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Growth Opportunities and the Choice of Leverage, Debt Maturity, and Covenants

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ABSTRACT

We investigate the effect of growth opportunities in a firm's investment opportunity set on its joint choice of leverage, debt maturity, and covenants. Using a database that contains detailed debt covenant information, we provide large-sample evidence of the incidence of covenants in public debt and construct firm-level indices of bondholder covenant protection. We find that covenant protection is increasing in growth opportunities, debt maturity, and leverage. We also document that the negative relation between leverage and growth opportunities is significantly attenuated by covenant protection, suggesting that covenants can mitigate the agency costs of debt for high growth firms.

KEY ELEMENTS OF CORPORATE FINANCIAL POLICY include the choice of debt level, the maturity structure of debt, and the types of restrictive covenants in the indentures. An important feature of these financial policy choices is that they are *jointly* determined as a function of firm characteristics and the contracting environment. Previous studies examine the joint choice of leverage and maturity. Ours is the first empirical investigation that also accounts for the endogenous choice of covenant structure. We provide large-sample evidence that covenant protection is increasing in growth opportunities, debt maturity, and leverage. We also document that covenant protection significantly attenuates the negative effect of growth opportunities on leverage. Our evidence suggests that firms use covenants to control stockholder–bondholder conflicts over the exercise of growth options, and that short-term debt and restrictive covenants are substitutes in controlling these conflicts.

The decision to become levered involves a tradeoff between the costs and benefits of debt financing. One of the most important costs of debt financing is the potential for conflicts between stockholders and bondholders over the investment and financing policies of the firm. Starting with the seminal work of Jensen and Meckling (1976), Myers (1977), and Smith and Warner (1979), it has been argued that the suboptimal incentive effects of debt financing can be

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controlled by a variety of contracting mechanisms, including the use of short-term debt and restrictive covenants. The use of these contracting mechanisms is argued to be more important for high growth firms, since these firms are more likely to face stockholder–bondholder conflicts.

This agency-theoretic view of financial contracting suggests a number of important and as of yet unanswered questions concerning the determinants of corporate financial policy. First, what are the relations among the jointly endogenous financial policy choices of leverage, maturity, and covenant structure? Furthermore, how do these choices vary with firm characteristics, and especially growth opportunities? Second, recognizing that short-term debt and covenants are substitute mechanisms for controlling agency conflicts, do firms with more short-term debt have less covenant protection? Finally, can covenant protection attenuate the well-documented negative relation between leverage and growth opportunities?

The extent research on covenants focuses on the determinants of the choice of individual covenants in debt issues.[1] To answer the questions that we pose, however, requires a measure of the firm's overall covenant structure and recognition of the joint endogenous relation between that structure and the other elements of corporate financial policy. Thus, in this article, we construct a large panel data set that contains information on firms' overall covenant structure, maturity structure, leverage, and other characteristics (e.g., growth opportunities). We construct this database by merging data on public debt issues from the Fixed Investment Securities Database (FISD) with the Compustat database. The version of FISD that we employ reports the incidence of more than 50 different types of covenants in over 15,000 debt issues by nonfinancial firms from the 1960s through the first quarter of 2003. We use this data on individual debt issues to construct a firm's history of covenants by tracking the firm's FISD debt issues through time, adjusting for sinking fund payments, calls, puts, conversions, and retirements at maturity. We then match this database to Compustat data, collecting information from Compustat on debt maturity structure, leverage, and firm characteristics.

The covenant information in FISD provides a unique opportunity to examine the incidence of covenants across a large sample of public debt issues. We find that lower priority, lower rated, and shorter maturity debt issues tend to have more covenant protection. In contrast, convertible debt issues and issues by regulated firms tend to have less covenant protection. Interestingly, we find that the incidence of all types of covenants has generally increased over the sample period. Finally, we find that the use of one type of covenant tends to be highly correlated with the use of all other types of covenants, although there are clearly identifiable "packages" of covenants that tend to be grouped together.

The distribution of covenants across bond issues translates into an equally rich distribution of covenants in our firm-year sample matched to Compustat data. To implement our tests of the joint determinants of leverage, maturity,

[1] For example, Nash, Netter, and Poulsen (2003), Chava, Kumar, and Warga (2004), and Reisel (2004) examine the determinants of covenants in public debt issues, while Bradley and Roberts (2004) examine the determinants of covenants in bank loans.

and covenant structure, we compute firm-level indices of covenant protection. In our simplest and broadest measure of covenant protection, we group covenants into 15 major categories and construct covenant indicator variables for a firm's outstanding debt issues, which are then summed to compute an index of covenant protection. We then estimate systems of simultaneous equations with leverage, the proportion of short-term debt, and the covenant index as endogenous variables.

We find that covenant protection is increasing in leverage and growth opportunities, and decreasing in the proportion of short-term debt. These results are consistent with the predictions that firms use restrictive covenants to control stockholder–bondholder conflicts, and that short-term debt and restrictive covenants are substitutes in controlling such conflicts. Importantly, we find that the negative relation between leverage and growth opportunities is significantly attenuated by covenant protection, as reflected in a positive coefficient on growth opportunities interacted with covenant protection in the leverage equation. This suggests that covenants can mitigate the agency costs of debt for high growth firms. We find that short-term debt is also effective in mitigating agency costs for the subsample of noninvestment grade firms. Overall, our covenant results are robust to alternative specifications of the covenant index and measures of growth opportunities.

The remainder of the article is organized as follows. Section I presents testable predictions for the relations between growth opportunities and the firm's choice of leverage, maturity, and covenants. This section also discusses related empirical work. Section II discusses the debt issue database used in our analysis and presents descriptive statistics on the incidence of covenants in public debt issues. Section III discusses the construction of our firm-year database and presents descriptive statistics for the variables used in our econometric analysis. Section IV presents results from the estimation of simultaneous equations systems with leverage, debt maturity, and covenant protection as endogenous variables. Section V concludes.

I. The Effect of Growth Opportunities on Financial Policy

This section discusses testable predictions for the relations among growth opportunities, leverage, debt maturity structure, and restrictive covenants. We conclude with a discussion of the existing empirical work that examines these issues.

A. Leverage and Growth Opportunities

As Jensen and Meckling (1976) and Myers (1977) argue, when the firm has risky debt outstanding and when managers act to maximize equity value rather than total firm value, managers have incentives to under- and overinvest in future growth opportunities. The loss in firm value attributable to these suboptimal investment decisions constitutes a significant component of the agency cost of debt. The other component is the cost of contracting mechanisms that the firm uses to mitigate stockholder–bondholder conflicts. Two such contracting mechanisms, which we discuss below, are the use of short-term debt and

restrictive covenants in debt contracts. Absent these contracting mechanisms, rational bondholders anticipate conflicts and will require a higher cost of debt financing. It is therefore in the firm's interest to mitigate potential conflicts over the exercise of future growth options. The obvious solution is to avoid them altogether by using less debt financing. This leads to the prediction that firms with more growth opportunities should have less leverage.

B. Short-Term Debt

Stockholder–bondholder conflicts over the exercise of growth options can be mitigated with short-term debt. Myers (1977) observes that if debt matures before growth options are exercised, the firm's incentive to deviate from a firm-value-maximizing exercise policy is eliminated. More generally, Childs, Mauer, and Ott (2005) argue that short-term debt can mitigate both under- and over-investment incentives by making the debt less sensitive to changes in firm value and by allowing for more frequent repricing of debt. We therefore predict that firms with more growth opportunities should have a larger proportion of short-term debt.

Diamond (1991) argues that short-term debt exposes the firm to a liquidity risk of the loss of unassignable control rents if lenders will not allow refinancing and the firm is liquidated. Because of this liquidity risk, he argues that only the highest quality and lowest quality firms use short-term debt. Further, Childs et al. (2005) argue that although short-term debt can mitigate incentives to under- and overinvest in growth options, this benefit must be balanced against the greater liquidity risk of refunding short-term debt. They show that for riskier firms, optimal leverage decreases as the maturity of debt decreases. We therefore predict a negative relation between leverage and the proportion of short-term debt for low quality firms.

Although the greater liquidity risk of short-term debt can have a negative *direct* effect on leverage, Johnson (2003) and Childs et al. (2005) argue that at the margin, the use of short-term debt should attenuate the negative effect of growth opportunities on leverage. We test this indirect benefit of short-term debt by including growth opportunities interacted with the proportion of short-term debt as a determinant of firm leverage. We expect to find a positive relation between leverage and this interacted variable.

C. Restrictive Covenants

Smith and Warner (1979) are the first to provide a detailed analysis of the different types of restrictive covenants in the indentures of public debt issues and the types of stockholder–bondholders conflicts that these covenants are designed to mitigate. They document three major groups of covenants. The first group limits the payment of dividends to shareholders and restricts the amount of dividends that a captive finance subsidiary can pay to its parent. This group also includes covenants designed to limit share repurchases. The second group restricts financing by placing limits on overall borrowing and the issuance of certain types of debt (e.g., secured debt). The final group of covenants is designed

to restrict investment policy, and ranges from prohibitions on certain types of investments to restrictions on mergers.

An important insight from Smith and Warner's (1979) analysis is that covenants designed to restrict one activity indirectly restrict other activities. For example, a restriction on dividend payments indirectly influences investment decisions because the restriction may prevent the firm from distributing cash to shareholders that otherwise would have been used to finance positive net present value investments. For this reason, Myers (1977) and Kalay (1982) argue that a covenant restricting dividends can help resolve the incentive of managers to underinvest in growth opportunities. Other covenants, for example, restrictions on the amount of debt financing or event-risk covenants designed to protect bondholders from the dilutive effects of highly leveraged transactions, indirectly mitigate the incentive to overinvest in risky investments by moderating the default risk of outstanding debt. This interrelatedness among the activities that covenants restrict suggests that we should examine the relation between growth opportunities and a firm's overall covenant structure.

We construct indices of covenant protection to examine the relation between growth opportunities and covenants, and between covenants and the firm's leverage and maturity choices. The foregoing discussion suggests that a firm's index of covenant protection should be increasing in the proportion of its assets composed of growth opportunities. This prediction must be tempered, however, by the fact that covenants are costly precisely because they restrict future financing and investment decisions. Although firms with high growth opportunities are more likely to face stockholder–bondholder conflicts and thereby benefit the most from restrictive covenants, it is easy to argue that these same firms would seek to preserve future financing and investment flexibility by having few if any restrictive covenants. Conversely, covenants may be relatively cheap for low growth opportunity firms and therefore be more prevalent in these firms. Ultimately, it is an empirical question as to whether the degree of covenant protection is positively or negatively related to growth opportunities.

