Online Appendix for

Why Do Loans Contain Covenants? Evidence from Lending Relationships

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This online appendix first discusses the extent to which covenant intensity and covenant tightness predict covenant violations. It then turns to discussing the reasons why certain loans drop out of the final sample and shows results from Heckman sample selection tests designed to assess whether this induces any selection effects. Finally, it discusses instrument weakness robust inference for the instrumental variables (IV) estimation in Table 9 using the Anderson-Rubin (1949) statistic.

A.1. Predicting covenant violations

Table A-1 shows probit regressions predicting whether or not a new covenant violation occurs during a loan's tenure. Quarterly covenant violation data are taken from Nini, Smith, and Sufi (2012). As suggested in their paper, covenant violations are judged as new if the firm has not reported a violation in the previous four quarters. The loan's tenure is assumed to last until the loan's maturity date as of the time the loan contract is entered into. Column 1 regresses the covenant violation indicator on the natural log of the number of financial covenants attached to the loan as well as the control variables from Table 4 of the paper. Borrowers whose loan has a larger covenant count are significantly more likely to report a covenant violation during the loan's tenure. Column 2 uses covenant tightness as a predictor instead of covenant intensity. Borrowers whose loan has tighter covenants are again significantly more likely to report a covenant violation subsequent to entering into the loan. Column 3 considers both covenant intensity and tightness in the same regression. Strikingly, the coefficients on these two aspects of covenant choice are virtually unchanged. Both intensity and tightness independently predict covenant violations.

A.2. Sample selection

As stated in Section 3 of the paper, the final sample of loans for which all necessary information is available is only half as large as the sample used to calculate relationship intensity. One may wonder whether there is something special about the loans that do not end up in the final sample. Table A-2 details why these loans are excluded. In 29% of

the cases, covenant information is missing in DealScan. Since data availability for financial covenants requires the sample to start in 1995 and the relationship intensity measure uses a five-year lookback period, loans made in 1990-1994 are used to determine relationship intensity, but are not used in the final sample. These loans make up 23% of the excluded loans and are not a concern. Company financials and loan maturities are each missing in 14% of the cases. In 13% of the cases, relationship intensity is unknown as there was no loan in the previous five years. The other reasons are of negligible magnitudes. From this analysis, one might be concerned that there is something special about a) loans for which covenant information is missing and b) loans that are a borrower's first loan in five years.

I estimate Heckman sample selection models for Eq. (5) to address these concerns. Results are displayed in Table A-3. The first column shows results using a simple OLS estimation of Eq. (5) for comparison purposes since the Heckman sample selection procedure also uses a linear model as the outcome equation. These results are highly similar to the Poisson regression shown earlier. The second and third columns show the selection and outcome equations of the Heckman sample selection model that addresses sample selection based on the availability of covenant information. It seems unlikely that one could find a reasonable instrument for the availability of covenant information. DealScan collects covenant data from firm's SEC filings, taking advantage of the fact that Regulation S-K requires material contracts to be filed as exhibits. While measures of materiality can be conceived (e.g., the size of the loan relative to the size of the firm), it seems unreasonable to assume that the materiality of the loan is unrelated to covenant intensity. Thus, the Heckman selection model relies on the nonlinearity in the first stage probit for identification. This could result in collinearity that could reduce the power of the model in finding a selection effect.

The results for the outcome equation are nearly identical to those in the OLS regression. The χ^2 test does not reject the null hypothesis that the selection and outcome equations are independent. Hence, the fact that covenant information is missing for some loans does not appear to be an issue. The availability of covenant information is strongly predicted by the number of lenders involved in a loan, consistent with loans with many participants being relatively large and complex and thus more likely to be filed. Loan amounts, on the other

hand, appear negatively related to the availability of covenant information. Note, however, that loan amounts, the number of lenders and the borrower's size are all correlated. In any case, this does not affect the relationship results. In addition, replacing the loan amount with the materiality of the loan or dummy variables for various levels of materiality does not affect conclusions.

Columns (4) through (6) examine the effect of omitting the loans for which relationship status is unknown because the loan is the borrower's first loan recorded in DealScan in the past five years. In column (4), this is done by an OLS regression that includes a dummy variable that equals one for such loans. This dummy is negative significant, but the relationship terms retain roughly the same coefficients. Since we now know that first-time borrowers are different from the average, if the Heckman selection model has sufficient power despite the lack of an instrument, we would expect it to pick up this difference. Columns (5) and (6) show that it does. The χ^2 test strongly rejects the hypothesis that the selection and outcome equations are independent. Nevertheless, after accounting for the selection effect, the relationship dummies are still negative significant. The fact that the Heckman selection model does pick up this difference without using an instrument also lends support to the validity of the results for sample selection on missing covenant information.

