of the bond issues. The average yield spread increases from 1.457% during the regulated phase to 1.687% during the deregulated phase. The increment of 23 basis points in the yield spread is statistically significant at the one percent level. The univariate statistics seem to suggest that deregulation increases the cost of debt. However, we should not read too much into this result. Instead, we should focus on the results from the difference-in-difference analysis that appropriately controls for other factors affecting yield spreads. In addition, the table shows that, on average, issue proceeds, measured in dollars or as a fraction of firm assets, also increase significantly following deregulation. Similarly, the proportion of firms issuing multiple debts within a year, and the fraction of bond issues underwritten by prestigious investment banks increase significantly after deregulation. These results indicate that firms tend to tap the bond market for financing more easily after deregulation than before. From the fully regulated period to the deregulated period, average bond credit ratings deteriorate by about two notches, and the fraction of bond issues receiving junk-bond ratings almost tripled (up from 6.9% to 20.2%). Average bond maturity, however, decreased from 21.792 years to only 13.603 years. Those changes, all significant at the 1% level, suggest that increased competition resulting from deregulation increases issuers' default risk and shortens the debt maturity.

Table 3, Panel B reports the summary characteristics of the bond-issuing firms. In the wake of deregulation, average ROA declines by 1.2 percentage points from 4.5% in the regulated period, book leverage decreases from 42.6% to 36.4%, and market leverage drops from 58.1% to 38.6%. These results are consistent with Ovtchinnikov's (2010) finding that firms experience a significant decline in profitability and leverage following deregulation. Stock volatility increases

from 21.7% in the regulated period to 28.9% after deregulation. The panel also shows that, relative to the regulated period, the bond-issuing firms become more efficient and enjoy higher growth potential in the deregulated period. Average total factor productivity rises from -0.557 to 0.190, average asset utilization ratio improves from 0.451 to 0.615, and average market-to-book asset ratio increases from 0.761 to 1.012. Those firms appear less financially constrained after deregulation: average O-scores and average Z-scores decrease respectively by 0.127 and 0.501. Both of these changes are significant at the 1% level.

3. Empirical Results

3.1. Impact of Deregulation on Bond Issue Costs

In this section we assess the overall impact of deregulation on the cost of public bond issues. The coefficient of the explanatory variable *Deregyr* is the key parameter of interest that measures the effect of deregulation on bond yield spreads.

Table 4 reports the baseline regression results. In the regression reported in Column (1), we include only the explanatory variable *Deregyr*. Its estimated coefficient is 0.224 and, with a standard error of 0.21, it is not significant at the 10% level. In Column (2), we include both firm-fixed effects and year-fixed effects in the regression. The estimated coefficient on *Deregyr* equals -0.583 and is significant at the 1% level. Note that the specification in Column (2) corresponds to a Dif-in-Dif approach while the specification in Column (1) does not. The opposite results between the two columns highlight the importance of using the Dif-in-Dif approach to appropriately filter out market trends in yield spreads. We thereby include firm- and year-fixed effects in our subsequent analyses.

Column (3) of Table 4 corresponds to the baseline specification of our analysis, which

also includes the set of control variables used in Francis, et al. (2010). The parameter of interest, i.e., the coefficient on *Deregyr*, equals -0.447 and, with a standard error of 0.09, is significant at the 1% level. This parameter estimate is also economically significant as it implies a 30.68% (=0.447/1.457) reduction in the average bond yield spread after deregulation.

[Insert Table 4 around here]

The utilities industry accounts for about 53% (1935 out of 3640) of the total bond issues of the five deregulated industries. We assess the impact of deregulation on bond issue costs in the utilities industry versus other industries and report the results in Columns (4) and (5), respectively. It is clear that, after deregulation, the yield spreads decline significantly in both the utilities and the other deregulated industries. The magnitude of the reduction, though, is much larger for the utilities industry. The estimated coefficients on *Deregyr* for utilities and the other four deregulated industries respectively equal -0.506 and -0.201, both significant at the 1% level. A two-sided test of the hypothesis that the two coefficients are equal to each other yields a *p*-value of 0.045. In Column (6), we pool both utilities and other firms and interact *Deregyr* with a dummy variable for utilities firms. Confirming the main results in Columns (4) and (5), the estimated coefficients on *Deregyr* and the interaction term are both negative and significant at the 5% level. The results show that, after deregulation, both utilities and other firms experience significant yield spread reductions and that the magnitude of the reduction is substantially greater for utilities firms. In Column (7), we replace firm-fixed effects with industry-fixed effects in the baseline regression. The coefficient estimate on *Deregyr* equals -0.649 and remains significant at the 1% level.

Taken together, our baseline results consistently show that firms in the five deregulated industries experience significant declines in their costs of issuing public debts. The reduction is

estimated to be over 40 basis points. Moreover, the reduction in bond issue costs appears to be considerably larger for utilities firms than for firms in the other deregulated industries.

3.2. Robustness

To assess the robustness of our results, we estimate the baseline regression models over various subsamples and report the estimation results in Table 5.

Can the main results in our baseline regressions be explained solely by secular changes, such as the development of the high yield bond market in the 1980s? This should not be the case because we include year fixed effects in our regressions. Nevertheless, to offer further evidence, we separately estimate the baseline regression model over the subgroup of firms with investment-grade credit ratings (i.e., *Speculative*=0) and the subgroup of firms with speculative credit ratings (i.e., *Speculative*=1). We present the results in Columns (1) and (2) of Table 5, respectively. For the firms with investment-grade ratings, the estimated coefficient on *Deregyr* equals -0.374 and is significant at the 1% level. For the firms with speculative ratings, the estimated coefficient on *Deregyr* is -1.765 and is significant at the 5% level. The results suggest that the yield spread reductions after deregulation are not limited to high-yield bond issues.

[Insert Table 5 around here]

We also estimate the baseline regression model over the group of firms that issue bonds both before and after deregulation. Those firms clearly survive the intensified competition arising from the industry deregulation. They are also likely to become more efficient than before with reduced likelihoods of financial distress. Accordingly, the market should reward those firms with lower financing costs. Column (3) of Table 5 reports the estimation results, bearing out this conjecture. For these surviving firms, the estimated coefficient on *Deregyr* equals -0.594 and this

estimate is significant at the 1% level. Note that, as reported in Column (3) of Table 4, the same coefficient for all firms ever issuing bonds during our sample period is estimated to be -0.447.

