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Product Market Imperfections and Loan Commitments

VOJISLAV MAKSIMOVIC*

ABSTRACT

I show in a model of competitive banks that the characteristics of loan contracts are affected by product market imperfections in the borrower's industry. A bank loan commitment increases the value of a borrower firm operating in an imperfectly competitive industry and thus dominates a simple loan even in the absence of risk sharing considerations and informational asymmetries between the borrower and the bank. While it is individually rational for a firm to obtain a loan commitment, all the firms in that industry taken together are made worse off by the existence of loan commitments.

A LOAN COMMITMENT IS a contract guaranteeing future availability of credit to a borrower at a prespecified fixed or stochastic interest rate. Although bank loan commitments are an important financial instrument, and there exists an extensive literature analyzing them, the rationale for their existence is still a matter of research. This paper provides an explanation for the existence of bank loan commitments to borrowers from industries in which there is imperfect competition in the product market. It is shown that in such industries the option to acquire financing at predetermined rates enhances the borrower's strategic power and thus creates value for the individual borrower.

Consider an industry with imperfect competition where firms face the problem of noncooperatively exploiting a product market opportunity. The optimal product market strategy of a firm depends on the output of its rivals. A firm with access to resources at a lower marginal cost than its competitors has a strategic advantage that it can exploit to gain a larger market share and profits. It is shown here that a firm that does not have such a strategic advantage can create it by purchasing for a fixed initial fee an option to acquire a factor of production, such as financing, at favorable terms. Specifically, by initially negotiating a bank loan commitment the firm can finance an expansion of output to meet a strategic contingency at more favorable terms than would be possible if the expansion had to be financed in the spot market. The ability to exercise the commitment enables the firm to threaten its rivals strategically and moves the industry to an equilibrium more favorable to that firm, thus creating value for the borrower. It is shown below that it is optimal for all firms to acquire bank loan commitments, altering the industry equilibrium in the process.

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The lending bank does not lose by extending credit at terms more favorable than available at the spot market; it can calculate the industry equilibrium that will obtain if all the firms are granted optimal bank loan commitments and so forecast borrowers' demand for cash. The bank can thus cost the loan commitment to a borrower at the time it is made. It can then ensure itself a competitive return on the money lent either by charging an initial fee or by inducing the firm to purchase additional financial services that are priced above the competitive rate.

The explanation for bank loan commitments advanced here is novel in that it shows how the structure of the borrower's industry determines the terms of a contract used in banking. This explanation for loan commitments complements others proposed in the literature which have explained the existence of bank commitments as providing a mechanism for optimal risk sharing,[1] resolving asymmetries of information between the bank and the borrower,[2] or ensuring credit availability on the supply side.[3]

The notion that a loan commitment is purchased before the borrower chooses his input level and that the commitment lowers the firm's cost of capital was also employed in another context by Boot, Thakor and Udell (1987a, b). In their model commitments also permitted borrowers to prepay a part of their financing costs. As a result, commitments enabled the firm to avoid changes in investment incentives that may occur when the firm faces the possibility of having to borrow at high future spot rates of interest. The explanation advanced in this paper differs from their contributions in that it relates bank commitments to strategic product market interactions. In imperfectly competitive industries some changes in incentives may be advantageous because the output choices of firms are interdependent. The equilibrium loan commitment then maximizes the benefit to each firm by inducing the *optimum* amount of change given the borrowing policies of rival firms.

The effect of corporate debt, as opposed to loan commitments, on product market interactions has been studied recently by Brander and Lewis (1986) and by Maksimovic (1986).[4] In their models the total amount of debt was determined before output decisions were made and financial structure affected product market equilibrium by altering the probability of bankruptcy. By contrast, the analysis presented here does not rely on bankruptcy to alter the equityholders' incentives. Thus, it is shown that financial structures that strenghten the firm's competitive position in the product market need not be associated with an increased risk of insolvency and higher bankruptcy costs.

The base model of imperfect competition is set out in Section I in the context of a duopoly. The optimal bank loan commitments are derived, and the new

[1] For example, Campbell (1978), Thakor, Hong, and Greenbaum (1981), Hawkins (1982), or Ho and Saunders (1983).