It is important to note that since the database used in this study (discussed below) only contains public debt issues, the relation that we find between covenant protection and growth opportunities could be downward biased if public debt issuers use significant amounts of private (e.g., bank) debt. For example, we could find a negative relation between covenant protection and growth opportunities because high growth firms substitute private debt with unobservable covenants for public debt with observable covenants. Recent research suggests, however, that public borrowers and private borrowers tend to be distinct groups of firms. For example, Denis and Mihov (2003) find that the median private borrower is smaller, has fewer tangible assets, and has lower credit quality than the median public borrower.[2] Since our sample is composed of public debt issuers, it is unlikely that these firms use large amounts of private debt.

[2] Interestingly, Denis and Mihov (2003) find no significant difference in growth opportunities between public and private borrowers. A similar finding is reported in Bradley and Roberts (2004).

We predict a positive relation between covenant protection and leverage. The rationale is that the risk of outstanding debt and therefore the incentive to make suboptimal investment decisions is greater when leverage increases. Importantly, we also predict that covenants should attenuate the negative effect of growth opportunities on leverage. We test this prediction by including the interaction of growth opportunities with covenant protection in the leverage equation. We expect to find a positive coefficient on this interacted variable. Finally, our discussion suggests that covenant protection and short-term debt are substitutes, since each contracting mechanism is costly and since they both mitigate stockholder–bondholder conflicts. We therefore predict a negative relation between covenant protection and short-term debt.

D. Existing Empirical Evidence on Growth Opportunities and Financial Policy

A large literature in finance empirically examines the separate relations between growth opportunities and leverage and between growth opportunities and maturity. For example, Rajan and Zingales (1995) find that leverage is negatively related to growth opportunities, while Barclay and Smith (1995) find that debt maturity is negatively related to growth opportunities. Only recently, however, has the literature started to formally recognize that these financial policy variables are jointly endogenous. In large panel data sets constructed using all nonfinancial firms in the Compustat database, Barclay, Marx, and Smith (2003) and Johnson (2003) estimate systems of simultaneous equations that treat leverage and debt maturity as jointly endogenous variables. Consistent with prior empirical work, Barclay et al. (2003) find that leverage and debt maturity are negatively related to growth opportunities. Johnson (2003) confirms the negative relation between growth opportunities and leverage, but finds no evidence that debt maturity is negatively related to growth opportunities. He finds further that short-term debt attenuates the negative effect of growth opportunities on leverage.

The empirical literature on covenants focuses on the factors that determine the choice of specific covenants in debt issues. Malitz (1986) and Begley (1994) find that highly leveraged firms are more likely to include restrictive covenants in public debt issues. Additionally, Begley (1994) finds that the firm's risk of financial distress and the maturity of a debt issue are negatively related to the use of covenants. Kahan and Yermack (1998) and Nash, Netter, and Poulsen (2003) examine the relation between a firm's growth opportunities and the choice of covenants in public debt issues. Both studies find that high growth firms are less likely to include restrictive covenants, suggesting that the benefit of preserving future flexibility outweighs the benefit of reducing the cost of debt by including covenants. Indeed, Kahan and Yermack (1998) find that convertible debt issues have virtually no covenants, suggesting that for high growth firms the conversion feature is a more cost-effective contracting mechanism than restrictive covenants in addressing stockholder–bondholder conflicts. Anderson (1999) finds consistent evidence for debt in Brazil, where

restrictive covenants in indenture agreements are replaced with contingent-maturity mechanisms.

More recently, a series of articles examine the joint choice and price effect of covenants in large samples of debt issues. Chava, Kumar, and Warga (2004), Reisel (2004), and Goyal (2005) examine public debt issues, while Bradley and Roberts (2004) examine private debt (primarily bank loans). All of these articles find that including covenants reduces the cost of debt. Additionally, Bradley and Roberts (2004) find that for private debt there is a positive relation between growth opportunities and covenants, and between leverage and covenants; they find little evidence that loan maturity is related to covenant choice, however.[3] For public debt issues, Chava et al. (2004), Reisel (2004), and Goyal (2005) find that high growth firms are typically less likely to include covenants. These authors find little consensus on the relation between debt maturity and covenants, but consistent with Bradley and Roberts's (2004) result for private debt, they find that highly leveraged firms are more likely to have covenants in their public debt issues.

II. The Bond Issue Sample and the Incidence of Restrictive Covenants

Similar to Chava et al. (2004) and Reisel (2004), we collect our sample of debt issues from the Fixed Investment Securities Database (FISD), which contains detailed information on over 130,000 public debt issues across all rating categories.[4] The version of FISD that we use includes debt issues that were issued through the first quarter of 2003 and that matured after 1989. After excluding U.S. government bonds, foreign bonds, bonds denominated in foreign currency, and bonds issued by financial firms and finance subsidiaries, we obtain an initial sample of 28,785 debt issues over 1960 to 2003. From this sample, we then exclude 5,173 medium-term notes (MTNs), since FISD does not record covenant information for MTNs.[5]

For the remaining sample of 23,612 debt issues, we verify whether FISD recorded covenant information and whether FISD checked "subsequent data" when recording the features of the debt issue. The subsequent data flag in the

[3] Dichev and Skinner (2002) also examine covenants in private debt, documenting that accounting-based covenants are often violated. This suggests that private lenders use covenants as trip wires.

[4] The FISD is produced by LJS Global Information Services, Inc. (formerly FITCH IBCA Information, Inc.), and is obtainable from the Fixed Income Research Program at the University of Houston College of Business. The database contains issuance information on all fixed income securities that are assigned CUSIPs, or debt instruments that are likely to receive one in the near future. Commercially, FISD serves as the issuance database engine for Reuters/Telerate and EJV/Bridge, which collectively account for the majority of trader information screens in the fixed income dealer market.

[5] MTNs are Rule 415 shelf-registered securities that may be issued up to 2 years after they are registered with the SEC. MTNs are not required to have medium terms, and typically have covenants similar to those of other debt issues. Unfortunately, when MTNs are issued, the FISD does not report the covenants in the original S-3 shelf registration document.

Table I
Corporate Debt Issue Sample by Time Period

The data on debt issues is from the Fixed Investment Securities Database (FISD). The sample excludes U.S. government bonds, foreign bonds, bonds denominated in foreign currency, bonds issued by financial firms and finance subsidiaries, and medium-term notes. A debt issue is also excluded if FISD reports no covenants and FISD does not verify the covenant status of the issue by checking the prospectus or other more detailed document or source.

Year	No. of Issues
1960–64	21
1965–69	74
1970–74	94
1975–79	64
1980–84	209
1985–89	1,470
1990–94	3,771
1995–99	6,161
2000–03	3,640
All Years	15,504

FISD indicates whether the issue proceeded beyond the initial input phase, containing data from a prospectus, pricing supplement, or other more detailed document or source. Of the 23,612 debt issues, 12,018 have covenant information and 11,594 have no covenant information. In the latter group of issues, 8,533 (3,061) have a "no" ("yes") for checked subsequent data. We exclude the 8,533 debt issues, except for 425 convertibles that validly appear to have no covenants, and we include the 3,061 debt issues. This leaves us with a final sample of 15,504 (12,018 + 3,061 + 425) debt issues over 1960 to 2003.[6]

Table I reports the distribution of the 15,504 debt issues over the period from 1960 through the first quarter of 2003. Notice that there are relatively few debt issues in the sample prior to 1985, which is consistent with the FISD requirement that debt issues mature after 1989. We choose to keep these earlier debt issues in the sample because many were still outstanding in the 1990s and therefore enter our firm-year sample of covenant protection (discussed below).

Table II reports the distribution of debt issues by various categories. The majority of issuers in the sample are industrial firms, although 17% are regulated. Convertible notes and bonds comprise approximately 12% of the sample, or 1,793 issues. As the table shows, 56% of the sample is classified by FISD as senior, with the remainder of the sample classified as senior secured (19%) and senior subordinate (25%). Only 71 debt issues in the sample are classified

[6] We are unable to find an obvious reason why the analysts at LJS Global Information Services check subsequent data for some debt issues and not for others. Like MTNs, however, many of the debt issues with "no" for subsequent data are shelf-registered. Fortunately, other than the high incidence of shelf registration, these "no" debt issues have similar distributions of priority, credit ratings, maturity, and issue years to the debt issues included in our final sample.

Table II
Corporate Debt Issue Sample by Categories

The data on debt issue characteristics is from the Fixed Investment Securities Database (FISD). The sample excludes U.S. government bonds, foreign bonds, bonds denominated in foreign currency, bonds issued by financial firms and finance subsidiaries, and medium-term notes. A debt issue is also excluded if FISD reports no covenants and FISD does not verify the covenant status of the issue by checking the prospectus or other more detailed document or source. The other category under debt types includes U.S. corporate inflation indexed, PIK, insured, and pass-through bonds.

Category	No. of Issues	% of Total No.
Industrial issuer	12,901	83.2
Regulated issuer	2,603	16.8
Debenture	12,429	80.2
Convertible	1,793	11.5
Others	1,282	8.3
Senior secured	2,928	18.9
Senior	8,713	56.2
Senior subordinate	3,792	24.5
Junior	20	0.1
Junior subordinate	51	0.3
Investment grade	8,104	52.3
Below investment grade	5,601	36.1
Not rated	1,799	11.6
Callable	8,745	56.4
Noncallable	6,759	43.6
Sinking fund	1,554	10.0
No sinking fund	13,950	90.0
Putable	756	4.9
Poison put	4,514	29.1
Unit deal (Warrants)	206	1.3
Orig. mat. $>$ 10 years	5,083	32.8
Orig. mat. $\leq$ 10 years	10,421	67.2
Total no. of issues	15,504	100.00

as junior, a number that is consistent with the paucity of junior debt issues in the entire FISD database. There are significant fractions of below-investment grade and unrated debt issues in the sample; approximately 36% (12%) of the sample is rated below investment grade (unrated). In the sample, 56% of the issues are callable, 10% have a sinking fund, 29% have a poison put, and 1% are unit deals (i.e., bond plus warrants). Note that a poison put allows bondholders to sell the issue back to the firm at par value or a small premium above par value upon a change of control. Additionally, 5% of the debt issues are putable, allowing bondholders to sell the issue back to the firm at fixed prices on specified future dates. Finally, 67% of the debt issues have an original maturity less than or equal to 10 years.

For each debt issue, the FISD reports the incidence of over 50 different bondholder protective and issuer restrictive covenants. Since typically there are

multiple covenants for each type of restricted activity, we group the covenants into 15 major categories, as given by the columns of Table III. The first two categories restrict payouts to equityholders and others. An issue has a dividend restriction if there is a covenant limiting the dividend payments of the issuer or a subsidiary of the issuer. Typical subsidiary restrictions limit dividend payments to the parent, thereby preventing the parent from draining the subsidiary's assets. An issue has a share repurchase restriction if there is a covenant limiting the issuer's freedom to make payments (other than dividend payments) to shareholders and others. Note that this covenant would also restrict the issuers' ability to redeem subordinate debt.

