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Discussion of Patrick Bolton's "Corporate Finance, Incomplete Contracts, and Corporate Control"

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The seminal work of Grossman and Hart (1986) changed the landscape of corporate finance by giving impetus to an extensive theoretical literature that analyzes financial decisions from an incomplete contracting perspective. In particular, the incomplete contracts approach has been successful in developing theories that motivate the use of debt contracts. The paper by Patrick Bolton (chapter 12)—one of the most influential contributors to this literature—offers an in-depth review and assessment of the incomplete contracts approach to financial contracting.

When Oliver Hart wrote his 2001 *Journal of Economic Literature* survey "Financial Contracting," the empirical evidence was just beginning to accumulate.[1] In the past few years the field has benefited from the availability of data on syndicated loans, commercial real estate loans, and asset-backed securities, which have enabled microlevel studies of financial contracting.[2] In this short discussion I review the empirical evidence on the role that collateral plays in financial contracts.

Incomplete Contracts and Collateral

Most of the theory on the role of collateral in secured lending has focused either on situations where borrowers exhibit moral hazard or on situations

[1] One exception is Kaplan and Stromberg's (2003) influential empirical paper.

[2] For example, see Assuncao, Benmelech, and Silva (2014), Benmelech (2009), Benmelech and Bergman (2008, 2009), Benmelech, Garmaise, and Moskowitz (2005), Djankov et al. (2007), Kaplan and Stromberg (2003), Qian and Strahan (2007), and Roberts and Sufi (2009a,b).

of adverse selection. The nature of the financial friction in these models yields differential theoretical predictions. When the financial friction is one of adverse selection and asymmetric information, high-quality firms are predicted to employ collateral when borrowing, whereas firms of low quality are predicted to borrow using unsecured debt. For example, the optimal contract in Bester (1985) is one in which risky borrowers pay a high interest rate but are not required to put down any collateral, while safer borrowers put down some collateral and pay a lower interest rate.

In contrast to the predictions relying on adverse selection and hidden information, models that are based on moral hazard predict that lower quality firms are required to use collateral when raising capital, whereas higher quality firms are able to borrow without it. In essence, collateral is used to increase borrowers' pledgeable income and hence helps in obtaining external finance and reducing its price. The empirical evidence suggests that, consistent with the moral hazard models, low-quality borrowers are those more likely to post collateral (see, e.g., Berger and Udell 1990; John, Lynch, and Puri 2003).

Collateral is of central importance in the incomplete contracting literature. In particular, collateral allows the creditor to recover, at least partially, a loan made to a debtor (see, e.g., Aghion and Bolton 1992; Shleifer and Vishny 1992; Hart and Moore 1994, 1998; Bolton and Scharfstein 1996). This threat of asset liquidation motivates debtors to avoid default. Thus, in the incomplete contracting literature, asset liquidation values play a key role in both the ex ante determination of debt contracts as well as the ex post determination of debt payments. In a series of papers with coauthors we test empirically predictions from the incomplete contracts literature and find that consistent with the models, collateral liquidation values determine the ex post strategic behavior of borrowers, as well as the ex ante pricing of these contracts, their maturity structure, debt capacity, and number of creditors.

Collateral Values and Renegotiations

In Benmelech and Bergman (2008) we document empirically the conditions under which airlines renegotiate aircraft leases in the United States. We first develop an incomplete contracting model of financial contract renegotiation based on Hart and Moore (1998) and then estimate it using data on the airline industry in the United States. The model has two testable implications. First, firms will be able to credibly renegotiate their financial commitments only when their financial situation is sufficiently poor. Second, when a firm's financial position is sufficiently poor, and hence its renegotiation threat is credible, a reduction in the liquidation value of assets increases the concessions the firm obtains in renegotiation. We proceed by empirically analyzing renegotiation of

aircraft leases by U.S. airlines. Aircraft leases are a natural environment for testing renegotiation-based models since in bankruptcy lessors are relieved from the automatic stay provision that affects most creditors. These lessors, therefore, have the ability to quickly repossess their assets if a firm defaults on its lease payments, which matches nicely the stylized assumption in much of the theoretical literature. Our results emphasize the importance of the incomplete contracting perspective to real-world financial contract renegotiation. The ability of firms to renegotiate their financial commitments depends heavily on their bargaining position vis-à-vis liability holders. This bargaining position is determined, in turn, by both the credibility of threats made during renegotiation and by the outside option of the bargaining parties.