[2] Berkovitch and Greenbaum (1987), Boot and Thakor (1987), Boot, Thakor, and Udell (1987a,b), Kanatas (1987), and Thakor (1982).

[3] Blackwell and Santomero (1982) and Deshmukh, Greenbaum, and Kanatas (1983).

[4] Fershtman and Judd (1987) independently analyzed equilibrium incentives in oligopolies in a model with uncertainty. They did not consider two-part contracts with third parties such as competitive banks. See also Rotemberg and Scharfstein (1990).

industry equilibrium is discussed, in Section II. Section III generalizes the model to the case of an imperfectly competitive industry with many firms, and Section IV summarizes the empirical implications.

I. Model of Industry Equilibrium

We consider the standard Cournot duopoly in which each firm sets the quantity produced as the strategic variable, firms do not collude, and there is perfect information. In a Cournot duopoly the two firms, here referred to as Firm 1 and Firm 2, adopt strategies that are functions of the other's output. The interaction between firms in the product market can be formally modeled as a game of strategy in which the equilibrium is in the sense of Nash (1951).[5]

For simplicity assume that the marginal cost of production is constant and equal for both firms (here normalized to 1.0 without loss of generality) and that production is financed by loans from a competitive banking sector. Let the market rate of interest be r. Assume also a linear inverse demand function:[6]

$$p = a - b(x_1 + x_2), \qquad a, b > 0,$$

where p is the price and x_i is the output of Firm i. The total financing cost of Firm i (TCF_i) is then rx_i. Normalizing by letting $a^* = a - 1.0$, and also assuming that $a^* > r$, the profit of Firm i, $\Pi_i(x_1, x_2)$ for $i = 1, 2$, is given by:

$$\Pi_i(x_1, x_2) = (a^* - b(x_1 + x_2))x_i - rx_i. \tag{1}$$

The reaction function for Firm i, giving the firm's optimal output as a function of its rival's output, is obtained by maximizing $\Pi_i(x_1, x_2)$ with respect to x_i. Thus, the reaction function for Firm i is:

$$x_i = -\frac{1}{2}x_j + \frac{a^* - r}{2b} \qquad \text{for} \quad i \neq j. \tag{2}$$

Figure 1 shows the arrangement of the reaction function and the isoprofit curves from which the reaction functions are derived.

The point at which the reaction functions cross E is the (Cournot–Nash) equilibrium point. There is no incentive for either firm to depart from that equilibrium if the market is not perturbed.

As the model is expanded to allow firms to acquire bank loan commitments before they decide how much to produce, another, more narrow equilibrium concept is needed to rule out implausible behavior. We adopt the subgame perfect equilibrium of Selten (1977) as a noncooperative equilibrium concept relevant to the analysis of industry equilibria.[7]

[5] For a formal exposition see Friedman (1977).

[6] Industries with nonlinear demand can be analyzed by applying the methods discussed in Maksimovic (1986).

[7] See Kreps and Spence (1983) for a discussion of equilibrium concepts in the analysis of oligopolistic interaction.