The next seven categories place restrictions on financing activities. A funded debt restriction prevents the issuer and/or subsidiary from issuing additional debt with a maturity of 1 year or longer. The next three covenants restrict the issuer from issuing additional subordinate, senior, and secured debt, respectively. Note that the secured debt covenant is referred to as a negative pledge, and typically specifies that the issuer cannot issue secured debt unless it secures the current issue on a pari passu basis. The category of covenants that we refer to as "total leverage tests" includes a variety of accounting-based restrictions on leverage, ranging from a requirement that the issuer maintain a specified minimum net worth to a requirement that the issuer maintain a specified minimum ratio of earnings to fixed charges. A sale and leaseback covenant restricts the issuer and/or subsidiary from selling and then leasing back assets that provide security for the debtholder. This provision usually requires that the proceeds from the sale be used to retire debt or acquire substantially equivalent property. Finally, the stock issue restriction restricts the issuer and/or subsidiary from issuing additional common or preferred stock.

The next three categories are event-driven covenants. An issue has a rating or net worth trigger if certain provisions are triggered (e.g., a put option) when either the credit rating or net worth of the issuer falls below a specified level. An issue has a cross-default provision if default (or acceleration of payments in default) is triggered in the issue when default (or acceleration of payments in default) occurs for any other debt issue. Finally, we include the poison put provision as a separate category, since it is triggered in the event of a change in control.

The remaining three covenant categories place restrictions on investment policy. An issue has an asset sale clause if the issuer and/or subsidiary are required to use the net proceeds from the sale of certain assets to redeem the issue at par or at a premium to par. Investment policy restrictions proscribe certain risky investments for the issuer and/or subsidiary. Finally, a merger restriction typically specifies that the surviving entity must assume the debt and abide by all of the covenants in the debt.

Table III reports the distribution of the 15 covenant categories for the full sample of 15,504 debt issues and for various groupings of the debt issues. In the full sample, the most frequent covenants are secured debt restrictions (44%), cross-default provisions (51%), asset sale clauses (65%), and merger restrictions (65%). Consistent with intuition, issues by regulated issuers generally have

Table III

Distribution of Covenants across Categories of Corporate Debt Issues

The data on debt issue characteristics and covenants is from the Fixed Investment Securities Database (FISD). The sample of debt issues excludes U.S. government bonds, foreign bonds, bonds denominated in foreign currency, bonds issued by financial firms and finance subsidiaries, and medium-term notes. A debt issue is also excluded if FISD reports no covenants and FISD does not verify the covenant status of the issue by checking the prospectus or other more detailed document or source. The other category under debt types includes U.S. corporate inflation indexed, PIK, insured, and pass-through bonds.

		Percentage of Debt Issues in Each Category with the Following Covenants														
Category	No. of Issues	1 Div. Pmnt. Restrs.	2 Share. Repur. Restrs.	3 Funded Debt Restrs.	4 Subord. Debt Restrs.	5 Senior. Debt Restrs.	6 Secured Debt Restrs.	7 Total Lev. Tests	8 Sale & Lease-Back	9 Stock Issue Restrs.	10 Rating & NW Triggers	11 Cross-Default Provs.	12 Poison Put	13 Asset Sale Clause	14 Invest. Policy Restrs.	15 Merger Restrs.
Full sample	15,504	27.0	22.6	3.0	6.0	1.4	44.3	30.4	29.2	17.3	4.1	51.0	29.1	64.5	4.2	64.6
Industrial issuer	12,901	27.5	26.0	2.6	7.2	1.7	48.4	29.6	32.9	20.5	4.8	51.0	33.8	69.3	4.6	69.3
Regulated issuer	2,603	24.7	6.1	5.0	0.3	0.1	24.3	34.1	10.9	1.9	0.7	50.7	5.7	40.3	1.9	41.2
Debenture	12,429	31.7	27.7	3.5	7.3	1.7	53.9	36.2	35.9	21.3	4.6	54.6	29.1	67.3	5.1	67.3
Convertible	1,793	7.3	1.8	0.4	0.7	0.4	5.6	3.0	2.9	1.4	2.9	50.9	49.0	55.8	0.4	56.1
Other	1,282	8.5	3.0	1.3	0.6	0.2	5.5	12.4	0.9	1.4	0.6	15.8	1.6	48.6	0.8	49.3
Senior secured	2,928	29.9	14.7	4.2	0.6	0.6	6.3	39.9	6.7	9.6	1.7	45.2	13.4	37.7	3.3	38.2
Senior	8,713	19.3	19.1	3.4	0.7	0.4	65.4	23.6	46.2	15.1	3.5	48.4	22.9	73.4	3.9	73.4
Senior subordinate	3,792	42.2	36.9	1.1	22.4	4.5	25.9	38.8	8.1	28.5	7.3	61.4	55.5	64.5	5.6	64.5
Junior	20	20.0	20.0	0.0	20.0	0.0	10.0	20.0	5.0	15.0	10.0	50.0	65.0	65.0	5.0	65.0
Junior subordinate	51	49.0	19.6	0.0	2.0	2.0	9.8	17.7	3.9	9.8	3.9	45.1	17.7	74.5	5.9	74.5
Investment grade	8,104	12.1	5.0	4.5	0.8	0.6	50.0	17.5	35.0	3.6	2.3	42.2	8.7	61.3	2.3	61.8
Below invest. grade	5,601	43.5	42.7	1.3	12.3	2.3	39.8	45.0	23.5	32.7	5.5	59.4	50.2	67.5	6.1	67.1
Not rated	1,799	42.8	39.4	1.7	9.8	2.6	33.0	42.9	21.1	31.5	7.8	64.2	55.4	69.0	7.0	69.0
Callable	8,745	39.5	35.8	2.6	10.1	2.2	47.8	43.3	30.7	27.8	5.0	56.2	36.8	65.7	5.3	65.7
Noncallable	6,759	10.8	5.6	3.5	0.7	0.4	39.9	13.7	27.3	3.8	2.9	44.2	19.2	62.8	2.7	63.0
Sinking fund	1,554	28.8	15.3	3.1	4.4	1.4	14.4	20.5	7.5	7.9	12.0	42.0	18.9	59.9	7.1	60.3
No sinking fund	13,950	26.8	23.4	3.0	6.2	1.4	47.7	31.5	31.6	18.4	3.2	52.0	30.3	65.0	3.9	65.0
Putable	756	7.0	4.9	2.7	0.8	0.4	40.6	9.7	25.4	4.1	4.5	48.2	32.3	66.0	0.9	66.1
Poison put	4,514	67.0	69.6	1.8	18.7	4.1	54.6	72.6	33.6	54.9	9.7	89.2	100.0	94.2	9.7	93.6
Unit deal (Warrants)	206	52.4	39.3	0.5	7.8	1.5	28.2	41.3	24.3	35.4	8.7	51.5	39.8	56.8	6.8	57.3
Orig. mat. > 10 yrs	5,083	15.2	6.1	4.1	1.7	0.8	35.7	17.9	23.3	4.2	3.7	40.1	12.2	56.4	1.9	56.8
Orig. mat. ≤ 10 yrs	10,421	32.7	30.7	2.4	8.1	1.7	48.6	36.5	32.1	23.8	4.3	56.3	37.4	68.4	5.3	68.3
Debt issues by time period:																
1985–89	1,470	25.8	8.2	2.2	4.0	1.4	18.0	12.7	10.1	5.4	15.9	36.0	15.8	49.3	4.5	50.0
1990–94	3,771	30.0	16.8	5.7	6.3	0.9	45.2	38.0	29.4	12.5	5.3	59.2	23.8	64.4	6.2	65.0
1995–99	6,161	31.6	33.0	2.7	7.1	2.6	53.6	36.6	35.7	26.3	2.5	57.7	37.8	72.0	4.4	72.0
2000–03	3,640	16.9	19.8	0.8	5.4	0.2	42.5	22.4	28.8	14.0	1.4	40.3	29.0	63.9	2.1	63.5

fewer restrictive covenants, although not dramatically so. Similarly, convertibles tend to have fewer covenants than nonconvertibles, although a significant number of the 1,793 convertible debt issues in our sample have cross-default provisions (51%), poison puts (49%), asset sale clauses (56%), and merger restrictions (56%). These results are roughly consistent with the results in Kahan and Yermack (1998), who find virtually no covenants in a small sample of convertible bonds in the 1990s, and with Nanda and Yun (1996), who observe that convertibles tend to have poison puts. The upshot is that presumably the conversion option protects debtholders and therefore obviates the need for a broad array of covenants, which may adversely restrict the flexibility of convertible debt issuers. Interestingly, our large-sample evidence suggests that a majority of convertible debtholders still require investment restrictions and event-risk protection.

Notice in Table III that covenant usage tends to increase as priority decreases. Additionally, below-investment grade (and unrated) debt issues tend to have a greater incidence of all types of restrictive covenants. For example, observe that relative to investment grade debt issues, below-investment grade debt issues have dramatically larger percentages of dividend and share repurchase restrictions, accounting-based restrictions (Category 7), and poison puts. Notice also that callable issues and issues without sinking funds tend to be more likely to have all types of covenants than their respective complement samples. Finally, observe that long-maturity (greater than 10 years) debt issues tend to have fewer covenants than short-maturity (less than or equal to 10 years) debt issues. This is interesting, since one might expect the opposite relation given that shorter-maturity debt presumably helps insulate lenders from stockholder–bondholder conflicts. A possible explanation for this result is that borrowers place relatively fewer covenants in long-term debt because they want to avoid imposing costly restrictions over long time periods. Of course, there are other equally plausible explanations, including the possibility that firms issuing short-term debt have high growth opportunities and that this accounts for the greater incidence of covenants in short-term debt.

The remaining entries in Table III examine the distribution of covenants in debt issues by time period. Given the paucity of debt issues before 1985 (see Table I) and the FISD debt issue inclusion criterion that the issue must mature after 1989, we report the incidence of covenants in debt issues starting in 1985. Despite this fairly limited time frame, observe that the incidence of all types of covenants in debt issues has generally increased over the 1980s and 1990s. In particular, there have been especially sharp increases in share repurchase restrictions, secured debt restrictions, sale and lease-back provisions, asset sale clauses, and merger restrictions. Interestingly, note that these increases seem to have subsided in the most recent time period (2000 to 2003), although since our data ends in the third quarter of 2003 it is difficult to draw any firm conclusions.

Given the rich nature of the covenant data, we are able to examine the likelihood of jointly observing various types of covenants, and to investigate what covenants tend to cluster together. Panel A of Table IV reports correlations between covenant indicator variables for the 15 covenant categories in the full

Table IV

Correlations and Conditional Probabilities between Covenant Indicator Variables for the Debt Issue Sample

Panel A reports Pearson correlation coefficients between covenant indicator variables, and Panel B reports conditional probabilities between covenant indicator variables for the 15,504 debt issue sample. The conditional probabilities in Panel B are the probability of observing a covenant in row i conditional on the presence of a covenant in column j. In Panel A, all p-values are less than 0.01 except two (correlation coefficients superscripted with NS), which are greater than 0.10.

