COMMENT ON MARKET CONDITIONS AND CONTRACT DESIGN: VARIATIONS IN DEBT CONTRACTING†

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INTRODUCTION

This Comment attempts to explain two stylized facts: As the market interest rate rises, lenders demand either (a) more collateral, or (b) tighter covenants. In their Article, *Market Conditions and Contract Design: Variations in Debt Contracting*, Choi and Triantis ("C&T") use two models in their explanation of these facts: an adverse selection model and a moral hazard model. The adverse selection model formally analyzes only collateral contracts, but the authors claim that both the collateral contract and the covenant contract mitigate adverse selection. The moral hazard model also considers only collateral contracts; the claim here is that these best mitigate moral hazard.

The Article claims to derive three principal results:

(A) The likelihood that parties write collateral contracts is increasing in the market interest rate (both models). When the problem is adverse selection, this result applies to covenants as well.

(B) Good (i.e., less risky) types are more likely to offer collateral than bad types (both models);

(C) The difference in the contracts of good and bad types widens as the market interest rate increases (both models).

This Comment argues that under symmetric information, results (A) and (C) continue to hold but result (B) reverses: Bad types offer more collateral than good types. Symmetric information is the more plausible assumption in the Article's adverse selection setup. I make three other points: (i) C&T's moral hazard model assumes that borrowers are ex ante identical: Every borrower is equally likely to pursue a later project that disadvantages the initial lender. This setup cannot explain why some parties—lenders and borrowers—use covenants while other, apparently similar parties, use security; (ii) Letting borrowers differ ex ante may explain when parties prefer one

† Albert Choi & George Triantis, *Market Conditions and Contract Design: Variations in Debt Contracting*, 88 N.Y.U. L. REV. 51 (2013).

or the other risk reduction device. In this framework, the better argument continues to be that bad types offer more collateral than good types; (iii) Turning to empirics, some data rejects C&T's result (B): Bad types appear in fact to offer more collateral than good types. Because this data is not current, it cannot settle the issue. On the other hand, and to summarize, the data and the analysis raise the question whether C&T are using the right models for the problem.

I
SUBSTITUTING SYMMETRIC INFORMATION FOR HIDDEN INFORMATION

An adverse selection model supposes that a borrower's riskiness is private information. Symmetric information, however, is a more plausible assumption in C&T's setup, in which the borrower brings one project to market and asks a single creditor to finance much or all of it. The debt contract will contain covenants, and these require the disclosure of what would otherwise be private information. Covenants require the borrower (i) to stay in the same line of business; (ii) to maintain its properties in good order; (iii) to maintain specified ratios of current assets to current liabilities; (iv) to maintain specified ratios of total liabilities to tangible net worth; (v) to incur only "permitted" debt; (vi) to open its books to the creditor at frequent intervals and to supply audited financials; and (vii) to report compliance with the nonfinancial restrictions. These covenants enable the lender to be well informed about the borrower's current state.[1]

Now contrast a simple symmetric information model of the one project context to C&T's adverse selection model. In the simple model, I is project cost, which the lender supplies; r is the market interest rate; p is the probability that the borrower's current project succeeds; R is the face value of the loan (the sum the borrower agrees to repay); A is the assets the lender can reach on default. The borrower agrees to repay R one period later and the credit market is competitive.

The borrower pays an effective interest rate of $r^* = R/I - 1$. To see where R comes from, the lender earns zero profits in a competitive equilibrium; hence, it expects only to recover the investment cost I. Its expected payoff is:

$$I = \delta[pR + (1 - p)A], \text{ where } \delta = 1/(1+r).$$

Solving for R,

[1] Private loans of this type are commonly described as "information rich."

$$\mathrm{R} = \frac{I(1+r) - (1-p)A}{p}$$

The face value of the loan, R, and therefore the effective interest rate r^*, is increasing in the market interest rate r and is decreasing in A and p. The project choice determines I, and r is exogenous. The borrower has two choice variables. He can increase the success probability p by working harder; more relevant here, he can increase the asset base A by offering collateral. Regarding this second response, the lender can reach A after obtaining a judgment for nonpayment. Collateral, however, reduces the lender's cost of seizing and selling assets and accelerates the lender's return. Hence, collateral increases the net value of the assets that back the loan.

Turning to C&T's result that collateral is more likely as the market interest rate increases, when the discount factor falls the required repayment sum R is less valuable to the lender. Also, the assets that back the loan become less valuable because, without security, the lender cannot realize on those assets for some time. The lender responds to the reduction in the value of both return possibilities—repayment or foreclosure—by increasing R, the face value of the loan; this in turn raises r^*. Both strong and weak borrower types have an incentive to respond by effectively increasing the asset base A; that is, by offering security.

Contrary to C&T's result (B), however, an increase in the market interest rate makes weak borrowers more likely to offer security than strong borrowers. The success probability p can be a proxy for the strength of the borrower: The projects of strong borrowers are more likely to succeed than the projects of weak borrowers. Differentiating R by r yields $I/p > 0$. The face value of the loan, R, increases as the borrower's project is less likely to succeed. Intuitively, the lower p is, the more weight the lender puts on the default state, in which it is restricted to the borrower's bad state assets. Because these are less valuable than the good state assets, the lender responds by raising R, its good state pay off, more for weak borrowers than for strong borrowers. The weak borrowers thus have a relatively stronger incentive than strong borrowers to offer collateral as the market interest rate increases.