A.3. Instrument weakness robust inference

The IV estimation in Table 9 produces large coefficients. IV model 1 rejects instrument weakness based on the critical values published in Stock and Yogo (2005) while IV model 2 does not. Instrument weakness robust inference can be achieved using the Anderson-Rubin (AR) (1949) statistic. This methodology is described in detail in Stock, Wright, and Yogo (2002). In a nutshell, defining y as the dependent variable, Y as the endogenous regressors with coefficients β, and X_1 as the exogenous regressors and X_2 as the instruments for Y, one can test the hypothesis $\beta = \beta_0$ by estimating the regression:

$$y - Y\beta_0 = X_1\gamma_1 + X_2\gamma_2 + \eta, \tag{1}$$

and performing a Wald test of $\gamma_2 = 0$ to obtain the F-statistic AR(β_0). This test always has the correct size, regardless of instrument weakness. However, it loses power when instruments are weak, which makes it more difficult to find any significant effect. It can therefore be used to obtain a conservative estimate of the statistical significance of the relationship effects shown here. As shown in Table 9, the AR-statistic strongly rejects the hypothesis that the relationship variables jointly equal zero. To determine whether they are individually significant, the AR-statistic can be inverted to construct a fully robust confidence set. For example, the 95% confidence set contains all β_0 for which AR(β_0) fails to reject at the 5% significance level.

I find the AR confidence set for both models using a grid search that allows either relationship effect to range from $[-10, 5]$ at increments of 0.05. Fig. A-1 shows the 95% and 90% AR confidence sets. Consistent with the limited power of the AR test under instrument weakness, the confidence sets for Model (2) are large, while they are smaller for Model (1). Importantly, however, the AR confidence sets are strictly contained in the third quadrant.

References

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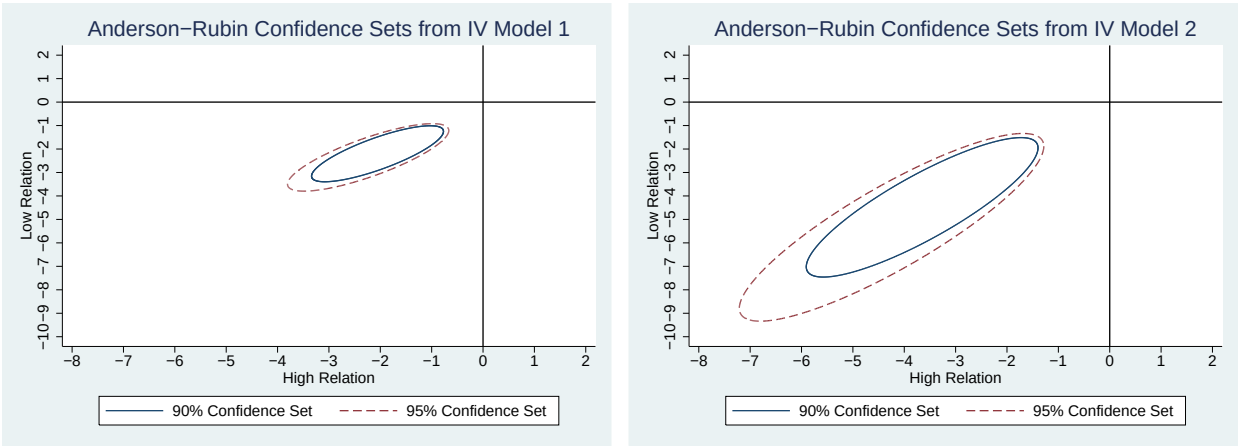

(a) **(b)**

Fig. A-1. Anderson-Rubin confidence sets from instrumental variables estimation. This figure shows instrument weakness-robust Anderson-Rubin confidence sets for the coefficients of the relationship indicator variables based on the IV estimation shown in Table 9. The sample includes 7,407 loans incurred between from 1995 and 2008 by non-financial, non-public administration, non-utility US borrowers for whom headquarters location is available. Confidence sets in subfigures (a) and (b) are based on the specifications in the IV models 1 and 2, respectively. The confidence sets are constructed by inverting the Anderson-Rubin (AR) statistic for joint significance of the endogenous variables as described in Stock, Wright, and Yogo (2002). This process uses a grid search allowing the coefficients for the *Low Relation* and *High Relation* dummies to vary from $[-10, 5]$ at increments of 0.05. The AR statistic is calculated for each point on the grid, and the 95% (90%) confidence set encompasses all points for which the p-value for the AR statistic exceeds 0.05 (0.10).