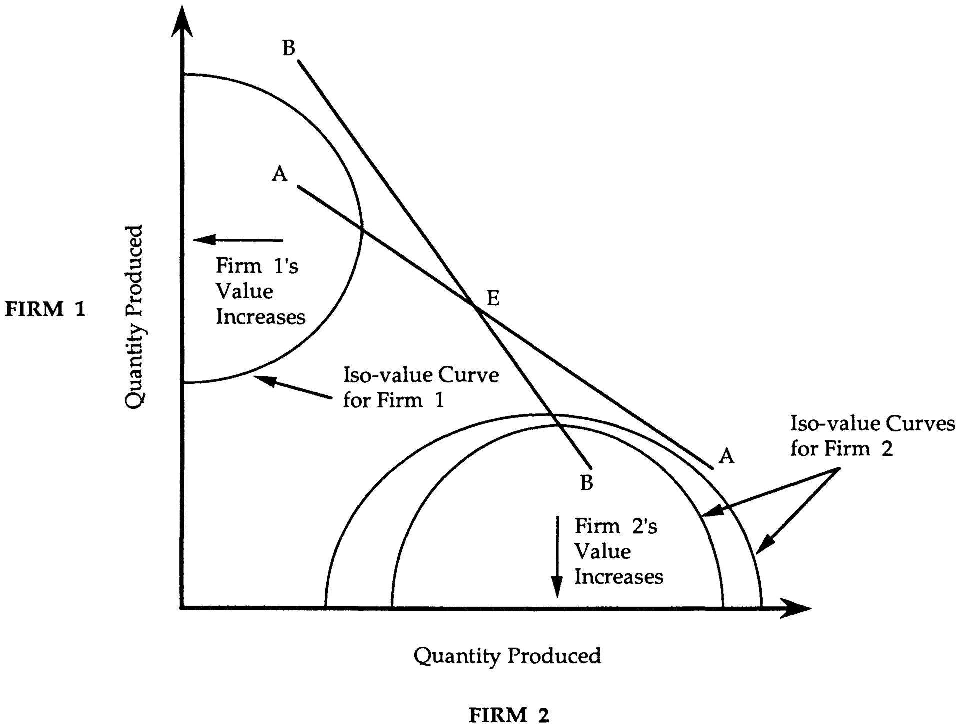

Figure 1. The equilibrium in a Cournot duopoly in the absence of loan commitments. Each firm's isovalue curves depicit levels of its own and its rival's output for which its value remains constant. AA and BB are the reaction curves for Firms 1 and 2, respectively. The reaction curve gives the optimum output of a firm as a function of the quantity produced by the rival. The equilibrium is at point E.

Definition: A set of strategies for a game is a subgame perfect equilibrium of a sequential game if and only if the strategies yield a Nash equilibrium for a subgame starting from any stage of the game.

In a subgame perfect equilibrium, firms' strategic threats are taken to be credible by rivals only if it is common knowledge that it is optimal for the threats to be executed in the event of noncompliance by rivals.

II. Bank Loan Guarantees and Industry Equilibrium

The isovalue curves are given by industry data—the properties of the demand and cost functions. By contrast, reaction functions embody the assumptions about the optimizing behavior of those agents directing the actions of the firms and about the "rules of the competition" in the particular market being considered.

To illustrate, suppose that Firm 1 announces that it will respond to Firm 2's output according to the schedule illustrated by A′A′ in Figure 2. Then, if Firm 1's announcement is held to be credible, Firm 2 will maximize its value by

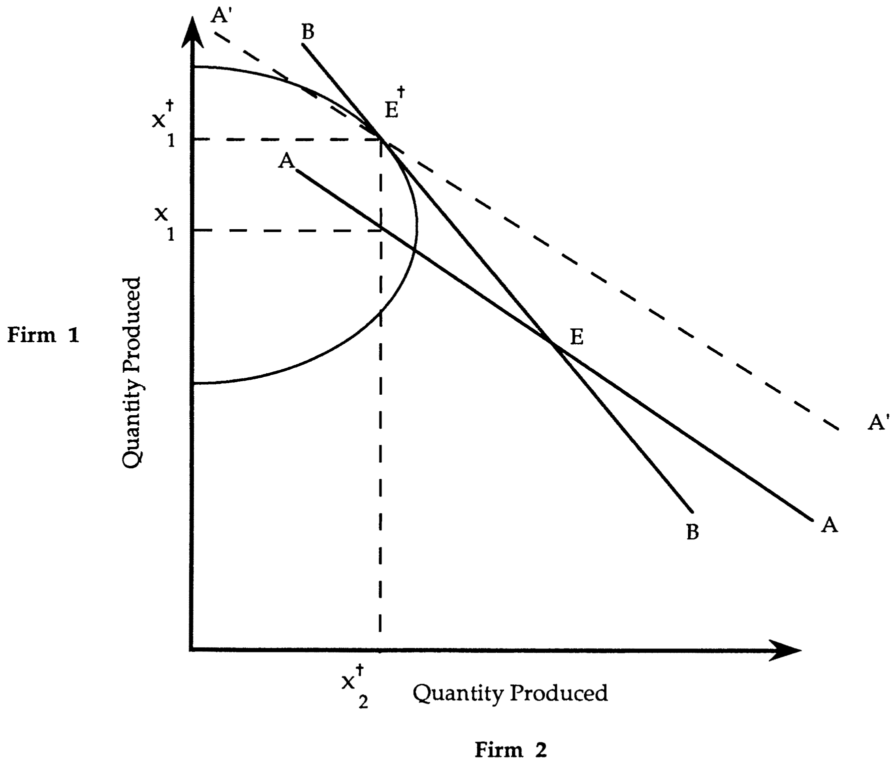

Figure 2. The equilibrium in a Cournot duopoly when Firm 1 credibly announces that its reaction function is A′A′. The equilibrium is now at point E†, the intersection of A′A′ and Firm 2's reaction function BB. As drawn, E† is also the point of tangency of Firm 1's isovalue curve and Firm 2's reaction function, i.e., the point at which Firm 1 maximizes value, taking into account the rival firm's response.

