Internet Appendix for "Bank Interventions and Trade Credit: Evidence from Debt Covenant Violations"

Zilong Zhang*

1 Regression Discontinuity Estimates of Firm Characteristics

[Table IA.1 is here]

2 An Alternative Sample of Covenant Violations

Nini et al. (2012) identify the occurrence of covenant violations directly from 10-K and 10-Q SEC filings based on a text-search algorithm over the period 1996 to 2008. I merge this data set with quarterly observations of Compustat nonfinancial firms and estimate the effect of covenant violations on trade credit. Since covenant thresholds are not observed to compute the running variable, the estimation has to be a quasi-RD

*zilzhang@cityu.edu.hk, College of Business, City University of Hong Kong, Kowloon, Hong Kong.

design: Instead of controlling for DISTANCE, I follow Nini et al. (2012) and control for covenant variables on which financial covenants are frequently written (as a noisy proxy for DISTANCE). These covenant variables include NET_WORTH, LEVERAGE, CURRENT_RATIO, and INTEREST_EXPENSE. Their high orders are included in some specifications to account for possible nonlinearity. Other control variables include the lagged values of ln(ASSET), ROA, MTB, CASH, CAPEX, and AB_ACC. I also control for industry-quarter fixed effects to absorb industry-wide shocks that could simultaneously cause a reduction in trade credit and a covenant violation.

I estimate regressions of trade credit on a lagged violation indicator (VIOLATION_SEC), which equals 1 when a firm reports a covenant violation in a fiscal quarter and 0 otherwise. Columns (1) and (2) of Table IA.2 present the estimation results. The coefficient on VIOLATION_SEC is -0.063 and statistically significant. For brevity, coefficients of other control variables are omitted. Including the quadratic covenant variables increases the economic magnitude of the coefficient (-0.068). To interpret, a covenant violation leads to a 0.068 decline in trade credit. This effect is economically similar to that estimated in the sharp-RD design.

I also conduct a difference-in-differences analysis by examining covenant violations as staggered shocks of bank interventions. Treated firms are defined as firms that experience a covenant violation that is not preceded by any violation in the prior four quarters. Control firms are chosen based on a propensity-score match algorithm following Nini et al. (2012). In particular, I use a probit regression to estimate the

likelihood (propensity score) that a firm violates a covenant, and then find the nonviolating firm with the closest propensity score for each violating firm (without replacement).[1] For each pair of treated firm and its match, I keep only four quarters prior to and four quarters after the treated firm's covenant violation.

Columns (3) and (4) of Table IA.2 presents the difference-in-differences estimates. POSTVIOLATION is an indicator variable that equals 1 for four quarters after a new violation, and 0 otherwise. The regression model controls for firm fixed effects and industry-quarter fixed effects. The negative and statistically significant coefficients suggest that during the four quarters after a covenant violation, on average violating firms lose 4.0 to 4.1 percentage points more trade credit than the matched nonviolating firm. Therefore, the DID analysis confirms that covenant violations bring down the trade credit of violating firms, which should have exhibited a trend similar to that of the matched nonviolating firms.

[Table IA.2 is here]

[1]The dependent variable in the probit model is a binary variable that equals 1 for a reported violation that is not preceded by any violation in the previous four quarters and 0 otherwise; covariates include lagged TRADE_CREDIT, ln(ASSET), calendar-quarter fixed effects, fiscal-quarter fixed effects, industry fixed effects, and the full set of covenant control variables, higher-order covenant controls, and lagged covenant controls.

Table IA.1: **Regression Discontinuity Estimates of Firm Characteristics**

This table presents the RD estimates from local linear regressions of ex ante firm characteristics. The running variable is the contemporaneous DISTANCE. I use the optimal bandwidth proposed by Calonico, Cattaneo and Titiunik (2014) with rectangular kernel weighting function. Robust bias-corrected standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(Asset)	ROA	MTB	CASH	AB_AAC	NET_WORTH	LEVERAGE	CAPEX
Linear regressions	-0.123	0.002	-0.020	0.006	-0.001	0.005	0.011	-0.002
	(0.085)	(0.002)	(0.039)	(0.005)	(0.002)	(0.010)	(0.010)	(0.003)
Observations	5,808	3,273	4,490	4,492	6,387	4,944	4,663	5,627
Kernel	Rectangular							

Table IA.2: **Covenant Violations Reported in SEC Filings**

This table presents the effect of bank interventions on trade credit using the sample of reported violations by nonfinancial firms between 1996 and 2008. Covenant violations are disclosed by firms in their SEC filings (Nini et al. (2012)). Columns (1) and (2) estimate a quasi-RD design in which the running variable is proxied by a set of covenant variables. Columns (3) and (4) estimate a difference-in-differences regression in which the POSTVIOLATION indicates the four quarters after a new covenant violation (a violation not preceded by any violation in the previous four quarters). In columns (3) and (4), each violating firm is matched with a nonviolating firm that has the closest propensity score of violating debt covenant in the same quarter. The dependent variable is TRADE_CREDIT. Other controls include the lagged values of ln(ASSET), ROA, MTB, CASH, CAPEX, and AB_ACC. Covenant controls include LEVERAGE, NET_WORTH, CURRENT_RATIO, and INTEREST_EXPENSE. Standard errors adjusted for firm clustering are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Baseline model		Difference-in-differences	
VIOLATION_SEC	-0.063***	-0.068***		
	(0.018)	(0.018)		
POSTVIOLATION			-0.040**	-0.041**
			(0.019)	(0.019)
Other controls	Yes	Yes	Yes	Yes
Covenant controls	Yes	Yes	Yes	Yes
High-order covenant controls	No	Yes	No	Yes
Industry×Quarter FE	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes
Adjusted R^2	0.197	0.202	0.539	0.539
Observations	171,241	171,241	31,895	31,895

References

Calonico, S.; M. D. Cattaneo; and R. Titiunik. "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs." *Econometrica*, 82 (2014), 2295–2326.

Nini, G.; D. C. Smith; and A. Sufi. "Creditor Control Rights, Corporate Governance, and Firm Value." *Review of Financial Studies*, 25 (2012), 1713–1761.