Panel A: Correlation Coefficients

Covenant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Dividend pmnt. restrs.	1.00														
2. Share repurchase restrs.	0.72	1.00													
3. Funded debt restrs.	0.03	−0.05	1.00												
4. Subordinate debt restrs.	0.37	0.43	−0.03	1.00											
5. Senior debt restrs.	0.14	0.18	0.03	0.02	1.00										
6. Secured debt restrs.	0.13	0.24	0.07	0.12	0.03	1.00									
7. Total leverage test	0.73	0.76	0.04	0.37	0.15	0.16	1.00								
8. Sale & leaseback	0.04	0.11	0.06	−0.04	−0.02	0.59	0.07	1.00							
9. Stock issue restrs.	0.67	0.76	−0.02	0.37	0.13	0.23	0.66	0.17	1.00						
10. Rating & net wrth. trgs.	0.12	0.11	0.04	0.08	0.04	0.01^{NS}	0.10	−0.03	0.04	1.00					
11. Cross-default provisions	0.51	0.49	0.06	0.24	0.11	0.28	0.57	0.19	0.41	0.09	1.00				
12. Poison put	0.58	0.72	−0.05	0.34	0.15	0.13	0.59	0.06	0.64	0.18	0.49	1.00			
13. Asset sale clause	0.26	0.39	0.03	0.18	0.08	0.53	0.27	0.42	0.33	0.07	0.42	0.40	1.00		
14. Invest. policy restrs.	0.24	0.28	0.03	0.13	0.13	0.06	0.25	0.00^{NS}	0.18	0.08	0.18	0.18	0.14	1.00	
15. Merger restrictions	0.26	0.38	0.03	0.18	0.08	0.53	0.27	0.42	0.32	0.07	0.42	0.39	0.98	0.14	1.00

(*continued*)

Table IV—*Continued*

Panel B: Probability of a Covenant in Row i Conditional on a Covenant in Column j

Covenant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Dividend Pmnt. restrs.		0.86	0.33	0.92	0.77	0.34	0.76	0.30	0.92	0.52	0.49	0.67	0.36	0.77	0.35
2. Share repurchase restrs.	0.72		0.11	0.93	0.86	0.34	0.71	0.30	0.92	0.44	0.43	0.70	0.35	0.79	0.35
3. Funded debt restrs.	0.04	0.02		0.01	0.07	0.04	0.04	0.05	0.02	0.06	0.04	0.02	0.03	0.05	0.03
4. Subordinate debt restrs.	0.21	0.25	0.03		0.11	0.09	0.19	0.05	0.25	0.15	0.12	0.19	0.09	0.21	0.09
5. Senior debt restrs.	0.04	0.05	0.03	0.03		0.02	0.04	0.01	0.05	0.04	0.03	0.04	0.02	0.09	0.02
6. Secured debt restrs.	0.55	0.66	0.63	0.68	0.56		0.57	0.90	0.69	0.47	0.58	0.55	0.64	0.59	0.64
7. Total leverage test	0.86	0.95	0.40	0.97	0.88	0.39		0.36	0.97	0.53	0.56	0.73	0.40	0.85	0.39
8. Sale & leaseback	0.32	0.39	0.44	0.22	0.20	0.59	0.34		0.46	0.22	0.38	0.34	0.43	0.30	0.43
9. Stock issue restrs.	0.59	0.71	0.13	0.73	0.60	0.27	0.55	0.27		0.25	0.33	0.55	0.27	0.50	0.26
10. Rating & net wrth. trgs.	0.08	0.08	0.09	0.10	0.10	0.04	0.07	0.03	0.06		0.06	0.10	0.05	0.12	0.05
11. Cross-default provisions	0.93	0.96	0.69	0.98	0.98	0.66	0.94	0.66	0.96	0.73		0.89	0.67	0.94	0.67
12. Poison put	0.72	0.90	0.18	0.90	0.85	0.36	0.70	0.33	0.92	0.69	0.51		0.43	0.67	0.42
13. Asset sale clause	0.85	0.99	0.73	0.99	0.98	0.93	0.84	0.96	0.99	0.81	0.84	0.94		0.97	0.99
14. Invest. policy restrs.	0.12	0.15	0.07	0.15	0.26	0.06	0.12	0.04	0.12	0.12	0.08	0.10	0.06		0.06
15. Merger restrictions	0.85	0.98	0.73	0.99	0.98	0.93	0.84	0.96	0.98	0.81	0.84	0.94	0.99	0.97	

sample of 15,504 debt issues. Notice that the pair-wise correlations between the covenant indicator variables tend to be positive, with only a handful of small negative correlations. The largest positive correlations tend to occur within the broader categories of payout restrictions, financing restrictions, and investment restrictions. For example, the use of dividend payment restrictions is highly correlated with the use of share repurchase restrictions (0.72), and the use of an asset sale clause is highly correlated with a merger restriction (0.98).

Cluster analysis using these pair-wise correlations identifies three groups of covenants that tend to be packaged together in debt issues. The cluster with the highest association includes the asset sale clause and merger restriction, with the secured debt and sale and leaseback restrictions (covenants 6, 8, 13, and 15). The cluster with the next highest association includes dividend and share repurchase restrictions with subordinate debt restrictions, total leverage tests, stock issue restrictions, cross-default provisions, and a poison put (covenants 1, 2, 4, 7, 9, 11, and 12). The last, primarily catchall cluster, comprises covenants 3, 5, 10, and 14. Although it is difficult to draw any definitive conclusions from this cluster analysis, it suggests that investment policy and payout restrictions tend to be in distinct covenant groups, with each group including financing restrictions.

Finally, Panel B of Table IV reports the probability of observing a covenant in a debt issue conditional on the presence of another covenant. Notice that certain covenants have large conditional probabilities with all other covenants, meaning that there is a high likelihood of observing that covenant given any other covenant. Examples of these covenants include dividend and share repurchase restrictions, cross-default and poison put provisions, and the asset sale clause and merger restriction. Additionally, observe that the conditional probabilities between any two covenants can be dramatically different. For example, the probability of an investment policy restriction given an asset sale clause is only 0.06, but the probability of an asset sale clause given an investment policy restriction is 0.97. Cluster analysis using these conditional probabilities, however, produces the same clusters based on correlation coefficients.

III. The Firm-Year Sample and the Variables Used in the Empirical Tests

Since our objective is to examine the relation between firm growth opportunities and the joint choice of leverage, maturity, and covenants, we create a firm-year panel database that matches the FISD debt issue data to issuer financial data reported in Compustat. We begin by using the sample of 15,504 debt issues reported in Table I to create a firm-year history of debt issues. Starting in 1960, we trace individual debt issues to their issuing firms and then track the firms' portfolios of debt issues over time. We use historical redemption information reported in FISD to account for the changing composition of a firm's debt issue portfolio by adjusting the outstanding principal of debt issues for sinking fund payments, calls, puts, conversions, and retirement at maturity.

We then match this historical debt issue database to Compustat data, requiring that firms have nonmissing values for the dependent and independent variables discussed below. We start the firm-year sample in 1989 to allow sufficient time for a firm's debt issue portfolio to develop, and because one of the independent variables is measured over the 4 years prior to the year in which leverage, maturity, and covenants are measured. We stop the sample in 2002 because one of the independent variables uses data in the year after the year in which leverage, maturity, and covenants are measured. The final sample consists of 7,016 firm-year observations, representing 1,410 different firms, over the period from 1989 to 2002.

Since we use FISD debt issue data to construct firm-level covenant protection measures, it is important to examine FISD debt coverage relative to Compustat debt measures. Using the 7,016 firm-year observations, the median ratios of the sum of FISD debt outstanding to Compustat long-term debt and total debt (long-term debt plus debt in current liabilities) are 0.68 and 0.58, respectively. This suggests that our FISD debt issue data is reasonably representative of the firm's outstanding debt. Nevertheless, since we do not know the covenant coverage of all of a firm's outstanding debt, our covenant measures will be somewhat noisy.

A. Indices of Covenant Protection

We use the 15 covenant categories to create firm-year indices of covenant protection. In our primary index, for a firm in a given sample year, we start by creating 15 covenant indicator variables that equal one if at least one debt instrument in its FISD debt issue portfolio has the given covenant and zero otherwise. We then sum the covenant indicator variables and divide by 15 to create an index that varies from zero (no covenant protection) to one (complete covenant protection).[7] Note that this index makes the implicit assumption that a covenant in one debt issue provides protection for all of a firm's other debt that does not also have that covenant. This seems like a plausible assumption, since covenants typically restrict firm policies that have the potential to affect all debtholders. For example, covenants in one debt issue that restrict payouts to equityholders clearly protect all debt issues, as does an asset sale clause or some other restriction on a firm's investment policy. Additionally, note that this implies that studies that examine the determinants of covenants in individual debt issues actually underestimate covenant protection, since covenants in other debt issues of the firm can provide implicit protection. Finally, note that this index gives equal weight to the various covenant categories, an assumption that we will explicitly address in our empirical analysis by examining covenant index components.

[7] Although not reported to preserve space, correlations and conditional probabilities between these firm-level covenant indicator variables are very similar to those reported in Table IV for the individual debt issues. Furthermore, cluster analysis using these firm-level correlations and conditional probabilities produces exactly the same covenant clusters that we identify for debt issues.

We also construct a weighted covenant index to address concerns about ascribing covenant protection to the overall firm if any debt issue has a covenant. Thus, for a firm in a given year, we first compute 15 covenant indicator variables for each of a firm's outstanding debt issues. For each covenant, we then weight each debt issue's covenant indicator variable by the amount outstanding relative to the total amount outstanding, and sum the weighted covenant indicator variable across issues. We then sum the weighted covenant indicator variables and divide by 15 to compute the weighted covenant index.

A final concern that applies to both indices is that they implicitly assume that a firm's covenant protection is equally effective regardless of whether the debt issue with the covenant(s) is newly issued or close to maturity. We recognize that this may not be the case unless the maturing issue will be replaced with a debt issue having the same set of covenants, or if covenants in a longer-maturity issue provide redundancy for the covenants in the near-maturity issue.

B. Leverage, Maturity, and Growth Opportunities

We measure leverage as the book value of total debt (long-term debt plus debt in current liabilities) divided by the market value of assets, where the market value of assets is estimated as the book value of assets minus the book value of equity plus the market value of equity. Since our empirical predictions focus on the firm's use of short-term debt, we measure maturity as the fraction of a firm's total debt that matures in 3 years or less. Note that our maturity measure uses Compustat data rather than FISD data. The reason, as we discuss above, is that a firm's total debt on Compustat typically exceeds its aggregate debt issues in FISD, and so we use Compustat data to construct our measure of maturity structure.[8]

Following standard convention in the literature, we use the market-to-book asset ratio as an index of the firm's growth opportunities. Importantly, Adam and Goyal (2003) provide evidence that the market-to-book asset ratio is the best proxy for growth opportunities, demonstrating that it has the highest correlation with a firm's actual investment opportunities, reflects the information in other proxies, and is least affected by confounding factors. Nevertheless, as we discuss below, our results are generally robust to alternative proxies for growth opportunities.