Table A-1
Covenant intensity and tightness as predictors of covenant violations

This table shows marginal effects from probit regressions predicting whether a new covenant violation occurs during the tenure of a loan. Quarterly covenant violation data are from Nini et al. (2012). As suggested in their paper, covenant violations are judged as new if the firm has not reported a violation in the previous four quarters. *Ln(FinCov)* is the log of the number of financial covenants attached to the loan (covenant intensity). Covenant tightness is defined as in Table 4. Control variables are the same as in Table 4. All regressions control for industry fixed effects at the one-digit SIC level, year fixed effects at the loan's origination date, as well as loan purpose and loan type fixed effects. Numbers in parentheses are z statistics adjusted for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Ln(FinCov)	0.0701***		0.0688***
	(4.28)		(4.23)
Tightness		0.2549***	0.2519***
		(5.41)	(5.33)
Ln(Loan Amount)	−0.0178*	−0.0175*	−0.0169*
	(−1.78)	(−1.76)	(−1.69)
Ln(Maturity)	0.1139***	0.1205***	0.1192***
	(7.64)	(8.08)	(8.02)
Ln(Lenders)	0.0061	0.0098	0.0068
	(0.67)	(1.07)	(0.75)
Ln(Assets)	−0.0258***	−0.0261***	−0.0241**
	(−2.69)	(−2.73)	(−2.51)
Leverage	−0.0243	−0.0337	−0.0377
	(−0.56)	(−0.77)	(−0.87)
Tangibility	−0.0111	−0.0036	0.0016
	(−0.32)	(−0.10)	(0.05)
Current Ratio	0.0087	0.0115**	0.0108*
	(1.48)	(1.97)	(1.86)
Ln(1+Coverage Ratio)	−0.0131	−0.0062	−0.0074
	(−1.58)	(−0.74)	(−0.89)
Rating	0.0161***	0.0160***	0.0141***
	(3.46)	(3.50)	(3.03)
Not rated	0.2197***	0.2182***	0.1938***
	(3.64)	(3.68)	(3.20)
MTB	−0.0259***	−0.0258***	−0.0254***
	(−3.18)	(−3.18)	(−3.12)
S&P 500	0.0425	0.0298	0.0418
	(1.37)	(0.97)	(1.36)
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Loan purpose effects	Yes	Yes	Yes
Loan type effects	Yes	Yes	Yes
Observations	6487	6487	6487

Table A-2
Reasons for exclusion of relationship sample loans from the final sample

For all borrowers with at least one loan in the final sample, this table details why a loan that was used to determine relationship intensity was not included in the final sample. Since data availability for financial covenants requires the sample to start in 1995 and the relationship intensity measure uses a five-year lookback period, loans made in 1990-1994 are used to determine relationship intensity, but are not used in the final sample. For the same reason, loans where there was no previous loan during the past five years are excluded from the final sample. Observations with a coverage ratio of less than minus one are excluded from the final sample since the log of one plus the coverage ratio is one of the control variables in the regressions. A few observations are excluded from the final sample because the firms are classified as financial, public administration or utility firms for these observations, even though they are classified as not belonging to these industries for other observations.

	Number	Percent
Covenant information missing	2316	29.35
Loan prior to 1995	1817	23.02
Company financials missing	1133	14.36
Maturity missing	1086	13.76
No loan in previous five years	1061	13.44
No record in Compustat for fiscal year prior to loan start	166	2.10
Coverage ratio less than minus one	147	1.86
Link to Compustat unavailable for this package	63	0.80
Foreign currency	41	0.52
Firm is classified as financial, public admin. or utility during this year	39	0.49
Syndication country foreign or unknown	19	0.24
SIC code missing	4	0.05
Total	7892	100.00