Interest rates have been historically low starting from the mid-2000s. Could our results be driven by this period? This is unlikely to be true as our baseline regression has already controlled for year-fixed effects. Nevertheless, to explicitly address this concern, we estimate the baseline regression model by excluding observations after 2005. Column (4) reports the results, which show that the estimated coefficient of *Deregyr* is -0.485 and remains significant at the 1% level.

For further robustness checks, we also add additional control variables to the baseline regression model. Table 6 reports the results of estimating various expanded regression models over the full sample period.

One concern is reverse causality as the above analysis assumes that industry deregulation events are exogenous to individual firms. We address this concern using the approach developed by Bertrand and Mullainathan (2003) and also used by Valta (2012). Specifically, we define three dummy variables, *Pre5*, *Pre2*, and *Pre1*, for three pre-deregulation periods, and we add them separately into the baseline regression model. *Pre5* (*Pre2*) equals one for years -5 (-2) through -1 relative to the year in which a deregulated industry introduces the first deregulatory initiative and zero otherwise. *Pre1* equals one for year -1 relative to the year of the first deregulatory initiative seen in a deregulated industry and zero otherwise. The three dummy variables allow us to assess whether there are effects of deregulation on bonds' at-issue yield spreads prior to the introduction of the first deregulatory initiative. If the estimated coefficient on any one of the three dummy variables is significant and negative, it would be an indication of reverse causation. Columns (1)-(3) report the results of estimating the expanded model including *Pre5*, *Pre2*, and *Pre1* in the baseline regression, respectively. The estimated coefficients on the

three dummies all differ insignificantly from zero. In each expanded model, the estimated coefficient of *Deregyr* remains negative and significant at the 1% level, and the estimates are similar in magnitudes to those reported in Table 5. Moreover, also consistent with a causal interpretation of our baseline regression results, the estimated coefficients on the three additional dummy variables are all smaller in magnitude than the coefficient on *Deregyr*. These results thus alleviate concerns about reserve causality and reaffirm our main findings.

[Insert Table 6 around here]

In Column (4) of Table 6 we add a measure of firm size, the logarithm of total assets, to the baseline regression model. The estimated coefficient of this new regressor equals -0.137 and is significant at the 5% level. The estimated coefficient of *Deregyr* in this regression equals -0.473 and is, once again, significant at the 1% level. In Column (5) of Table 6 we further add stock return performance and stock return volatility to the baseline model. The sample size drops slightly from 9,121 to 8,887. The costs of issuing bonds are significantly and negatively related to one-year cumulative stock returns and are significantly and positively related to stock return volatility. Both relations are intuitive and consistent with economic theory. The estimated key parameter of interest remains significantly negative. The coefficient on *Deregyr* is -0.454 and is significant at the 1% level. In Column (6), we further add the log of firm age to the regression. The coefficient on *Deregyr* equals -0.437 and remains significant at the 1% level even though the sample size drops to 8,732. In Column (7), we include all those additional variables in the extended model and the main results remain very similar.

In summary, the main results of our analysis are robust to including additional control variables in the regression models. That is, the cost of issuing public bonds declines significantly after an industry is deregulated.

3.3. Effect of Deregulation on the Cost of Bond Issues: Intertemporal Dynamics

It usually takes several years for a regulated industry to transit to a deregulated state. We assess whether the impact of deregulation on yield spreads varies across different phases of deregulation. To do this, we break the deregulated period (i.e., *Deregyr* =1) into two subperiods, partially-deregulated and fully-deregulated. We label the subperiods *During* and *After*, respectively. *During* refers to the period between the first and the last major deregulatory initiatives. *After* is the remainder of the deregulated period. It may take time for a firm to fully adjust to the new regulatory environment, so we also define several variants of *During* by extending that subperiod by one, two, and up to five years after the last major deregulatory initiative takes place, and we define *After* accordingly as the remainder of the deregulated period. We then replace *Deregyr* with both *During* and *After* in the model. The regression results are reported in Table 7.

A few results stand out in Table 7. The negative effects of deregulation on yield spreads are apparent in both the partially- and fully-deregulated subperiods. As shown in Column (1), the coefficients on *During* and *After* are -0.474 and -0.349, respectively, and both are significant at the 1% level. Furthermore, the negative effects of deregulation on yield spreads are very stable across the partially-deregulated subperiod. As shown in Columns (2) through (6), if we prolong the subperiod by one, two, or up to five years, the coefficient estimates on *During* are -0.464, -0.450, -0.448, -0.449, and -0.448, respectively, and all are significant at the 1% level. Moreover, the negative effect of deregulation on yield spreads persists and tends to intensify in the fully-deregulated subperiod as we start the subperiod a few more years after the relevant industries

have completed the deregulation. As reported in Columns (2) to (6), if we start the *After* subperiod from the year that is one, two, or up to five years after the last major deregulatory initiative, the coefficients on *After* are -0.368, -0.433, -0.441, -0.436, -0.438, respectively. All are significant at the 1% level.

[Insert Table 7 around here]

Taken together, the results in Table 7 show that deregulation reduces the cost of bond issues in both phases of the deregulated period and that the effects on yield spreads are long lasting.

3.4. Cross-Sectional Analysis

We examine what types of bonds and what kinds of firms are most affected by deregulation. This analysis can help to distinguish among competing theories of the negative effects of deregulation on bond yield spreads. For brevity, we present in this section the results that are obtained over the entire deregulated period. The results for dividing the period into the two subperiods, *During* and *After*, are similar and are available upon request.

3.4.1 Bond Characteristics

We examine how bond maturity, credit risk, and issue size are related to yield spread changes following deregulation. We classify the bonds into two categories by each of the three following bond characteristics: time to maturity, credit rating, and issue size. We define three dummy variables accordingly. *Ltbond* equals one if a bond's time to maturity exceeds ten years and zero otherwise. *Speculative* equals one if a bond's credit rating is below Moody's "Baa3" or S&P's "BBB-", and zero otherwise. *Lgissue* is equal to one if the principal amount of the issue is

above the median level in the same year, and zero otherwise.[9] We then interact each of the three dummy variables with *Deregyr*, and we in turn include the interaction terms in the baseline model. Table 8 reports the regression results.