C. Exogenous Variables

In the empirical analysis in the next section, we estimate simultaneous equations models with leverage, maturity, and the covenant index as endogenous

[8] The results reported below are robust to alternative specifications of leverage and maturity. For example, we find qualitatively similar results when leverage is measured as the book value of total debt divided by the sum of the book value of total debt, market value of equity, and liquidation value of preferred stock, and when leverage is measured as the book value of total debt divided by the book value of assets. Similarly, using the fractions of a firm's total debt maturing in less than or equal to 2 years, 4 years, or 5 years has little influence on our results.

variables. In addition to including the market-to-book ratio in each equation, we include a number of other exogenous variables. For the leverage and maturity equations, we use the variables that Johnson (2003) employs in his system of leverage and maturity equations. In particular, in the leverage equation we include fixed assets, profitability, firm size, volatility, abnormal earnings, and investment tax credit, net operating loss, and regulated firm dummy variables. In the maturity equation, we include firm size and the square of firm size, volatility, abnormal earnings, asset maturity, term premium, investment tax credit, net operating loss, regulated firm, and debt rating dummy variables. Following Barclay et al. (2003), we also include a commercial paper program dummy variable in the maturity equation. Borrowing from the covenant equation specifications in Begley (1994), Nash et al. (2003), and Reisel (2004), in the covenant index equation we include firm size, volatility, and Altman's Z-score < 1.81 (a proxy for financial distress), regulated firm, and convertible debt dummy variables.[9] We also include year dummies in the covenant equation.

We define the variables in Table V. With two exceptions, each variable is measured at the fiscal year-end prior to the year in which leverage, maturity, and the covenant index are measured.[10] Since the various exogenous variables that we discuss above are not integral to our empirical predictions, we preserve space by not including their testable predictions here. The interested reader is referred to the discussions in Begley (1994), Barclay et al. (2003), Johnson (2003), Nash et al. (2003), and Reisel (2004).

D. Descriptive Statistics

Panel A of Table V presents descriptive statistics for the endogenous and exogenous variables. For descriptive purposes, we report the unscaled versions of the unweighted and weighted covenant indices. The median firm-year has five covenant categories, with firm-years ranging from 0 to 13 covenant categories. The weighted covenant index has a similar distribution, with a median of 4 and a range of 0 to 12 covenant categories. The similarity of the unweighted and weighted covenant indices suggests that the FISD debt issues of a firm do not have vastly different covenants.

For the other variables, the last two columns of Panel A report mean and median values for all other nonfinancial firms in Compustat with complete data over the sample period from 1989 to 2002. Asterisks on the means and medians indicate whether they are significantly different from those of our

[9] Following Denis and Mihov (2003), we use Altman's Z-score < 1.81 as a proxy for financial distress. The use of a cutoff value of 1.81 has its origin in Altman (1977), and is widely used by industry practitioners to indicate a significant probability of financial distress. However, our results are robust to alternative measures of financial distress, including using different cutoff values for Z-score and using the inverse of Z-score.

[10] To minimize the effect of outliers, all ratio variables (including leverage and maturity) are Winsorized at the 1st and 99th percentiles (i.e., ratios less (greater) than the 1st (99th) percentile are set equal to the 1st (99th) percentile).

Table V

Descriptive Statistics of Firm Characteristics and Correlations between Financial Policy Variables

The table reports descriptive statistics (Panel A) and Pearson correlations (Panel B) for 7,016 firm-year observations over the 1989 to 2002 period. For comparison, Panel A also reports mean and median values for all other nonfinancial firms on Compustat with complete data for all variables over the 1989 to 2002 period. Asterisks on these mean and median values indicate whether they are significantly different from the corresponding values for our FISD–Compustat intersection sample. With two exceptions (noted below), each variable is measured at the fiscal year-end prior to the year in which leverage, maturity, and the covenant index are measured. Leverage is the book value of total debt (long-term debt plus debt in current liabilities) divided by the market value of assets, where the market value of assets is estimated as the book value of assets minus the book value of equity plus the market value of equity. Maturity is the fraction of a firm's total debt that matures in 3 years or less. Covenant index is the sum of the firm's 15 covenant indicator variables (see the covenant categories in Table III), which are constructed using debt issue data from the Fixed Investment Securities Database (FISD). A firm's covenant indicator variables are equal to one if any of its outstanding debt issues have a given covenant. Weighted covenant index is the sum of the firm's weighted covenant indicator variables. A firm's weighted covenant indicator variables are computed as the sum of the firm's debt issue covenant indicator variables weighted by the amount outstanding to the total amount outstanding. Market-to-book is the market value of assets divided by the book value of assets. Fixed assets is the ratio of net property, plant, and equipment to the book value of total assets. Profitability is the ratio of earning before interest, taxes, depreciation, and amortization (EBITDA) to the book value of total assets. Firm size is net sales in millions of dollars. Dollar values are inflation-adjusted (December 2002) using the all-urban CPI. Volatility is the standard deviation of the first difference in EBITDA over the 5 years preceding and including the year in which leverage, maturity, and the covenant index are measured, scaled by the average book value of assets during this period. Abnormal earnings is the difference between earnings per share in year $t + 1$ (excluding extraordinary items and discontinued operations and adjusted for any changes in shares outstanding) minus earnings per share in year t, divided by the year t share price. Asset maturity is the book value-weighted maturity of long-term assets and current assets, where the maturity of long-term assets is computed as gross property, plant, and equipment divided by depreciation expense and the maturity of current assets is computed as current assets divided by the cost of goods sold. Term premium is the difference between the month-end yields on a 10-year government bond and a 6-month government bill, matched to the month of a firm's fiscal year-end. Bond yields are from the Federal Reserve Bank of St. Louis's economic database (FRED). Altman's Z-score is calculated as $Z = 3.3 \times$ EBIT/total assets $+ 1.0 \times$ sales/total assets $+ 1.4 \times$ retained earnings/total assets $+ 1.2 \times$ working capital/total assets $+ 0.6 \times$ market value equity/total debt. Regulated firms have SIC codes between 4900 and 4939. We use ***, **, and * to denote significance at the 1% level, 5% level, and 10% level, respectively.

Panel A: Descriptive Statistics

	FISD–Compustat Intersection					All Other Nonfinancial Compustat	
Variable	Mean	Median	Std. Dev.	Min	Max	Mean	Median
Leverage	0.29	0.26	0.18	0.01	0.77	0.21***	0.16***
Maturity (proportion short)	0.22	0.16	0.22	0.00	1.00	0.46***	0.38***
Covenant index	5.33	5.00	3.11	0.00	13.00		
Weighted covenant Index	4.17	4.00	2.58	0.00	12.00		
Market-to-book	1.66	1.34	1.00	0.77	7.03	1.81***	1.31
Fixed assets	0.40	0.36	0.24	0.04	0.91	0.32***	0.26***
Profitability	0.13	0.13	0.08	−0.19	0.34	0.07***	0.09***
Firm size (Sales $m)	4,504.00	1,419.41	8,301.56	19.21	53,517.29	1,378.23***	136.56***
Volatility	0.05	0.03	0.04	0.00 > 0	0.24	0.09***	0.07***
Abnormal earnings	0.04	0.00 > 0	0.63	−2.37	4.52	0.06***	0.00 > 0
Asset maturity	12.06	8.79	10.42	0.50	48.46	10.72***	6.64***
Term premium (%)	1.12	0.60	1.28	−0.68	3.30		
Proportion of firm-years with							
Altman's $Z < 1.81$	0.24					0.25	
Investment tax credits	0.11					0.08***	
NOL carryforwards	0.26					0.32***	
Debt rating	0.91					0.25***	
Commercial paper program	0.25					0.03***	
Proportion of regulated firm-years	0.07					0.04***	

(*continued*)

Table V—*Continued*

Panel B: Correlations between Leverage, Maturity, Covenants, and Market-to-Book

	Leverage	Maturity (Prop. Short)	Covenant Index	Weighted Cov. Index	Market-to-Book
Leverage	1.00				
Maturity (prop. short)	0.01	1.00			
Covenant index	0.31***	−0.08***	1.00		
Weighted covenant index	0.27***	−0.05***	0.85***	1.00	
Market-to-book	−0.44***	−0.05***	−0.11***	−0.10***	1.00

FISD-Compustat intersection sample. As Panel A shows, the firms in our sample are more highly leveraged, have less short-term debt, are substantially larger, but have similar market-to-book ratios and proportions of firm-years with Altman's Z less than 1.81. The latter two results are noteworthy, since tests of our empirical predictions will be more powerful if firms in our sample have nontrivial growth opportunities and financial distress risk.

Panel B of Table V presents correlations among leverage, maturity, the covenant indices, and the market-to-book ratio. Observe that leverage is negatively related to the market-to-book ratio and positively related to the covenant indices. Additionally, notice that the covenant indices are negatively related to the market-to-book ratio, a result that is consistent with the literature (discussed above) that examines the determinants of covenants in individual debt issues. One must be cautious, however, when concluding that this implies that high growth firms use fewer covenants to preserve future flexibility. The reason is that this unconditional negative relation between covenants and growth opportunities could be purely mechanical, driven by the result that high market-to-book firms have low leverage and therefore fewer covenants. This highlights the need to control for the endogeneity of leverage and maturity structure when examining the determinants of covenant structure. Finally, notice that the covenant indices and short-term debt are negatively related, which is consistent with the view that they are substitutes in addressing stockholder–bondholder conflicts.

Table VI presents mean leverage by (unweighted) covenant index (Panel A) and maturity (Panel B) for market-to-book quartiles. Panel A illustrates that covenants appear to significantly attenuate the negative effect of growth opportunities on leverage. In particular, notice that as the covenant index increases, the difference between mean leverage in the lowest and highest market-to-book quartiles (as seen in the Low – High column) decreases. In comparison, we do not observe a similar attenuation effect for short-term debt in Panel B; as the proportion of short-term debt increases, the difference between mean leverage in the lowest and highest market-to-book quartiles is essentially unchanged. Also observe in Panel B that there does not appear to be a liquidity risk effect of short-term debt on leverage, since for a given market-to-book quartile we do not observe a measurable decrease in leverage as the proportion of short-term debt increases. Although interesting, these unconditional relations require more refined multivariate tests, which we turn to next.