producing $x_2^\dagger$, and the equilibrium will be at $E^\dagger$. Firm 1 realizes higher profits at $E^\dagger$ than at E. Thus Firm 1 can create value and increase its market share by credibly announcing the reaction function A′A′.

However, $E^\dagger$ is not a subgame perfect equilibrium for the industry. Thus a simple announcement of A′A′ as the new reaction function is not credible. If the owners of Firm 2 were to react to 1's announcement of A′A′ by ordering the production of $x_2^\dagger$, Firm 1's owners would respond not by producing $x_1^\dagger$ to realize $E^\dagger$, but by producing x_1. This occurs because the value of Firm 1 if the production levels are $(x_1, x_2^\dagger)$ is higher than at $(x_1^\dagger, x_2^\dagger)$. Since Firm 2's owners know this they will not produce $x_2^\dagger$ in response to Firm 1's initial announcement, and equilibrium will remain at E.

The fundamental problem with Firm 1's attempt at value creation is that the choice of A′A′ is not credible. A similar situation would arise if both firms attempted to announce new, lower, reaction functions simultaneously. Both firms may be better off at the intersection of the new "reaction functions," but unless they collude openly they cannot realize this outcome in equilibrium because it is in the interest of each firm to produce on its true reaction function.

However, Firm 1 can use a bank loan commitment to make the reaction function A′A′ credible. In Figure 2 the reaction function A′A′ is only credible if Firm 1's financing costs, as perceived by the owners of Firm 2, are such that the point $(x_1^\dagger, x_2^\dagger)$ is on the reaction function of Firm 1. Since in a competitive financial market the bank must earn the market rate of return on the loan, to do this the firm must convert an optimal portion of its marginal interest costs into sunk costs. The interest rate $r^\dagger$, which enables the firm to make its threat to produce at $E^\dagger$ credible, is obtained by solving for the intercept of the reaction function A′A′.

$$x_1^\dagger = -\frac{1}{2}\,x_2^\dagger + \frac{a^* - r^\dagger}{2b}. \tag{3}$$

Such a cost structure can be achieved by the adoption of a two-part tariff in the pricing of Firm 1's bank loan. If, *before it sets its production level,* Firm 1 is able to acquire an option from its bank to borrow as much as it needs at interest rate $r^\dagger$ to respond optimally to Firm 2's production, the reaction function A′A′ is credible. In equilibrium Firm 1's total financing cost is then $TFC_1 = f + r^\dagger x_1^\dagger$, where $r^\dagger$ is obtained from equation (3), and f is the purchase price of the loan commitment.

If Firm 2 reacts along BB, the subgame perfect Nash equilibrium at $E^\dagger$ will be attained. In that case a competitive bank will be willing to offer Firm 1 the loan commitment for a rational expectations price of $f = (r - r^\dagger)x_1^\dagger$. In equilibrium the bank will break even on the loan commitment and Firm 1's value will increase.

In general, Firm 2 will not remain passive and will also attempt to create value by acquiring a loan commitment. This will induce a two-stage game in which both firms first obtain optimal loan commitments and only then compete with each other in a product market. In their attempt to gain strategic advantage in the product each firm will transform variable costs into sunk fixed costs, thereby creating a Prisoner's dilemma. The industry outcome will be a subgame perfect Nash equilibrium of the two-stage game, the second stage of which is Cournot duopoly (introduced in Section I), and the first stage of which consists of both firms simultaneously obtaining the optimal loan commitment from competitive banks.[8]

To determine the optimal loan commitment for the industry, we adopt the standard approach of solving backwards from the second stage. Let r_i, be the marginal cost of financing paid by Firm i under the terms of the loan commitment.