To summarize, a simple symmetric information model of the one borrower, one loan context shows that (i) an increase in the market interest rate increases the incentive of all borrowers to offer security, confirming C&T's result (A); and (ii) the incentive to offer collateral bears more harshly on the weak borrowers, making them more likely to offer security, and thereby disconfirming C&T's result (B). Intuitively, when money becomes more costly, creditors are less willing to lend to the more problematic borrowers. The sharp difference in predictions that hidden information and symmetric information models yield should permit the empiricist to reject one or the other model.

II
A More Plausible Moral Hazard Model

In the model here, the lender can evaluate the borrower's current project, for the reasons given in the symmetric information model, but faces uncertainty because it does not know what the borrower's next project will be. The asset beta characterizes a project's riskiness.

$$\beta_{project} = \beta_{revenue}\left(1 + \frac{d}{A}\right)$$

The present value of the borrower's current debt is d and the borrower's current assets are A.

Now let the borrower take a second project. If the first project constitutes g% of the borrower's total value, the borrower's total asset beta becomes:

$$\beta_{firm} = g\beta_1 + (1 - g)\beta_2$$

As is apparent, if the borrower's second project has a positive net present value, but is debt financed, the project can increase the borrower's riskiness if $\beta_2 > \beta_1$. Relevant here, a second project is likely to increase risk if the ratio of debt to assets on the second project is higher than the debt/asset ratio on the initial project. As a consequence, early lenders face risk even when borrowers take only efficient projects. The risk is that a borrower's later project choice will dilute the value of the initial loan.

The model makes five assumptions:

A1: A weak borrower's portfolio of future projects is distributed on $G(v_w)$ with support $[0, v_w]$. A strong borrower's portfolio of future projects is distributed on $G(v_s)$ with support $[0, v_w]$: $v_w < v$s. The lender knows $G(v_w)$ and $G(v_s)$ but which future project a borrower draws is private information. Thus, (i) both borrower types can draw a strong or a weak later project but the strong borrower is more likely to draw a strong project; and (ii) the lender can distinguish weak from strong borrowers when it makes the initial loan.

A2: Covenants permit the lender to prevent either borrower type from taking a second project. Covenants thus enable the lender to control the riskiness of the borrower.

A3: Security also permits the lender to prevent the borrower from taking a second project. Hence, again contract terms enable the initial lender to control risk.

A4: Contracting costs are positive: A security contract costs k_s to write; a covenant contract costs k_c. The security contract is more expensive: $k_c < k_s$.

A5: A covenant contract is enforceable only against the borrower; a security contract is enforceable against the borrower and third parties. The borrower, however, can credibly commit to comply with its covenants.

Turning to the analysis, assumptions A2 and A3 imply that lenders require and borrowers offer either covenants or security to reduce the risk of loan dilution. Assumptions A4 and A5 imply that covenants are preferred. If covenant contracts are less costly to write and are as effective as security contracts, only covenant contracts exist. Security contracts and covenant contracts coexist, however. Which assumption should be relaxed?

Assumption A1 implies that the most plausible answer is A4. A borrower who trips covenants may incur (i) a reputational loss; (ii) the imposition of extra fees; (iii) debt acceleration; and (iv) bankruptcy. These costs bear more harshly on strong firms, which expect to continue, than on weak firms, which expect difficulty. For example, a borrower that expects to reenter the loan market periodically weighs a reputational loss heavily. A borrower in trouble may discount this loss if only a second debt financed risky project can rescue it. Because covenants are enforceable only against the debtor, this reasoning implies that weak borrowers who trip covenants are harder to punish than strong borrowers. A security contract binds third party lenders; hence, collateral materially reduces the risk of loan dilution.

Turning to the contracting stage, an equilibrium in which both borrower types offer covenants violates subgame perfection. Recalling that lenders can distinguish borrower types, the weak borrower's promise to abide by covenants is less credible than the strong borrower's promise.

The more reasonable equilibrium thus has borrowers separating. Lenders require strong borrowers to offer covenants and weak borrowers to offer collateral.

CONCLUSION

C&T's first model assumes that borrowers make one loan and there is hidden information: The lender does not know the borrower's type. Their second model assumes that all borrower types are ex ante identical; a borrower pursues (at least) two debt financed projects over its life; and there is hidden action—the creditor, at the time of the initial loan, does not know which later project a borrower will choose. This Comment argues that it is more plausible to assume symmetric information in the one loan context, and it is more plausible to suppose that borrowers differ ex ante. On the substituted assumptions, C&T's result (B) reverses: It is the strong borrowers who offer covenants to lenders and the weak borrowers who offer security. This new result raises a question of model selection. What is the most productive way to model the simple loan contexts that C&T study?

The data appear to reject C&T's argument, showing that risky firms are more likely to offer security than safe firms. The data is a little old, but it also is consistent with casual empiricism. The two models sketched in this Comment are pretty simple, however. The Comment's conclusion thus is that (i) C&T should apply their models to data and look for current support; (ii) in the absence of supporting data, the appropriate model for these problems is yet to be written.