[Insert Table 8 around here]

In Column (1) of Table 8, we include the interaction term involving *Ltbond*. The estimated coefficient on the interaction term is -0.125 and significant at the 10% level, suggesting that the reduction in at-issue yields of long-term bonds are 12.5 basis points more than that in the at-issue yields of short- and medium-term bonds in the aftermath of deregulation. The negative coefficient on the interaction term, together with the negative coefficient on *Deregyr*, which is -0.370, implies that after deregulation the at-issue yields of short- and medium-term bonds decline by 37 basis points and the at-issue yields of the long-term bonds reduce by 49.5 basis points. In Column (2), we include the interaction term involving *Speculative* in the regression. The coefficient on the interaction term is -0.676 and is significant at the 5% level. This result implies that speculative-grade bonds experience much larger reductions in at-issue yields than investment-grade bonds in the deregulated period. The coefficient on *Deregyr* equals -0.393, which is significant at the 1% level and indicates that the at-issue yields of investment-grade bonds fall by 39.3 basis points after deregulation. From the two estimates combined we can infer that the at-issue yields of junk bonds in the deregulated period are 106.9 (=39.3+67.6) basis points lower than before. In Column (3), we include the interaction term involving *Lgissue*. The estimated coefficients on the interaction term and *Deregyr* are -0.169 and -0.355, respectively, and both are significant at the 1% level. These results suggest that, after deregulation, both small bond issues and large bond issues experience significant declines in

[9] We use cutoffs based on the year-by-year distributions to form cross sections in this study. Using cutoffs based on the full-sample distributions to form cross sections yields similar results.

their at-issue yields, and the latter receives larger reductions by 16.9 basis points than the former.

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3.4.2 Firm Characteristics

We also assess whether strong or weak firms experience greater changes in their costs of public debt issues following deregulation. For this purpose, we sort the bond-issuing firms into groups based on proxies measuring several firm characteristics: profitability and operating efficiency, market share, financial health and financing constraints. We measure a firm's profitability by *Roa* and *Profitmargin*, operating efficiency by *Asseturn* and *Tfp*, market share by *ARatio_Ind*, *RRatio_Ind*, and *ERatio_Ind*, financial health by *Booklev*, *Marketlev*, *Zscore*, *Oscore*, and financing constraints by *KZindex* and *Firmage*. *Profitmargin* equals net income divided by total revenue. *Asseturn* is the ratio of total sales to total assets. We calculate *Tfp*, or total factor productivity, as the residuals of regressing logged total sales against logged number of employees and logged net value of property, plant and equipment.[10] *RRatio_Ind* is the ratio of revenues of a firm to the total revenues of the industry to which the firm belongs. *ARatio_Ind* is the ratio of total assets of a firm to the total assets of the industry to which the firm belongs. *ERatio_Ind* is the ratio of the number of employees of a firm to the total number of employees of the industry to which the firm belongs. *Marketlev* is the ratio of the book value of firm total debt to the sum of the book value of its total debt and its stock market capitalization. *Oscore*, *KZindex, and Zscore* are respectively Ohlson's (1980) O-score, Kaplan-Zingales' (1997) financing constraint index, and negative Altman's (1968) Z-score. We add a negative sign to

[10] This approach to obtain firm-level total factor productivity (TFP) mirrors attempts to estimate the Solow residual in macroeconomic growth models. As an analogy to the residual that refers to the part of total output not caused by traditionally measured inputs of labor and capital, the firm-level TFP measures the overall effectiveness with which a firm uses capital and labor in a production process. See Olley and Pakes (1996) and Levinsohn and Petrin (2003) for measuring the firm-level TFP.

each Altman's *Z*-score so that, like *Oscore* or *KZindex*, a higher value of *Zscore* corresponds to more severe financing constraints facing a firm.

We define dummy variables based on each of these proxies so that these indicators equal one for the firms that are less profitable, less efficient, less productive, and more financially constrained, and zero otherwise. *DRoa50* (*DProfitmargin50*) equals one if a bond-issuing firm's ROA (net-income-to-assets ratio) is below the median level and zero otherwise. *DAsseturn50* (*DTfp50*) equals one if a bond-issuing firm's sales-to-asset ratio (total factor productivity) is below the median level, and zero otherwise. *DARatio_Ind50*, *DRRatio_Ind50*, and *DERatio_Ind50* are three dummy variables that equal one if a bond-issuing firm's market share, calculated respectively on the basis of assets, revenues, and employees, is below the median level, and zero otherwise. *DBooklev75* (*DZcore75*) equals one if a bond-issuing firm's book leverage (negative Altman's *Z*-score) exceeds the 75 percentile, and zero otherwise. *DKZindex75* is equal to one if a bond-issuing firm's *KZindex* exceeds the 75 percentile, and zero otherwise. *DMarketlev50* (*DOscore50*) equals one if a bond-issuing firm's market leverage (Ohlson's O-score) exceeds the median level, and zero otherwise. *DFirmage25* is a dummy variable that equals one if a bond-issuing firm's age is below the 25 percentile, and zero otherwise. Like the above cross-sectional analysis, we interact each of these dummy variables characterizing the firm characteristics with the dummy variable, *Deregyr*, and then add in turn the interaction terms into the baseline model.

Table 9 reports the results of the cross-sectional analyses regarding firm profitability and operating efficiency. Consider first the results on firms' earning capability. In Column (1), we include the interaction term involving *DRoa50*. The coefficient on the interaction term is estimated to be -0.149 and is significant at the 5% level. In Column (2), we include the

interaction term involving *DProfitmargin50*. Its coefficient is estimated to be -0.135 and is significant at the 1% level. In both columns, the estimated coefficients of *Deregyr* are significantly negative, equal to -0.344 and -0.339, respectively. Taken together, the results indicate that, after deregulation, firms in the deregulated industries with high ROA and high profit margin respectively reduce their bond-issue yields by 34.4 and 33.9 basis points; those with low ROA and low profit margin lower their bond-issue yields in even larger magnitudes: 49.3 and 47.4 basis points, respectively.

[Insert Table 9 around here]

Now consider the effect of firm operating efficiency on yield spreads. In Column (3) of Table 9 we include the interaction term involving *DAsseturn50*. The coefficient on the interaction term is estimated to be -0.316 and is significant at the 5% level. This implies that firms with low asset utilization ratios experience after deregulation a 31.6 basis points greater reduction in yield spreads than firms with high asset utilization ratios. In Column (4), we include the interaction term involving *DTfp50*. The estimated coefficient on *Deregyr* is -0.200 and significant at the 5% level, and the coefficient on the interaction term is -0.392 and significant at the 1% level. This result shows that deregulation reduces the bond-issue yields by 20 basis points for firms with high total factor productivity and by 59.2 basis points for firms with low total factor productivity. The evidence in Table 9 is consistent with the hypothesis that weaker firms in deregulated industries, those that are less profitable, less efficient, and less productive, experience greater reductions in their costs of debt than do the stronger firms.