Table VI
Leverage by Covenant Index and Maturity for Market-to-Book Quartiles

The table reports mean leverage by covenant index and maturity for market-to-book quartiles in the sample of 7,016 firm-year observations over the 1989 to 2002 period. Leverage is the book value of total debt (long-term debt plus debt in current liabilities) divided by the market value of assets, where the market value of assets is estimated as the book value of assets minus the book value of equity plus the market value of equity. Covenant index is the sum of the firm's 15 covenant indicator variables (see the covenant categories in Table III), which are constructed using debt issue data from the Fixed Investment Securities Database (FISD). Maturity is the fraction of a firm's total debt that matures in 3 years or less. Market-to-book is the market value of assets divided by the book value of assets.

Panel A: Leverage by Covenant Index for Market-to-Book Quartiles

		Market-to-Book Quartiles				
Covenant Index	No. of Obv.	1 = Low	2	3	4 = High	Low − High
0	511	0.41	0.30	0.24	0.14	0.27
1	266	0.40	0.29	0.22	0.14	0.26
2	403	0.39	0.31	0.23	0.13	0.26
3	589	0.38	0.31	0.24	0.14	0.24
4	1,385	0.35	0.30	0.21	0.12	0.23
5	1,097	0.35	0.26	0.20	0.13	0.22
6	623	0.34	0.27	0.22	0.13	0.21
7	405	0.44	0.33	0.23	0.22	0.22
8	247	0.45	0.39	0.35	0.26	0.19
9	449	0.50	0.44	0.41	0.32	0.18
10	614	0.47	0.43	0.37	0.33	0.14
11	314	0.47	0.41	0.36	0.31	0.16
12	92	0.44	0.42	0.44	0.30	0.14
13	21	0.45	0.37	0.60	0.33	0.12

Panel B: Leverage by Maturity for Market-to-Book Quartiles

	Market-to-Book Quartiles				
Maturity (Prop. Short) Quartiles	1 = Low	2	3	4 = High	Low − High
1 = Low	0.41	0.33	0.26	0.16	0.25
2	0.43	0.34	0.27	0.18	0.25
3	0.40	0.31	0.23	0.16	0.24
4 = High	0.42	0.32	0.25	0.15	0.27

IV. Joint Determinants of Leverage, Maturity, and Covenants

To account for the endogenous choice of leverage, maturity, and covenants, we estimate systems of simultaneous equations with leverage, the proportion of short-term debt, and the covenant index as endogenous variables. Recall from Section I that our empirical predictions for the leverage equation are that leverage should be negatively related to the market-to-book ratio and the proportion of short-term debt, and positively related to the market-to-book

ratio interacted with the proportion of short-term debt and interacted with the covenant index.[11] The sign of the relation between leverage and the covenant index is unclear, since higher leverage may coincide with more covenant protection, or leverage might be moderated by covenants in outstanding debt issues that restrict additional debt financing. In the maturity equation, we predict that the proportion of short-term debt is negatively related to leverage and the covenant index, and positively related to the market-to-book ratio. Finally, in the covenant index equation, we predict that the covenant index is positively related to leverage and negatively related to the proportion of short-term debt. Recall that it is an empirical question as to whether the use of restrictive covenants is increasing or decreasing in growth opportunities. As such, the coefficient on the market-to-book ratio in the covenant index equation could be positive or negative.

We estimate the system of equations by generalized method of moments (GMM), using the exogenous variables as instruments in the moment conditions. Note that other instrumental variables techniques, such as two-stage least squares (2SLS), are special cases of GMM. For example, in comparison with 2SLS, Greene (2002) and Kennedy (2003) observe that GMM estimates are more efficient than 2SLS estimates when regression errors are heteroskedastic and/or autocorrelated, and that GMM estimates coincide with 2SLS estimates otherwise. Thus, GMM ensures that the standard errors of the estimates are heteroskedasticity and autocorrelation consistent. Another issue in the estimation of our system is that we include as right-hand-side variables the product of exogenous and endogenous variables (e.g., the product of the market-to-book ratio and the covenant index). The upshot is that even this mild degree of nonlinearity may produce inconsistent estimates if the system is estimated with a linear technique. We therefore estimate the system using nonlinear GMM, which recognizes that any products involving endogenous variables are themselves endogenous functions of the exogenous variables (see, e.g., Greene (2002)). Finally, note that we do not report the R^2s for our estimated equations, since as Goldberger (1991) observes, there is no guarantee that the R^2s reported in system estimation techniques lie between zero and one. Unfortunately, there is no widely accepted goodness of fit measure for nonlinear system estimation.

A. Estimation Results

Table VII reports the estimation of two systems of equations for the pooled sample of 7,016 firm-year observations over the period from 1989 to 2002. Analogous to Johnson (2003) and Barclay et al. (2003), the first two columns report the estimation of a system with a leverage and maturity equation (i.e., excluding the covenant equation). The next three columns report the estimation of our system with a leverage, maturity, and covenant equation. Note that the covenant equation uses the (scaled) unweighted covenant index. Our

[11] Note that the negative relation between leverage and short-term debt assumes that firms in our sample are subject to liquidity risk.

Table VII

Joint Determinants of Leverage, Maturity, and Covenants

The systems of equations are estimated by nonlinear GMM, and are based on 7,016 firm-year observations over the 1989 to 2002 period. The variables are defined in Table V. The covenant index is scaled by 15 so that it ranges from zero to one, and the covenant index equation includes year dummy variables that are not reported in the table. Heteroskedasticity and autocorrelation consistent *t*-statistics are reported in parentheses below the parameter estimates. We use ***, **, and * to denote significance at the 1% level, 5% level, and 10% level, respectively.

	Two-Equation System		Three-Equation System		
Independent Variable	Leverage	Maturity (Prop. Short)	Leverage	Maturity (Prop. Short)	Covenant Index
Intercept	0.588	0.320	0.527	0.206	−0.013
	(11.80)***	(3.43)***	(6.06)***	(3.11)***	(−0.22)
Leverage		−0.115		0.252	1.193
		(−1.30)		(5.89)***	(14.18)***
Maturity (prop. short)	0.185		2.122		−0.783
	(0.80)		(5.80)***		(−6.38)***
Covenant index			−1.116	0.030	
			(−3.74)***	(0.25)	
Market-to-book (MV/BV)	−0.036	−0.020	−0.174	0.001	0.036
	(−1.54)	(−2.77)***	(−3.32)***	(0.04)	(5.05)***
MV/BV × maturity	−0.210		−1.140		
(prop. short)	(−1.61)		(−5.03)***		
MV/BV × covenant index			1.064	−0.021	
			(5.01)***	(−0.26)	
Fixed assets	0.091		0.049		
	(8.86)***		(3.59)***		
Profitability	−0.211		−0.288		
	(−3.63)***		(−2.88)***		
Log(firm size)	−0.031	0.008	−0.029	−0.013	0.029
	(−20.69)***	(0.48)	(−12.92)***	(−1.17)	(9.36)***
[Log(firm size)]^2		−0.000		0.002	
		(−0.14)		(2.82)***	
Volatility	−0.062	0.376	−0.147	0.331	0.266
	(−0.80)	(4.15)***	(−1.11)	(3.67)***	(2.35)**
Abnormal earnings	0.022	0.023	0.001	0.018	
	(3.53)***	(3.07)***	(0.13)	(3.58)***	
Asset maturity		−0.001		−0.001	
		(−0.98)		(−0.77)	
Term premium		0.002		−0.001	
		(0.90)		(−0.16)	
Altman's $Z < 1.81$					−0.042
					(−2.74)***
Investment tax credit	−0.029	−0.005	0.019	0.009	
Dummy	(−4.77)***	(−0.57)	(2.03)**	(1.49)	
Net operating loss	0.010	0.001	0.005	0.002	
Dummy	(1.98)**	(0.14)	(0.67)	(0.38)	
Debt rating		−0.113		−0.112	
Dummy		(−7.60)***		(−8.24)***	
Commercial paper program		−0.003		0.015	
Dummy		(−0.29)		(2.47)**	
Convertible bond					−0.063
Dummy					(−9.61)***
Regulated firm	−0.003	−0.032	0.057	−0.041	−0.191
Dummy	(−0.29)	(−3.22)***	(5.17)***	(−4.09)***	(−15.43)***

motivation for separately estimating a leverage and maturity system is to compare our sample's estimates to those in Johnson (2003) and Barclay et al. (2003), and to assess whether conditioning on covenant protection influences the basic leverage and maturity results for our sample.

There is an important caveat to keep in mind when comparing our two-equation system estimation results to those in Johnson (2003) and Barclay et al. (2003). Specifically, both studies base their samples on *all* industrial firms in the Computat database, whereas by necessity our sample is limited to the intersection between the FISD and Compustat. In addition to having firm-year samples that are three to five times larger than our sample, their samples are not conditioned on public debt issuers. As Table V shows, the firms in our sample tend to be larger, to be more heavily leveraged, and to use less short-term debt than the remainder of the firms in the Compustat database. These same observations can be made from a comparison of the descriptive statistics of the firms in Johnson's sample with those for our sample.[12]

In the two-equation system in Table VII, notice in the leverage equation that the coefficients on maturity (proportion of short-term debt), market-to-book, and market-to-book interacted with maturity are not significantly different from zero. At first blush, the lack of a liquidity risk effect (negative coefficient on maturity) or an attenuation effect (positive coefficient on maturity interacted with market-to-book) appears to be inconsistent with the strong effects reported by Johnson. Revealingly, however, Johnson (2003) finds that the liquidity risk and attenuation effects of short-term debt are dramatically less important for Compustat firms with bond ratings than for unrated Compustat firms.[13] Since virtually all of the firms in our sample are rated and since, as noted earlier, the liquidity risk of short-term debt is only relevant for lower quality firms (e.g., unrated firms), our results are consistent with Johnson's (2003) rated-firm results.[14] Additionally, note in the maturity equation that the proportion of short-term debt is negatively related to the market-to-book ratio. Although inconsistent with the predicted positive relation documented in Barclay et al. (2003), Johnson (2003) also finds a negative relation between short-term debt and market-to-book. Finally, we note that the coefficients on the other variables in the leverage and maturity equations are generally consistent with those reported in Johnson (2003) and Barclay et al. (2003).[15]

[12] See Table I on page 218 in Johnson (2003). Barclay, Marx, and Smith (2003) do not report descriptive statistics for their sample, so a similar comparison cannot be made.

[13] In his sample of 20,565 Compustat firm-year observations from 1986 to 1995, only 20% have bond ratings.

[14] Below, we show that the liquidity risk and attenuation effects of short-term debt do exist for the subsample of below-investment grade and unrated firms. This subsample is more comparable to the one used in Johnson (2003).

[15] The only truly noteworthy differences are that the regulated firm dummy in the leverage equation and the commercial paper dummy in the maturity equation are not significantly different from zero. Note, however, that the coefficients on both variables have the predicted positive signs in the three-equation system that includes the covenant index. Finally, observe the seemingly odd positive coefficient on the net operating loss dummy in the leverage equation. Although the coefficient is predicted to be negative, both Johnson (2003) and Barclay et al. (2003) find a similarly positive coefficient in their leverage equations.