Stage II: Given an already determined r_i the owners of the Firm i will set production to maximize not the expression for the total value of the firm, given in (1), but:

$$\Pi_i^{\mathrm{II}}(x_1, x_2) = (a^* - b(x_1 + x_2))x_i - r_i x_i, \tag{4}$$

where the superscript II indicates the marginal cost of borrowing under the loan commitment r_i is taken as predetermined in the expression for profit. Maximizing

[8] The extension to the case of interest rate uncertainty is straightforward.

the profits of each firm yields the Nash equilibrium outputs:

$$x_1 = (a^* - 2r_1 + r_2)/3b, \tag{5}$$

$$x_2 = (a^* - 2r_2 + r_1)/3b. \tag{6}$$

Stage I: If banks set prices rationally, then the owners of both firms know that they will ultimately bear the total cost of producing their outputs. Thus to determine the terms of the equilibrium loan commitment it is necessary to substitute for x_1 and x_2 from (5) and (6) into (1) to obtain the value of each firm in terms of r_i, for $i = 1, 2$, the marginal cost of financing. Maximizing $\Pi_i(r_1, r_2)$ with respect to r_i yields the reaction function for Firm i in $r_1 - r_2$ space over the interval $r_i \in [0, r]$:

$$r_i = -\frac{1}{4} r_j + \frac{6r - a^*}{4} \quad \text{for} \quad i \neq j. \tag{7}$$

Figure 3 depicts the reaction functions of both firms in $r_1 - r_2$ space. As shown, there exist equilibrium interest rates r_1^* and r_2^*. Given r_1^* and r_2^*, the equilibrium

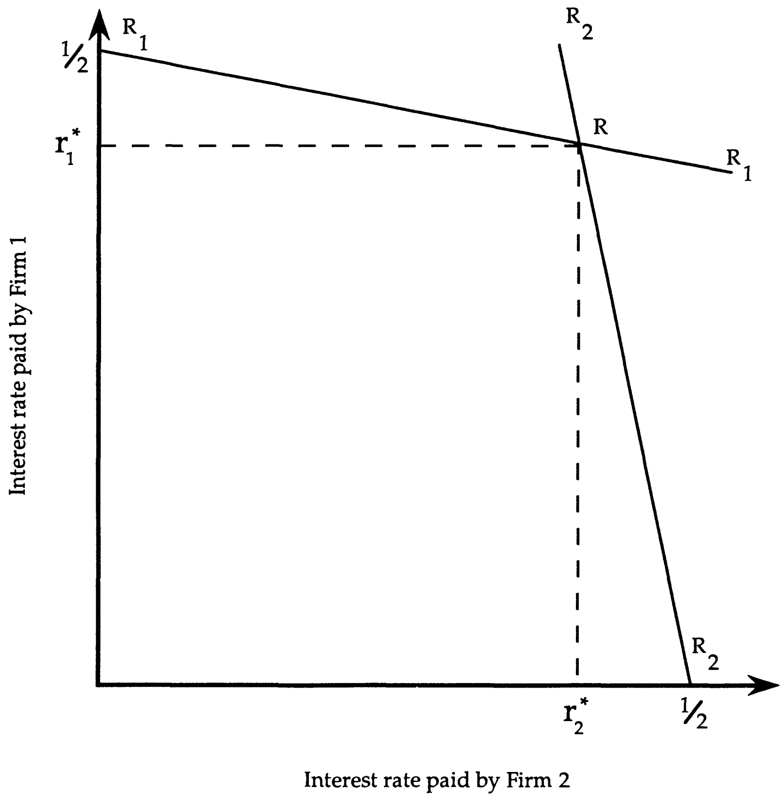

Figure 3. The equilibrium choice of contract terms. R_1R_1 and R_2R_2 depict the optimal choice of interest rate associated with the loan commitment as a function of the rival firm's choice for Firm 1 and Firm 2, respectively. The equilibrium occurs at R.

production levels are derived from (5) and (6). The firm values are obtained by substituting the equilibrium values of x_1 and x_2 into (1). The required fixed payment to acquire the bank loan commitment, f_i, is then calculated from the expression $(r - r_i^*)x_i(r_1^*, r_2^*)$.