Table 10 lists the results of the cross-sectional analysis based on firm market shares. For all of the three market share measures based respectively on a firm's assets, revenues, and employees, the regressions produce significantly negative coefficient estimates on the interaction

terms with *Deregyr*. When the dummy variable for the asset-based market share, *DARatio_Ind50*, is used in the regression, the coefficient on the interaction term is estimated to be -0.308, significant at the 1% level (Column (1)). When the dummy variable for the revenue-based market share, *DRRatio_Ind50*, is used in the regression, the coefficient on the interaction term is estimated to be -0.180, significant at the 5% level (Column (2)). When the dummy variable for the employee-based market share, *DERatio_Ind50*, is used in the regression, the coefficient on the interaction term is estimated to be -0.342, significant at the 1% level (Column (3)). In this table, the estimated coefficients on *Deregyr* itself are all negative, significant at the 1% level in the first two columns and insignificant in the third column. These results combined tend to show that the reductions in bond-issue yields after deregulations are much larger among firms having smaller market shares.

[Insert Table 10 around here]

We also consider the effects of firm financial health and financing constraints on changes in yields. Financially constrained firms are not necessarily less efficient firms, the group that competition is supposed to eliminate, but they are typically smaller firms that are less well known to investors. Table 11 presents the results. In Column (1), we include the interaction term involving *DBooklev75*. The coefficient on the interaction term with *Deregyr* is estimated to be -0.168 and is significant at the 10% level. In Column (2), we include the interaction term involving *DZscore75*. The estimated coefficient on the interaction term equals -0.185 and is significant at the 1% level. In Column (3), we include the interaction term involving *DKZindex75*. The coefficient on the interaction term is also negative and significant at the 1% level. The estimated coefficients on *Deregyr* in the three columns are respectively -0.402, -0.348, and -0.399, all significant at the 1% level. These results combined indicate that deregulation

substantially reduce bonds' at-issue yields, especially for firms with high financial leverage, severe financial distress, and stringent financing constraints.

[Insert Table 11 around here]

We consider also alternative measures for financial health and financing constraints in our analysis. In Column (4) of Table 11, we use the dummy for high market leverage, *Dmarketlev50,* in the regression. The estimated coefficients on *Deregyr* and the interaction term are respectively -0.333, significant at the 1% level, and -0.127, significant at the 10% level. In Column (5), we use the dummy for high O-score, *DOscore50,* in the regression. The estimated coefficients on *Deregyr* and the interaction term are both negative and significant at the 1% level. Young firms tend to face more severe financial distress and more stringent financing constraints than mature firms. In Column (6), we interact the dummy for young firms, *DFirmage25,* with *Deregyr*. The interaction term has a negative parameter estimate, which is -0.178 and significant at the 1% level. The estimated coefficient on *Deregyr* equals -0.392, which is significant at the 1% level.

We can draw two inferences from the results reported in Table 11. In the aftermath of deregulation, bond-issue yields decline considerably for healthy firms in solid financial condition. The magnitudes of reductions range from 24.8 to 40.2 basis points. Moreover, firms in relatively poor financial conditions and those facing financial distress or financing constraints experience even larger reductions in their bond issue costs after deregulation.

In summary, our cross-sectional analysis produces several main findings. Deregulation appears to have reduced bond issue costs by larger magnitudes for long maturity bonds, speculative grade bonds, and for large issues. In addition, firms in deregulated industries generally incur lower costs in issuing bonds after their industries undergo deregulation. These

reductions are more pronounced for weak firms with low profitability, low operating efficiency, low productivity, and tighter financial constraints.

4. Conclusions

In this paper we assess the effect of industry deregulation on the cost of public bond issues. Using a difference-in-difference estimation approach, we find robust evidence that the bond at-issue yield spreads decline after deregulation. The declines are both economically and statistically significant. We also find that these declines are long-lasting and that the reductions in the bond-issue costs are persistent and of similar size in different phases of the deregulated period. The effects of deregulation on bond issue costs also exhibit substantial cross-sectional variation. Long maturity bonds, poorly rated bonds, and large issues experience relatively greater yield reductions in the wake of deregulation. Moreover, firms with low profitability and low operating efficiency, having small product market shares and facing financial constraints appear to experience much larger reductions in bond issue costs after deregulation than firms with otherwise opposite characteristics.

Deregulation aims to enhance efficiency and intensify competition in the affected industries. For firms in those industries, improved efficiency likely lowers their cost of issuing bonds, while intensified competition may reduce their profit margins and increase their default risks, thereby leading to higher financing costs. Our results indicate that the enhanced efficiency appears to outweigh the intensified competition and drive down the cost of issuing public bonds in the deregulated industries.

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Table 1. Definitions of variables

Yldsprd	Yield spread measured in percentages and calculated as the at-issue yield of a bond minus the Treasury yield with same maturity.
Annret	Firm's cumulative monthly returns over the past twelve months.
Assets	Firm's total assets.
ARatio_Ind	Ratio of total assets of a firm to the total assets of the industry in which this firm belongs.
Asseturn	Ratio of net sales to total assets.
Booklev	Firm's book leverage measure, calculated as the ratio of total debt, the sum of short-term and long-term debts, to total assets.
ERatio_Ind	Ratio of the number of employees of a firm to the total number of employees of the industry in which this firm belongs.
Firmage	Firm age, measured by the number of years since the CRSP begins its coverage of the firm till the bond issue date.
Issuesize	Issue size, measured as the issue proceeds divided by firm's total assets.
KZindex	Kaplan-Zingales' index, high values correspond to severe financial distress or financial constraint.
Marketcap	Firm's market capitalization, equal to share price times number of shares outstanding.
Marketlev	Ratio of the total debt to the sum of total debt and stock market capitalization.
Mtb	Ratio of market asset to book asset, where market asset is calculated as the sum of market capitalization, book value of total debt, and preferred stock carrying value, minus deferred taxes and investment tax credit.
Oscore	Ohlson's O-score, high values correspond to severe financial distress or financial constraint.
Profitmargin	Net income divided by total revenue.
Rate	Bond's credit crating, measured by Moody's bond ratings and, if unavailable, supplemented with Standard & Poor's ratings at the issue date, with the smallest value for the best ratings.
RRatio_Ind	Ratio of revenues of a firm to the total revenues of the industry in which this firm belongs.
Roa	Return on assets calculated as the ratio of income before extraordinary items divided by total assets.
Tfp	Residuals of regressing logged total sales against logged number of employees and logged net value of property, plant and equipment.
Tm	Time to maturity of bonds in years.
Volatility	Standard deviation of monthly stock returns over the past five years.
Zscore	Negative Altman's Z-score, high values correspond to severe financial distress or financial constraint.