Table A-3
Heckman selection models

This table shows estimates of the effect of relationship intensity on financial covenant intensity using OLS regressions and Heckman selection models. The dependent variable is the log of the financial covenant count. Columns 1 through 3 ask whether a selection effect is present in the loans for which information on financial covenants is missing. Columns 4 through 6 assess selection effects in loans that are excluded from the final sample because they constitute a borrower's first borrowing (during the previous five years) in DealScan. The total number of observations in columns 4 and 5 does not match because some first borrowings also lack information on covenant intensity. Moving these observations to the analysis on missing covenant information yields qualitatively and quantitatively similar results. Control variables are the same as in Table 4. All regressions control for industry fixed effects at the one-digit SIC level, year fixed effects at the respective loan's origination date, as well as loan purpose and loan type fixed effects. Numbers in parentheses are z statistics adjusted for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Missing covenant information			First borrowing		
	OLS	Heckman model		OLS	Heckman model	
		Outcome	Selection		Outcome	Selection
Low Relation	−0.0819***	−0.0819***		−0.0815***	−0.0629***	
	(−5.30)	(−5.32)		(−5.28)	(−4.65)	
High Relation	−0.0368**	−0.0368**		−0.0359**	−0.0273**	
	(−2.35)	(−2.35)		(−2.29)	(−1.98)	
First Borrowing				−0.0427**		
				(−2.12)		
Ln(Loan Amount)	−0.0233**	−0.0229**	−0.0913***	−0.0190**	−0.0190*	0.0089
	(−2.43)	(−2.39)	(−3.12)	(−2.08)	(−1.87)	(0.31)
Ln(Maturity)	0.0120	0.0117	0.0387	0.0126	0.0241*	−0.0895**
	(0.93)	(0.91)	(1.04)	(1.03)	(1.77)	(−2.40)
Ln(Lenders)	0.0562***	0.0545***	0.4161***	0.0526***	0.0244***	0.0871***
	(6.94)	(6.42)	(17.00)	(6.74)	(2.84)	(3.31)
Ln(Assets)	−0.0240***	−0.0231***	−0.2043***	−0.0244***	−0.0344***	0.0722***
	(−2.81)	(−2.70)	(−7.33)	(−2.95)	(−3.82)	(2.90)
Leverage	0.0637	0.0650*	−0.2985**	0.0477	0.0459	0.0562
	(1.60)	(1.65)	(−2.41)	(1.25)	(1.13)	(0.48)
Tangibility	−0.0628**	−0.0630**	0.0239	−0.0575**	−0.0620**	−0.0137
	(−2.10)	(−2.12)	(0.26)	(−2.03)	(−2.07)	(−0.18)
Current Ratio	0.0106**	0.0105**	0.0387**	0.0095**	0.0105**	−0.0064
	(2.16)	(2.13)	(2.19)	(2.07)	(1.99)	(−0.43)
Ln(1+Coverage Ratio)	0.0360***	0.0359***	0.0407	0.0349***	0.0368***	−0.0805***
	(4.78)	(4.78)	(1.63)	(4.97)	(4.73)	(−3.77)
Rating	0.0268***	0.0268***	0.0132	0.0280***	0.0258***	0.0184
	(6.54)	(6.56)	(1.21)	(6.85)	(6.13)	(1.21)
Not rated	0.3711***	0.3706***	0.1465	0.3832***	0.3656***	0.1605
	(7.09)	(7.11)	(1.03)	(7.40)	(6.82)	(0.84)
MTB	−0.0102	−0.0101	−0.0222	−0.0108*	−0.0075	−0.0214
	(−1.60)	(−1.59)	(−0.93)	(−1.77)	(−1.10)	(−1.15)

Table A-3
Heckman selection models — *Continued*

	Missing covenant information			First borrowing		
	OLS	Heckman model		OLS	Heckman model	
		Outcome	Selection		Outcome	Selection
S&P 500	-0.1737^{***}	-0.1740^{***}	0.0560	-0.1708^{***}	-0.1500^{***}	-0.0985
	(-7.28)	(-7.32)	(0.84)	(-7.37)	(-6.21)	(-1.25)
Constant	0.6285^{***}	0.6365^{***}	0.3683	0.6393^{***}	0.8592^{***}	0.3998
	(5.60)	(5.65)	(1.02)	(5.89)	(7.13)	(1.12)
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan type effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7924	10238		8709	8985	
Censored Observations		2314			1061	
Rho		-0.032			-0.955	
χ^2		0.28			1016.41	
p-value		0.60			0.00	