Collateral Values and Financial Contracting

The value of the creditor's option to foreclose on collateral affects both his willingness to provide financing and the terms on which financing is extended. Incomplete contracting models of debt financing predict that the terms of debt financing depend on the collateral liquidation values. The following are some of the central empirical predictions arising from these models.

- Prediction 1. Debt levels increase in collateral liquidation values (Shleifer and Vishny 1992; Hart and Moore 1994).
- Prediction 2. The promised debt yield decreases in asset liquidation values, controlling for the debt level.
- Prediction 3. Debt maturity increases in collateral liquidation value (Shleifer and Vishny 1992; Hart and Moore 1994).
- Prediction 4. Firms borrow from multiple creditors when liquidation value is low and from a single creditor when liquidation value is high (Bolton and Scharfstein 1996; Diamond 2004).

Benmelech and Bergman (2009) analyze the effect of collateral redeployability on the pricing of loans using a novel data set of secured debt issued by U.S. airlines. Airlines in the United States issue tranches of collateralized debt obligations, which take a variety of formats known as equipment trust certificates, Enhanced Equipment Trust Securities, and pass through certificates. These debt instruments pledge aircraft from an airline's fleet as collateral and have served as the main source of external financing for U.S. airlines since the mid-1990s. Matching aircraft serial numbers hand collected from filing prospectuses to a database on worldwide aircraft, we obtain detailed information about the characteristics of all aircraft serving as underlying collateral. For each debt tranche, this information is then used to construct measures of collateral redeployability.

Benmelech and Bergman (2009) show that debt tranches that are secured by more redeployable collateral exhibit lower credit spreads, higher credit ratings, and higher loan-to-value ratios—an effect that our estimates show to be economically sizable. The results thus suggest that—consistent with predictions 1 and 2—the ability to pledge collateral, in particular redeployable collateral, lowers the cost of external financing and increases debt capacity.

Moreover, Benmelech (2009) investigates the effect of assets' liquidation values on capital structure by exploiting the diversity of track gauges in nineteenth-century North American railroads. The abundance of track gauges limited the redeployability of rolling stock and track to potential users with similar track gauge. Furthermore, potential demand for both rolling stock and tracks was further diminished when many railroads went under equity receiverships. Consistent with prediction 3, Benmelech (2009) shows that the potential demand for a railroad's rolling stock and tracks was a significant determinant of debt maturity and the amount of debt that was issued by railroads.

These results are not confined only to the airline and railroad industries. Benmelech, Garmaise and Moskowitz (2005) analyze the effect of liquidation values on debt contracting using a unique data set of commercial property loan contracts. The empirical identification strategy employs commercial zoning regulation to capture the flexibility of a property's permitted uses as a measure of an asset's redeployability or value in its next best use. Within a census tract, Benmelech, Garmaise, and Moskowitz (2005) find that more redeployable properties receive larger loans with longer maturities and durations, lower interest rates, and fewer creditors, controlling for the property's type, sales price, and earnings-to-price ratio. These results are consistent with all of the incomplete contracting–based predictions listed above on the relation between collateral values and debt financing terms.

In a recent paper, Assuncao, Benmelech, and Silva (2014) analyze the effects of a credit reform in Brazil on the auto credit market. The development of the Brazilian auto loan market faced several impediments. Chief among them was the inefficient process of repossession and resale of autos when borrowers defaulted on their loans. Banks were allowed to repossess the autos of borrowers who failed to repay their loans. However, the banks could not resell repossessed cars without court approval. As a result, the time from the repossession of a car to its resale by the bank averaged more than two years. In August 2004, the Brazilian government announced a broad credit reform that, among other legal changes, eased the resale of repossessed autos.

Assuncao, Benmelech, and Silva (2014) show that consistent with predictions 1, 2, and 3, the legal change has led to larger loans with lower credit spreads, longer maturities, and higher leverage. The authors also find that the credit reform led to the "democratization" of credit in that borrowers with lower income, with higher risk, and who are self-employed were more likely to obtain

a loan after the law was implemented. These results shed light on the consequences of a credit reform, highlighting the crucial role that collateral and repossession play in the liberalization and democratization of credit markets.

Conclusion

The incomplete contracting approach to financial contracting provided a rich setting for the analysis of debt contracts. One of the main contributions of this literature is to emphasize the important role that collateral plays in debt financing. Collateral liquidation value affects the ex ante willingness to provide financing and the terms on which credit is extended as well as the ex post determination of debt payments that are affected by contract renegotiations and strategic default. The ultimate strength of any economic theory lies in its ability to explain real-world outcomes. The ample empirical evidence that has accumulated in recent years provides strong support for the incomplete contracting approach to financial contacts.

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