Table 2. Summary Statistics

This table reports summary statistics for the sample of nonfinancial firms that have issued straight debts during the period from 1970 through 2011. *Pluw* is a dummy variable that equals one if a bond issue has a prestigious lead underwriter, and zero otherwise. Per Francis et al. (2010), a lead underwriter is prestigious if it is affiliated with one of the following eight investment banks: Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JPMorgan, and DLJ. *Speculative* is a dummy variable that equals one if a bond's credit rating is below Moody's "Baa3" or SP's "BBB-", and zero otherwise. *Senior* is a dummy variable to denote bond seniority. *Multissue* is a dummy variable that equals one if a firm makes more than one bond issues, public or private, within a year, and zero otherwise. All the other variables are defined in Table 1.

Variable	N	Mean	Stdev	P25	Median	P75
Yldsprd (%)	9487	1.553	1.875	0.666	1.170	2.108
Issuesize	9124	0.090	0.188	0.017	0.040	0.092
Principal ($B)	9487	0.473	0.751	0.100	0.200	0.500
Rate (%)	9487	6.860	3.572	5.000	6.000	9.000
Tm (yrs)	9487	13.331	9.704	6.992	10.011	19.989
Pluw	9487	0.543	0.498	0.000	1.000	1.000
Speculative	9487	0.181	0.385	0.000	0.000	0.000
Senior	9487	0.937	0.243	1.000	1.000	1.000
Multissue	9487	0.549	0.498	0.000	1.000	1.000
Roa	9122	0.048	0.056	0.027	0.047	0.072
Booklev	9123	0.338	0.157	0.232	0.329	0.429
Marketlev	8985	0.346	0.205	0.177	0.320	0.496
Assets ($B)	9124	17.110	35.031	2.098	5.793	16.540
Marketcap ($B)	8983	15.152	32.420	1.140	3.635	13.212
Annret	8953	0.176	0.407	-0.041	0.138	0.335
Volatility	8953	0.299	0.141	0.210	0.269	0.341
Firmage (yrs)	9200	35.364	22.411	17.108	32.721	53.090
Profitmargin	8985	0.048	0.061	0.027	0.048	0.073
Zscore	8985	-2.653	1.878	-3.477	-2.280	-1.330
Oscore	8854	-1.568	1.367	-2.376	-1.500	-0.764
KZindex	9124	-2.341	54.115	-2.065	-0.087	0.959
Asseturn	8985	0.934	0.687	0.437	0.799	1.193
Tfp	8790	0.192	0.708	-0.251	0.167	0.592
RRatio_Ind	9060	0.068	0.119	0.007	0.022	0.071
ARatio_Ind	9063	0.070	0.121	0.007	0.022	0.072
ERatio_Ind	8967	0.064	0.111	0.006	0.021	0.065

Table 3. Summary Statistics of Bond Issues and Firm Characteristics in Deregulated Industries
This table summarizes the corporate bonds issues (in Panel A) and bond-issuing firms (in Panel B) in five deregulated industries (Entertainment, Petroleum and Natural Gas, Telecommunications, Transportation, and Utilities) during the 1970-2011 period. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. All the other variables are defined in Table 1. The last column "(2)-(1)" reports the differences in mean values of the variables between the two periods. ***, **, and * denote (two-sided) statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. Bond Characteristics

Variable	Full Sample			*Deregyr*=0		*Deregyr*=1		
	N	Mean	Median	N	Mean	N	Mean	(2)-(1)
Yldsprd (%)	3640	1.629	1.269	915	1.457	2725	1.687	0.230***
Principal ($B)	3640	0.425	0.200	915	0.133	2725	0.523	0.390***
Rate	3640	6.891	7.000	915	5.127	2725	7.483	2.356***
Tm (yrs)	3640	15.660	10.031	915	21.792	2725	13.603	-8.188***
Pluw	3640	0.500	1.000	915	0.344	2725	0.553	0.208***
Speculative	3640	0.168	0.000	915	0.069	2725	0.202	0.133***
Senior	3640	0.963	1.000	915	0.977	2725	0.958	-0.018**
Multissue	3640	0.574	1.000	915	0.445	2725	0.617	0.172***
Issuesize	3538	0.082	0.035	831	0.046	2707	0.093	0.047***

Panel B. Firm Characteristics

Variable	Full Sample			*Deregyr*=0		*Deregyr*=1		
	N	Mean	Median	N	Mean (1)	N	Mean (2)	(2)-(1)
Roa	3537	0.036	0.039	831	0.045	2706	0.033	-0.012***
Booklev	3538	0.378	0.378	831	0.426	2707	0.364	-0.063***
Marketlev	3530	0.432	0.437	831	0.581	2699	0.386	-0.195***
Annret	3462	0.179	0.154	867	0.181	2595	0.178	-0.003
Volatility	3462	0.271	0.232	867	0.217	2595	0.289	0.072***
Tfp	3407	0.009	-0.077	827	-0.557	2580	0.19	0.747***
Asseturn	3534	0.576	0.413	831	0.451	2703	0.615	0.164***
Mtb	3530	0.953	0.803	831	0.761	2699	1.012	0.251***
Oscore	3482	-1.239	-1.235	828	-1.142	2654	-1.269	-0.127***
Zscore	3534	-1.667	-1.365	831	-1.284	2703	-1.784	-0.501***
KZindex	3538	0.305	0.443	831	0.27	2707	0.316	0.047