As Table VII reports, the leverage equation results sharpen when the system is estimated with the covenant index equation. The coefficient on the proportion of short-term debt is positive, which suggests that not only does the average firm in our sample not face liquidity risk, but that more leveraged firms have larger amounts of short-term debt. Interestingly, the coefficient on the covenant index is negative, suggesting that covenants limiting the issuance of additional debt effectively reduce leverage. As expected, note that the coefficient on the market-to-book ratio is also negative, which is consistent with the prediction that high growth firms use less leverage. Importantly, observe that the coefficient on the market-to-book ratio interacted with the covenant index is positive, which, consistent with the univariate results in Table VI, supports the prediction that covenants can help attenuate the negative effect of growth opportunities on leverage. In contrast, observe that the coefficient on the market-to-book ratio interacted with the proportion of short-term debt is negative. This suggests that high growth firms in our sample do face liquidity risk, and that for these firms short-term debt reduces overall debt capacity.

To assess the economic significance of the attenuation effect of covenants on the market-to-book ratio's influence on leverage, we use the coefficient estimates of the leverage equation to compute the effect on (mean) leverage of a one-standard deviation increase in the market-to-book ratio. Holding the proportion of short-term debt constant at the sample mean, a one-standard deviation increase in the market-to-book ratio reduces mean leverage by 72% (from 0.29 to 0.08) when covenant protection is at the first quartile of the sample (i.e., scaled covenant index = 0.20, or (0.20)(15) = 3 covenants). In comparison, a one-standard deviation increase in the market-to-book ratio reduces mean leverage by 24% (from 0.29 to 0.22) for the median firm's level of covenant protection (i.e., covenant index = 0.33 or 5 covenants). Clearly, covenant protection can significantly attenuate the negative effect of growth opportunities on leverage. Indeed, at the third quartile of the covenant index (7 covenants), a one-standard deviation increase in the market-to-book ratio actually increases mean leverage by 24% (from 0.29 to 0.36).

The results for the maturity equation are weak. Consistent with the positive coefficient on maturity in the leverage equation, the coefficient on leverage in the maturity equation is positive. The coefficients on the covenant index and the market-to-book ratio are not different from zero, however. Additionally, observe that we include the market-to-book ratio interacted with the covenant index to see whether the relation between maturity and the market-to-book ratio is influenced by covenants. The coefficient on this interacted variable is also not different from zero.

The results for the covenant index equation strongly support our empirical predictions. Consistent with the predicted positive relation between covenants and leverage, the coefficient on leverage is positive. Importantly, the coefficient on the market-to-book ratio is also positive. This result is consistent with the view that high growth firms use covenants to mitigate stockholder–bondholder conflicts over the exercise of growth options, in spite of the fact that covenants have the potential to limit future investment and financing flexibility. Note that the positive coefficient on the market-to-book ratio is inconsistent with the

negative correlations between the covenant indices and the market-to-book ratio reported in Panel B of Table V. This inconsistency highlights the importance of accounting for the joint endogeneity of financial policy variables when assessing relations between individual financial policy variables and firm characteristics. Finally, observe that the coefficient on short-term debt is negative, which supports the prediction that short-term debt and covenants are substitutes in addressing stockholder–bondholder conflicts. Notwithstanding, an alternative explanation for this result is that short-term debt is a proxy for covenants in private debt, and therefore firms with higher proportions of short-term debt in our sample need fewer covenants in their public debt issues. Although we cannot rule out this alternative explanation, it seems unlikely given that the intersection between public debt issuers and firms active in private debt markets appears to be small (see, e.g., Denis and Mihov (2003)).

The results for the covenant index equation appear to be economically significant. A one-standard deviation increase in leverage increases the covenant index by 60.6%, moving the index from its mean of 5.33 covenants to 8.56 covenants. In contrast, a one-standard deviation increase in the proportion of short-term debt decreases the covenant index by 48.2% (from 5.33 to 2.76). Finally, a one-standard deviation increase in the market-to-book ratio increases the covenant index by 10% (from 5.33 to 5.87).

The signs of the coefficients on the other variables are generally consistent with the predicted effects of these variables on the respective endogenous variables.[16] Of particular interest, note in the covenant index equation that covenant protection is increasing in firm size and the volatility of cash flows, and decreasing in financial distress risk (Altman's $Z < 1.81$), whether the firm has convertible debt, and whether the firm is regulated. Although it may appear odd that firms facing greater financial distress risk have less covenant protection, this result is not entirely unexpected. McDaniel (1986) and Begley (1994) argue that covenants restricting financing flexibility are especially costly to a firm facing financial distress, since it many need to borrow additional funds and/or restructure existing liabilities to survive. Furthermore, consistent with the negative relation between covenant protection and financial distress risk, Gilson and Warner (1998) find that when distressed firms issue junk debt to pay down bank debt, the junk debt has fewer restrictions than the replaced bank debt. Finally, it is interesting to note that when any of a firm's FISD bond issues are convertible (i.e., the convertible bond dummy equals one), the firm has lower overall covenant protection. This is consistent with the result in Table III that convertible debt issues tend to have fewer covenants than other debt issues.

B. Alternative Regression Specifications

Baker and Wurgler (2002) argue that the widely documented negative relation between leverage and market-to-book reflects historical market timing

[16] Again, see the discussions in Begley (1994), Barclay et al. (2003), Johnson (2003), Nash et al. (2003), and Reisel (2004).

of equity issues rather than the agency-cost explanation of leverage utilized here. If true, this might call into question our interpretation that the positive coefficient on the market-to-book ratio interacted with the covenant index reflects the attenuating influence of covenants. To address this potential criticism, Table VIII reports results from the estimation of the system using alternative measures of growth opportunities. System (1) proxies growth opportunities with a backward-looking measure of sales growth computed as $S(t)/S(t-1)$, where $S(t)$ and $S(t-1)$ are sales in constant dollars in years t and $t-1$, respectively. System (2) proxies growth opportunities with a forward-looking measure of sales growth computed as $S(t+1)/S(t)$. Finally, system (3) proxies growth opportunities with the ratio of R&D expense to sales. Although each system reported in Table VIII (and the subsequent tables) includes all of the variables, we only report coefficient estimates on key variables to preserve space.

As Table VIII reports, leverage is negatively related to each of the alternative proxies for growth opportunities, and importantly, covenant protection attenuates this negative relation (i.e., each of the coefficients on the growth option proxy interacted with the covenant index is positive). Thus, it does not appear as if our results are influenced by market timing considerations. Two noteworthy differences arise when we replace the market-to-book ratio with sales growth, however. First, consistent with a liquidity risk and attenuation effect of short-term debt, in systems (1) and (2) leverage is negatively related to sales growth and positively related to sales growth interacted with short-term debt. Unfortunately, these results are not robust when we replace the (unweighted) covenant index with the weighted covenant index. In unreported results, the coefficient on short-term debt is positive and the coefficient on either measure of sales growth interacted with short-term debt is negative when the system is estimated using the weighted covenant index.[17] Finally, observe in systems (1) and (2) that the covenant index is not significantly related to the sales growth proxies for growth opportunities. In contrast, and consistent with the market-to-book result in Table VII, note in system (3) of Table VIII that the covenant index is positively related to the R&D proxy for growth opportunities.

Another important question is how the potential for financial distress influences these joint relations. Since stockholder–bondholder conflicts are more severe when debt is risky, and since the liquidity risk of short-term debt is more important for lower quality firms, we might expect that our results are stronger when we condition on the likelihood of financial distress. Using S&P issuer credit ratings in Compustat to proxy for financial distress risk, Table IX

[17] The only other difference worth mentioning when using the weighted covenant index is that the proportion of short-term debt is significantly positively related to the market-to-book ratio, which supports the prediction that high growth firms use more short-term debt to mitigate stockholder–bondholder conflicts. Also note in system (3) of Table VIII that short-term debt is positively related to R&D.

Table VIII

Joint Determinants of Leverage, Maturity, and Covenants Using Alternative Measures of Growth Opportunities

The systems of equations are estimated using GMM, and are based on 7,016 firm-year observations over the 1989 to 2002 period. Although we only report the coefficients on key variables, each system is estimated with all of the variables used in Table VII. The variables are defined in Table V. System (1) proxies growth opportunities with a backward-looking measure of sales growth computed as $S(t)/S(t-1)$, where $S(t)$ and $S(t-1)$ are net sales in millions of constant dollars in years t and $t-1$, respectively. System (2) proxies growth opportunities with a forward-looking measure of sales growth computed as $S(t+1)/S(t)$, where $S(t+1)$ and $S(t)$ are net sales in millions of constant dollars in years $t+1$ and t, respectively. System (3) proxies growth opportunities with the ratio of R&D to net sales, where R&D and net sales are measured in year $t-1$. We exclude firm-year observations with zero or missing values of R&D, so this system is estimated with 2,891 firm-year observations. Heteroskedasticity and autocorrelation consistent t-statistics are reported in parentheses below the parameter estimates. We use ***, **, and * to denote significance at the 1% level, 5% level, and 10% level, respectively.

	(1) Growth Opportunities = $S(t)/S(t-1)$			(2) Growth Opportunities = $S(t+1)/S(t)$			(3) Growth Opportunities = R&D/Sales		
Independent Variable	Leverage	Maturity (Prop. Short)	Covenant Index	Leverage	Maturity (Prop. Short)	Covenant Index	Leverage	Maturity (Prop. Short)	Covenant Index
Leverage		0.241	1.025		0.148	0.934		−0.096	0.574
		(5.11)***	(18.01)***		(3.05)***	(16.15)***		(−1.51)	(4.15)***
Maturity (prop. short)	−2.737		−1.194	−7.090		−0.946	0.282		−0.798
	(−2.09)**		(−9.90)***	(−2.39)**		(−7.86)***	(1.19)		(−4.31)***
Covenant index	−4.182	0.452		−10.489	0.479		0.063	0.443	
	(−6.81)***	(1.00)		(−6.79)***	(0.80)		(0.39)	(4.16)***	
Growth opportunities	−2.371	0.113	−0.003	−5.457	0.101	0.024	−2.082	1.284	0.160
	(−6.79)***	(0.69)	(−0.18)	(−6.44)***	(0.47)	(1.58)	(−2.05)**	(2.25)**	(3.01)***
Growth opportunities	3.310			7.787			−4.167		
× maturity (prop. short)	(2.69)***			(2.72)***			(−1.74)*		
Growth opportunities	4.352	−0.435		10.476	−0.421		9.767	−6.745	
× covenant index	(7.58)***	(−1.03)		(7.09)***	(−0.73)		(1.98)**	(−2.68)***	

Table IX

The Joint Determinants of Leverage, Maturity, and Covenants for Investment Grade and Below–Investment Grade Firms

The systems of equations are estimated using GMM. System (1) is based on the full sample of 7,016 firm-year observations over the 1989 to 2002 period. System (2) is based on the 3,339 firm-year observations with investment grade S&P issuer credit ratings. System (3) is based on the 3,677 firm-year observations with below–investment grade S&P issuer credit ratings (3,015) and no rating (662). Although we only report the coefficients on key variables, each system is estimated with all of the variables used in Table VII. The variables are defined in Table V. Heteroskedasticity and autocorrelation consistent *t*-statistics are reported in parentheses below the parameter estimates. We use ***, **, and * to denote significance at the 1% level, 5% level, and 10% level, respectively.