Table 4. Baseline Results

This table reports the baseline regression results. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. *DUtility* equals one if utility industry and zero otherwise. All the other variables are defined in Table 1. In Columns (1)-(3) and Columns (6)-(7), we include all industries in regressions. In Column (4), we include Utilities and non-deregulated industries in the regression. In Column (5), we include all non-Utilities industries in the regression. Standard errors adjust for clustering at the industry level and are reported in parentheses. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Deregyr	0.224	-0.583***	-0.447***	-0.506***	-0.201**	-0.215**	-0.649***
	(0.21)	(0.11)	(0.09)	(0.13)	(0.10)	(0.09)	(0.09)
Deregyr×DUtility						-0.400**	
						(0.16)	
Issuesize			-0.218	-0.065	-0.248	-0.203	0.421***
			(0.39)	(0.28)	(0.50)	(0.40)	(0.16)
Rate			0.159***	0.159***	0.169***	0.157***	0.157***
			(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Ln(Tm)			0.171***	0.181***	0.169***	0.171***	0.180***
			(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Pluw			-0.057	-0.032	-0.075*	-0.057	-0.020
			(0.04)	(0.04)	(0.04)	(0.04)	(0.03)
Speculative			0.708***	0.659***	0.835***	0.721***	0.941***
			(0.17)	(0.14)	(0.19)	(0.17)	(0.10)
Senior			0.114	-0.107	0.219	0.115	0.259*
			(0.26)	(0.23)	(0.26)	(0.26)	(0.15)
Multissue			-0.034	0.001	-0.055	-0.039	-0.088**
			(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
Roa			-2.787***	-3.121***	-2.655***	-2.824***	-2.890***
			(0.71)	(0.47)	(0.76)	(0.71)	(0.50)
Booklev			0.692**	0.394	0.613*	0.623*	0.249
			(0.31)	(0.25)	(0.36)	(0.33)	(0.16)
DUtility						1.140***	
						(0.25)	
Constant	1.462***	1.838***	0.375	0.617*	0.132	0.135	0.358*
	(0.06)	(0.14)	(0.37)	(0.34)	(0.37)	(0.35)	(0.21)
Firm effects	No	Firm	Firm	Firm	Firm	Firm	Industry
Year effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	2.97e-3	0.503	0.542	0.522	0.580	0.543	0.382
No of Obs.	9121	9121	9121	7504	7201	9121	9121

Table 5. Robustness Check: Estimating Baseline Model over Different Subsamples
This table reports the results of estimating the baseline regression model over various subsamples. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. All the other variables are defined in Table 1. The samples used in estimations consist of firms with investment-grade credit ratings in Column (1), firms with speculative credit ratings in Column (2), and firms issuing bonds in both the pre- and post-deregulation periods in Column (3), respectively. In Column (4), the sample consists of all bond-issuing firms but the sample period ends in 2005. Standard errors adjust for clustering at the industry level and are reported in parentheses. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Deregyr	-0.374***	-1.765**	-0.594***	-0.485***
	(0.09)	(0.89)	(0.13)	(0.11)
Issuesize	0.074	-0.188	0.103	0.572
	(0.27)	(0.91)	(0.46)	(0.45)
Rate	0.129***	0.381***	0.146***	0.110***
	(0.02)	(0.11)	(0.02)	(0.01)
Ln(tm)	0.190***	-0.350	0.188***	0.192***
	(0.02)	(0.51)	(0.03)	(0.03)
Pluw	-0.042	-0.309	-0.027	-0.003
	(0.03)	(0.30)	(0.04)	(0.03)
Speculative			0.729***	0.640***
			(0.19)	(0.17)
Senior	0.363	0.246	0.035	-0.217
	(0.25)	(0.53)	(0.28)	(0.26)
Multissue	-0.002	-0.131	-0.018	-0.040
	(0.03)	(0.30)	(0.04)	(0.04)
Roa	-2.571***	-1.769	-3.238***	-3.433***
	(0.72)	(1.79)	(0.74)	(0.85)
Booklev	0.192	2.061	0.748*	0.878*
	(0.25)	(1.67)	(0.44)	(0.45)
Constant	0.301	-3.000	0.321	0.736**
	(0.35)	(4.57)	(0.43)	(0.34)
Firm effects	Firm	Firm	Firm	Firm
Year effects	Yes	Yes	Yes	Yes
Adj. R^2	0.313	0.409	0.508	0.453
No of Obs.	7,548	1,573	6,962	7,297

Table 6. Robustness Check: Estimating Extended Models

This table reports the results of estimating various regression models that include additional variables in the baseline regression model. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. *Pre5* (*Pre2*) is a dummy variable that equals one for the period from five years (two years) before to one year before a deregulated industry has the first deregulatory initiative in place, and zero otherwise. *Pre1* is a dummy variable that equals one for the one year before a deregulated industry has the first deregulatory initiative in place, and zero otherwise. All the other variables are defined in Table 1. All regressions control for year-fixed effects and firm-fixed effects. Standard errors adjust for clustering at the industry level and are reported in parentheses. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Deregyr	-0.501***	-0.502***	-0.467***	-0.473***	-0.454***	-0.437***	-0.422***
	(0.13)	(0.12)	(0.11)	(0.10)	(0.11)	(0.11)	(0.11)
Issuesize	-0.218	-0.216	-0.218	-0.392	-0.267	-0.421	-0.448
	(0.40)	(0.40)	(0.40)	(0.41)	(0.41)	(0.42)	(0.42)
Rate	0.160***	0.160***	0.159***	0.156***	0.135***	0.127***	0.104***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Ln(Tm)	0.171***	0.170***	0.171***	0.169***	0.186***	0.183***	0.181***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)
Pluw	-0.05	-0.057	-0.057	-0.057	-0.062*	-0.067*	-0.069**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)
Speculative	0.708***	0.707***	0.706***	0.697***	0.648***	0.619***	0.582***
	(0.17)	(0.17)	(0.18)	(0.17)	(0.16)	(0.16)	(0.17)
Senior	0.118	0.120	0.115	0.136	-0.074	0.100	0.053
	(0.26)	(0.25)	(0.26)	(0.26)	(0.25)	(0.24)	(0.24)
Multissue	-0.036	-0.037	-0.035	-0.022	-0.003	-0.016	-0.012
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)
Roa	-2.771***	-2.783***	-2.793***	-2.890***	-2.416***	-2.277***	-1.119**
	(0.71)	(0.71)	(0.71)	(0.72)	(0.68)	(0.65)	(0.57)
Booklev	0.690**	0.687**	0.691**	0.728**	0.711*	0.749**	0.509
	(0.31)	(0.31)	(0.31)	(0.31)	(0.37)	(0.35)	(0.31)
Pre5	-0.123						
	(0.16)						
Pre2		-0.341					
		(0.25)					
Pre1			-0.280				
			(0.31)				
Ln(Assets)				-0.137**	-0.173**	-0.225***	
				(0.07)	(0.07)	(0.07)	
Annret					-0.511***	-0.501***	-0.501***
					(0.08)	(0.08)	(0.08)
Volatility					1.918***	2.199***	1.875***
					(0.37)	(0.36)	(0.38)
Ln(Firmage)						0.128	0.169
						(0.16)	(0.15)
Ln(Marketcap)							-0.371***
							(0.07)
Constant	0.361	0.362	0.371	0.338	0.078	-0.481	2.124***
	(0.36)	(0.36)	(0.37)	(0.36)	(0.35)	(0.59)	(0.75)
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.542	0.542	0.542	0.542	0.547	0.546	0.548
No of Obs.	9121	9121	9121	9,121	8,887	8,732	8,601

Table 7. Difference-in-Difference Regressions over Different Cuts of Post-Regulation Periods
This table reports the regression results using different ways of splitting the after-regulation period, i.e., the period during which a deregulatory initiative is in place, into two subperiods, "*During*" and "*After*". The "*During*" subperiod starts from the year when the first deregulatory initiative is in place and ends in respective different cutoff years: the year (T) when the last deregulatory initiative is in place (Column(1)), T+1 (Column(2)), T+2 (Column(3)), T+3 (Column(4)) T+4 (Column(5)), and T+5 (Column(6)). The "*After*" subperiod refers to the remainder of the period when deregulatory initiatives are in place but other than the "*During*" subperiod, and is accordingly defined in Columns (1)-(6). *During* (*After*) is a dummy variable that equals one for the "*During*" ("*After*") subperiod and zero otherwise. All the other variables are defined in Table 1. All regressions control for year-fixed effects and firm-fixed effects. Standard errors adjust for clustering at the industry level and are reported in parentheses. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
During	-0.474***	-0.464***	-0.450***	-0.448***	-0.449***	-0.448***
	(0.10)	(0.09)	(0.10)	(0.09)	(0.10)	(0.10)
After	-0.349***	-0.368***	-0.433***	-0.441***	-0.436***	-0.438***
	(0.09)	(0.11)	(0.13)	(0.14)	(0.13)	(0.13)
Issuesize	-0.214	-0.215	-0.217	-0.218	-0.217	-0.217
	(0.39)	(0.39)	(0.39)	(0.39)	(0.39)	(0.39)
Rate	0.159***	0.159***	0.159***	0.159***	0.159***	0.159***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Ln(Tm)	0.170***	0.170***	0.171***	0.171***	0.171***	0.171***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Pluw	-0.058	-0.058	-0.057	-0.057	-0.057	-0.057
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Speculative	0.712***	0.711***	0.708***	0.708***	0.708***	0.708***
	(0.18)	(0.18)	(0.17)	(0.18)	(0.17)	(0.17)
Senior	0.117	0.117	0.114	0.114	0.114	0.114
	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)
Multissue	-0.035	-0.034	-0.034	-0.034	-0.034	-0.034
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Roa	-2.778***	-2.787***	-2.787***	-2.786***	-2.787***	-2.787***
	(0.71)	(0.71)	(0.71)	(0.71)	(0.71)	(0.71)
Booklev	0.703**	0.702**	0.694**	0.693**	0.693**	0.693**
	(0.32)	(0.32)	(0.31)	(0.31)	(0.31)	(0.31)
Constant	0.358	0.365	0.373	0.374	0.374	0.374
	(0.37)	(0.37)	(0.37)	(0.38)	(0.37)	(0.37)
Firm effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.542	0.542	0.542	0.542	0.542	0.542
No of Obs.	9121	9121	9121	9121	9121	9121

Table 8. Cross-section Analysis: By Bond Characteristics

This table reports the results of the cross-sectional analysis which interacts *Deregyr* with dummy variables based on various bond characteristics. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. *Ltbond* is a dummy variable that equals one if a bond's time to maturity exceeds ten years, and zero otherwise. *Speculative* is a dummy variable that equals one if a bond's credit rating is speculative and zero otherwise. *Lgissue* is a dummy variable that equals one if the principal amount of a bond issue is above the median level and zero otherwise. All the other variables are defined in Table 1. All regressions control for year-fixed effects and firm-fixed effects. Standard errors adjust for clustering at the industry level and are reported in parentheses. Pvalue-Ftest is the p-value for the F-test on the interaction terms. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Deregyr	-0.370***	-0.393***	-0.355***
	(0.09)	(0.10)	(0.11)
Deregyr×Ltbond	-0.125*		
	(0.07)		
Deregyr×Speculative		-0.676**	
		(0.34)	
Deregyr×Lgissue			-0.169***
			(0.06)
Issuesize	-0.220	-0.209	-0.161
	(0.39)	(0.39)	(0.40)
Rate	0.158***	0.158***	0.161***
	(0.02)	(0.02)	(0.02)
Ln(Tm)	0.193***	0.169***	0.173***
	(0.03)	(0.03)	(0.03)
Pluw	-0.057	-0.057	-0.052
	(0.04)	(0.04)	(0.04)
Speculative	0.706***	0.924***	0.699***
	(0.17)	(0.18)	(0.17)
Senior	0.106	0.165	0.120
	(0.26)	(0.26)	(0.26)
Multissue	-0.034	-0.030	-0.033
	(0.04)	(0.04)	(0.04)
Roa	-2.790***	-2.745***	-2.781***
	(0.70)	(0.70)	(0.72)
Booklev	0.692**	0.688**	0.690**
	(0.32)	(0.32)	(0.31)
Constant	0.318	0.344	0.343
	(0.38)	(0.37)	(0.38)
Firm effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Adj. R^2	0.542	0.543	0.542
Pvalue-Ftest	0.083	0.051	0.006
No of Obs.	9121	9121	9121

Table 9. Cross-section Analysis: By Firms' Profitability and Operating Efficiency

This table reports the results of the cross-sectional analysis which interacts *Deregyr* with dummy variables measuring a firm's profitability and efficiency. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. *DRoa50* (*DProfitmargin50*) is a dummy variable that equals one if a bond-issuing firm's *Roa* (profit margin) is below the median level and zero otherwise. *DAsseturn50* (*Dtfp50*) is a dummy variable that equals one if a bond-issuing firm's sale-to-asset ratio (total factor productivity) is below the median level, and zero otherwise. All the other variables are defined in Table 1. All regressions control for year-fixed effects and firm-fixed effects. Standard errors adjust for clustering at the industry level and are reported in parentheses. Pvalue-Ftest is the p-value for the F-test on the interaction terms. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Deregyr	-0.344***	-0.339***	-0.162	-0.200**
	(0.11)	(0.10)	(0.14)	(0.10)
Deregyr×DRoa50	-0.149**			
	(0.07)			
Deregyr×DProfitmargin50		-0.135***		
		(0.05)		
Deregyr×DAsseturn50			-0.316**	
			(0.15)	
Deregyr×DTfp50				-0.392***
				(0.05)
Issuesize	-0.218	-0.160	-0.158	-0.004
	(0.39)	(0.40)	(0.40)	(0.34)
Rate	0.160***	0.161***	0.158***	0.157***
	(0.02)	(0.02)	(0.02)	(0.02)
Ln(Tm)	0.171***	0.173***	0.172***	0.175***
	(0.03)	(0.03)	(0.03)	(0.03)
Pluw	-0.056	-0.057	-0.059*	-0.059*
	(0.04)	(0.04)	(0.04)	(0.03)
Speculative	0.703***	0.698***	0.716***	0.717***
	(0.18)	(0.18)	(0.17)	(0.17)
Senior	0.118	0.073	0.055	0.015
	(0.26)	(0.26)	(0.26)	(0.26)
Multissue	-0.034	-0.040	-0.043	-0.040
	(0.04)	(0.04)	(0.04)	(0.04)
Roa	-2.970***	-2.892***	-2.748***	-2.928***
	(0.66)	(0.70)	(0.72)	(0.67)
Booklev	0.701**	0.750**	0.728**	0.629*
	(0.32)	(0.32)	(0.32)	(0.33)
Constant	0.379	0.390	0.427	0.461
	(0.37)	(0.37)	(0.37)	(0.36)
Firm effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Adj. R^2	0.542	0.542	0.543	0.544
Pvalue-Ftest	0.037	0.006	0.035	1.76e-9
No of Obs.	9121	8985	8985	8790