	(1) Full Sample			(2) Investment Grade Sample			(3) Below–Investment Grade Sample		
Independent Variable	Leverage	Maturity (Prop. Short)	Covenant Index	Leverage	Maturity (Prop. Short)	Covenant Index	Leverage	Maturity (Prop. Short)	Covenant Index
Leverage		0.252	1.193		0.488	0.470		−0.057	0.650
		(5.89)***	(14.18)***		(10.31)***	(4.52)***		(−0.94)	(4.58)***
Maturity	2.122		−0.783	2.168		−0.583	−0.314		−0.518
(prop. short)	(5.80)***		(−6.38)***	(5.25)***		(−3.23)***	(−2.39)**		(−5.16)***
Covenant index	−1.116	0.030		−1.396	−0.307		−0.113	0.075	
	(−3.74)***	(0.25)		(−2.35)**	(−0.64)		(−0.93)	(0.55)	
MV/BV	−0.174	0.001	0.036	−0.161	−0.102	−0.001	−0.192	−0.010	0.027
	(−3.32)***	(0.04)	(5.05)***	(−1.45)	(−1.05)	(−0.09)	(−9.02)***	(−0.36)	(2.46)***
MV/BV × maturity	−1.140			−0.650			0.121		
(prop. short)	(−5.03)***			(−2.76)***			(1.91)*		
MV/BV × covenant	1.064	−0.021		0.768	0.361		0.323	−0.018	
index	(5.01)***	(−0.26)		(1.94)**	(1.10)		(3.78)***	(−0.19)	

reports estimation results for the full sample (1), and the subsamples of investment grade firms (2) and below-investment grade firms (3).[18]

There are three important differences in the investment grade and below–investment grade estimation results in Table IX. First, the coefficient on maturity in the leverage equation of the below–investment grade sample is negative. This contrasts with the positive coefficient on maturity in the investment grade sample, and suggests that below–investment grade firms face greater liquidity risk of short-term debt. Second, notice that the positive relation between the covenant index and growth opportunities (proxied by the market-to-book ratio) is evident only for the below–investment grade sample. In contrast, there is no relation between covenant protection and growth opportunities for investment grade firms. This suggests that only high growth firms facing financial distress risk are willing (and/or required by lenders) to restrict future investment and financing flexibility with a greater degree of covenant protection in their outstanding debt issues. Nevertheless, note in the leverage equation of system (2) that even for investment grade firms, covenant protection attenuates the negative effect of growth opportunities on leverage. Third, the positive coefficient on the interaction of maturity and market-to-book in system (3) suggests that maturity attenuates the negative effect of growth opportunities on leverage. This result is consistent with Johnson (2003), who finds this effect is strongest amongst unrated firms.

Finally, we note that the various estimation results for the pooled firm-year sample are robust to fixed effects specifications using either firm or industry fixed effects. We note further, however, that the strength of the various joint relations documented in the pooled sample is diminished using purely cross-sectional data. In particular, estimating the system of equations for each sample year tends to diminish the significance of some of the parameter estimates.

C. Covenant Groups

The covenant index approach used in our analysis implicitly assumes that all covenants are equally important in constraining firm behavior, and therefore a higher index value implies more covenant protection. Testing this assumption is infeasible since it requires estimation of a system of equations that includes one equation for each of the 15 different covenant categories that we use in our indices. Unfortunately, we do not have enough exogenous variables to estimate the parameters of such a system. An alternative approach is to separately

[18] We include unrated firms in the below–investment grade subsample. The unrated firms tend to be riskier than investment grade firms and have risk characteristics similar to the sample with below–investment grade ratings. For example, the median *Z*-score (a metric that is designed to decrease as default risk increases) is 3.8 for the investment grade firms, 2.4 for below–investment grade firms, and 2.8 for unrated firms. Similarly, the percentage of firms likely to be experiencing financial distress (i.e., having a *Z*-score less than 1.81—see footnote 9) in the unrated subsample is similar to that for the below–investment grade subsample.

examine how covenant groups (including individual covenants) jointly interact with leverage and maturity decisions, and with firm growth opportunities.[19]

Table X reports estimation results for systems in which the covenant variable reflects payout restrictions (1), financing restrictions (2), and investment restrictions (3), respectively. As we describe in the table, these covenant variables are constructed by grouping the 15 covenant categories into payout, financing, and investment restrictions, and then scaling the respective indices by the number of covenants in each category so that they range from zero to one. The results across the three systems are generally consistent. In the covenant equations, notice that payout, financing, and investment restrictions are positively related to leverage and growth opportunities, and negatively related to maturity (proportion of short-term debt). Interestingly, however, the influence of payout restrictions on leverage differs from that of financing and investment restrictions. Notice in the leverage equation of system (1) that leverage is positively related to payout restrictions, but that such restrictions (weakly) reduce leverage for high growth firms (i.e., negative coefficient on market-to-book ratio interacted with payout restrictions). In contrast, leverage is negatively related to financing and investment restrictions, but both restrictions attenuate the negative effect of growth opportunities on leverage. The lack of an attenuation effect for payout restrictions is inconsistent with Myers (1977) and Kalay (1982), who argue that payout restrictions can help mitigate the incentive of managers to underinvest in growth opportunities and thereby enhance debt capacity. Overall, and despite this interesting difference across covenant categories, it seems reasonable to conclude that payout, financing, and investment restrictions are individually important components of our covenant index.[20]

We also conduct untabulated joint estimations for each of the 15 individual covenant types.[21] Although there is a good degree of heterogeneity in the results, there is strong evidence even at the individual covenant level that covenant protection is positively related to leverage and growth opportunities, and negatively related to maturity (proportion of short-term debt). Importantly, we also find that the positive role that covenants play in attenuating the negative effect of growth opportunities on leverage is broadly distributed across individual covenants.

V. Conclusions

We use the Fixed Investment Securities Database (FISD) to study the incidence of covenants in corporate debt issues and to examine the joint

[19] One caveat concerning this approach is that it implicitly assumes that the decision to include a covenant in a given group is independent of the choice of any covenant outside the group. It is unclear how this assumption influences the estimation results reported below.

[20] Although not reported, we find qualitatively similar results to those in Tables VII through IX when we estimate systems using covenant variables constructed from the cluster analysis groupings discussed earlier.

[21] These results are available upon request.

Table X

Joint Determinants of Leverage, Maturity, and Covenant Categories

The systems of equations are estimated using GMM, and are based on 7,016 firm-year observations over the 1989 to 2002 period. Although we only report the coefficients on key variables, each system is estimated with all of the variables used in Table VII. The variables are defined in Table V. System (1) examines payout restrictions, where the covenant variable is the sum of the firm's two payout-specific covenant indicator variables scaled by two. The two payout-specific covenants are 1 and 2 in Table III. System (2) examines financing restrictions, where the covenant variable is the sum of the firm's seven financing-specific covenant indicator variables scaled by seven. The seven financing-specific covenants are 3, 4, 5, 6, 7, 8, and 9 in Table III. System (3) examines investment restrictions, where the covenant variable is the sum of the three investment-specific covenant indicator variables scaled by three. The three investment-specific covenants are 13, 14, and 15 in Table III. Heteroskedasticity and autocorrelation consistent t-statistics are reported in parentheses below the parameter estimates. We use ***, **, and * to denote significance at the 1% level, 5% level, and 10% level, respectively.

	(1) Covenants = Payout Restrictions			(2) Covenants = Financing Restrictions			(3) Covenants = Investment Restrictions		
Independent Variable	Leverage	Maturity (Prop. Short)	Covenants	Leverage	Maturity (Prop. Short)	Covenants	Leverage	Maturity (Prop. Short)	Covenants
Leverage		0.338	2.915		0.370	0.918		−0.070	0.628
		(6.72)***	(23.70)***		(9.52)***	(12.75)***		(−1.49)	(6.86)***
Maturity (prop. short)	0.386		−1.151	2.188		−0.772	1.564		−0.602
	(2.60)***		(−6.29)***	(7.14)***		(−8.12)***	(3.15)***		(−4.68)***
Covenants	0.431	0.012		−0.502	0.195		−1.349	−0.037	
	(7.54)***	(0.14)		(−3.70)***	(2.59)***		(−3.76)***	(−0.21)	
MV/BV	−0.032	0.007	0.110	−0.019	0.028	0.024	−0.624	−0.118	0.026
	(−2.63)***	(0.92)	(10.18)***	(−1.69)*	(3.14)***	(4.07)***	(−4.56)***	(−1.65)*	(3.59)***
MV/BV × maturity (prop. short)	0.006			−1.070			−1.030		
	(0.07)			(−5.54)***			(−3.27)***		
MV/BV × covenants	−0.073	−0.069		0.527	−0.159		1.206	0.144	
	(−1.89)*	(−1.33)		(5.92)***	(−3.52)***		(4.92)***	(1.16)	

determinants of leverage, maturity, and covenant structure. In a sample of over 15,000 debt issues during the period from 1960 to 2003, we find fewer covenants when the debt issue is convertible, when it has a long maturity, or when the issuer is regulated. In contrast, lower rated issues, lower priority issues, and issues with change of control provisions (i.e., poison puts) tend to have more covenants of all kinds. We also document that the incidence of all types of covenants in debt issues has generally increased over time. Finally, we find that although the use of one covenant tends to be positively correlated with the use of other covenants, there are distinct groups of covenants that are frequently packaged together in debt issues. Investment policy and payout restrictions tend to be in distinct covenant groups, with each group including financing restrictions.

We use the covenant information in a firm's debt issues to create indices of covenant protection. We then use a simultaneous equations framework to examine the joint determinants of leverage, maturity, and covenant protection in a large panel of firms, focusing on how growth opportunities in a firm's investment opportunity set condition these choices. We find that covenant protection is increasing in leverage and the market-to-book ratio, and decreasing in the proportion of a firm's debt that is short-term. These results are consistent with the predictions that firms use covenants to control stockholder–bondholder conflicts over the exercise of growth options, and that short-term debt and restrictive covenants are substitutes in controlling these conflicts. Although the direct effect of growth opportunities on leverage is negative, we find a positive relation between leverage and growth opportunities interacted with covenant protection. Importantly, this supports the prediction that covenants attenuate the negative effect of growth opportunities on leverage. We also find that short-term debt can similarly attenuate the negative effect of growth opportunities on leverage for riskier borrowers. Extensive additional analysis confirms the robustness of our results.

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