Table 10. Cross-section Analysis: By Firms' Market Share

This table reports the results of the cross-sectional analysis which interacts *Deregyr* with dummy variables measuring a firm's market share. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. *DARatio_Ind50*, *DRRatio_Ind50*, and *DERatio_Ind50* are three dummy variables that equal one if a bond-issuing firm's market share, calculated respectively on the basis of assets, revenues, and employees, is below the median level, and zero otherwise. All the other variables are defined in Table 1. All regressions control for year-fixed effects and firm-fixed effects. Standard errors adjust for clustering at the industry level and are reported in parentheses. Pvalue-Ftest is the p-value for the F-test on the interaction terms. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Deregyr	-0.231**	-0.301***	-0.190
	(0.09)	(0.09)	(0.12)
Deregyr×DARatio_Ind50	-0.308***		
	(0.07)		
Deregyr×DRRatio_Ind50		-0.180**	
		(0.07)	
Deregyr×DERatio_Ind50			-0.342***
			(0.12)
Issuesize	-0.199	-0.213	-0.213
	(0.39)	(0.39)	(0.39)
Rate	0.156***	0.157***	0.156***
	(0.02)	(0.02)	(0.02)
Ln(Tm)	0.172***	0.173***	0.173***
	(0.03)	(0.03)	(0.03)
Pluw	-0.054	-0.055	-0.054
	(0.04)	(0.04)	(0.04)
Speculative	0.722***	0.719***	0.728***
	(0.17)	(0.17)	(0.17)
Senior	0.124	0.119	0.116
	(0.26)	(0.26)	(0.26)
Multissue	-0.032	-0.033	-0.030
	(0.04)	(0.04)	(0.04)
Roa	-2.802***	-2.794***	-2.831***
	(0.70)	(0.71)	(0.71)
Booklev	0.695**	0.671**	0.616**
	(0.32)	(0.31)	(0.31)
Constant	0.365	0.375	0.362
	(0.36)	(0.37)	(0.37)
Firm effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Adj. R^2	0.547	0.547	0.545
Pvalue-Ftest	3.47e-5	0.012	0.006
No of Obs.	9060	9060	8966

Table 11. Cross-section Analysis: By Firms' Financial Leverage and Financing Constraint

This table reports the results of the cross-sectional analysis which interacts *Deregyr* with dummy variables measuring a firm's financial leverage and financing constraint. *Deregyr* is a dummy variable that equals one for the period during which a deregulatory initiative has been in place in a deregulated industry, and zero otherwise. *DBooklev75* (*DZcore75*) is a dummy variable that equals one if a bond-issuing firm's book leverage (*Z*-score) exceeds the 75 percentile, and zero otherwise. *DKZindex75* is a dummy variable that equals one if a bond-issuing firm's KZ-index exceeds the 75 percentile, and zero otherwise. *DMarketlev50* (*DOscore50*) is a dummy variable that equals one if a bond-issuing firm's market leverage (O-score) exceeds the median level, and zero otherwise. *DFirmage25* is a dummy variable that equals one if a bond-issuing firm's age is below the 25 percentile, and zero otherwise. All the other variables are defined in Table 1. All regressions control for year-fixed effects and firm-fixed effects. Standard errors adjust for clustering at the industry level and are reported in parentheses. Pvalue-Ftest is the p-value for the F-test on the interaction terms. ***, **, and * denote (two-sided) statistical significances at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Deregyr	-0.402***	-0.348***	-0.399***	-0.333***	-0.248**	-0.392***
	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)	(0.10)
Deregyr×DBooklev75	-0.168*					
	(0.10)					
Deregyr×DZscore75		-0.185***				
		(0.07)				
Deregyr×DKZindex75			-0.208***			
			(0.08)			
Deregyr×DMarketlev50				-0.127*		
				(0.07)		
Deregyr×DOscore50					-0.254***	
					(0.05)	
Deregyr×DFirmage25						-0.178***
						(0.06)

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	(1)	(2)	(3)	(4)	(5)	(6)
Issuesize	-0.219	-0.173	-0.224	-0.168	-0.109	-0.291
	(0.39)	(0.40)	(0.39)	(0.40)	(0.39)	(0.39)
Rate	0.159***	0.162***	0.160***	0.161***	0.158***	0.157***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Ln(Tm)	0.171***	0.172***	0.171***	0.172***	0.175***	0.170***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Pluw	-0.056	-0.056	-0.053	-0.059	-0.057	-0.058
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Speculative	0.707***	0.705***	0.709***	0.711***	0.709***	0.695***
	(0.18)	(0.18)	(0.17)	(0.18)	(0.17)	(0.17)
Senior	0.110	0.076	0.118	0.076	0.024	0.258
	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)
Multissue	-0.036	-0.040	-0.036	-0.039	-0.036	-0.053
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Roa	-2.787***	-2.848***	-2.855***	-2.761***	-2.991***	-2.775***
	(0.70)	(0.71)	(0.70)	(0.71)	(0.66)	(0.69)
Booklev	0.769**	0.768**	0.727**	0.774**	0.754**	0.742**
	(0.36)	(0.33)	(0.32)	(0.33)	(0.33)	(0.31)
Constant	0.365	0.380	0.371	0.373	0.445	0.269
	(0.37)	(0.36)	(0.37)	(0.37)	(0.36)	(0.37)
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.542	0.543	0.542	0.542	0.540	0.541
Pvalue-Ftest	0.088	0.012	0.011	0.073	3.21e-6	0.004
No of Obs.	9121	8985	9121	8983	8854	8962