The equilibrium depicted in Figure 3 is an interior one. It can be shown that the equilibrium interest rate on the commitment is:

$$r_i^* = r - (a^* - r)/5.$$

The equilibrium marginal cost is lower than r for feasible market structures (i.e. for $a^* > r$). It can be shown that both firms make profits in symmetric equilibrium if:

$$r^* > r - (a^* - r)/2.$$

Thus, the equilibrium is feasible. In equilibrium, output is higher and firms are worse off than if they had not been able to obtain bank loan commitments. This follows from the concavity of $\Pi_i(r_1, r_2)$ in r_i and can be verified by direct calculation.[9]

A crucial feature of the model is that banks are willing to enter into an agreement to supply an indefinite amount (i.e., sufficiently large) of financing at a constant rate below r.[10] The banks do this because they can solve for the equilibrium demand for the input by each of the duopolists, conditional on the existence of the bank loan commitment, and are thus able to price the commitment correctly. At the same time the duopolists are able to make credible threats to produce at disequilibrium levels at the same low cost per unit thereby policing the equilibrium and ensuring that the commitments are correctly priced.[11] Such threats would not be credible in the absence of (partial) third-party financing of production at the margin.

[9] The negative effect on the firm's equilibrium profits of its ability to enter into contracts with third parties has also been obtained in other contexts by Brander and Lewis (1986) and Maksimovic (1986, Sections III.3–III.9). Their analysis relied on bankruptcy to alter the equityholders' incentives. Thus, since there was no uncertainty at the time the output decision was made, the financing strategies they analyzed would not affect equilibrium in our model. The analysis presented here can, however, be directly generalized to the case of uncertainty.

[10] In this model the interest rate is constant for all levels of production. In practice it may vary with the size of the loan. All that is necessary is that the loan commitment permit the firm to borrow at better terms than would be available to it on the spot market at the time at which it needs to respond to a rival's output decision. In Boot, Thakor, and Udell (1987a) loan commitments also permitted the firm to borrow at a rate below spot. As noted above, in their model this enabled the firm to avoid investment distortions that would otherwise have been caused by the risk of future high rates.

[11] In principle suppliers of other inputs can negotiate similar "supply commitments" with customers. However, accurate pricing of such commitments requires the knowledge of the customer's obligations, an ability to forecast industry outcomes, and a reputation for honoring contracts. In general, these abilities will be most highly developed by financial intermediaries. Loan commitments also permit the firm flexibility by allowing it to choose which inputs to acquire in response to a rival's move.

III. Industry Size and the Equilibrium Loan Commitment

The analysis can be generalized to obtain the terms of the equilibrium loan commitment and the effect on firm profits for industries with n firms. Now in Stage II, Firm i, where $i = 1, \cdots n$ maximizes:

$$\Pi_i^{\mathrm{II}}(x_1, \cdots, x_n) = (a^* - b \textstyle\sum_{j=1}^n x_j)x_i - r_i x_i, \tag{8}$$

where, as before, the firm takes the marginal cost of borrowing the firm faces under the loan agreement r_i, as given. As in the two-firm case, the quantity produced in equilibrium can be obtained by maximizing Π_i^{II} with respect to x_i and simultaneously solving for x_i, $i = 1, \ldots, n$. This yields:

$$x_i(r_1, \cdots, r_n) = \frac{a^* - nr_i + \sum_{k\neq i}^n r_k}{(n+1)b}, \qquad i = 1, \cdots, n. \tag{9}$$

By inspection of (9) it can be seen that as the rate of interest the firm pays increases, it produces less in equilibrium. In contrast, as the rivals' marginal cost of financing increases, the firm produces more.

As before, competitive banks can calculate the equilibrium demand for loans and price the loan commitment accordingly. The firms therefore pay the fair market price r for the funds they borrow in equilibrium. Thus in Stage I the firm's profit can be expressed as a function of the outputs of all the firms, which in turn depend on the marginal cost of borrowing under the loan agreement, and on the spot rate of interest r as:

$$\Pi_i^{\mathrm{I}}(r_1, \cdots, r_n) = (a^* - b \textstyle\sum_{j=1}^n x_j(r_1, \cdots, r_n) - r)x_i(r_1, \cdots, r_n), \tag{10}$$

where $x_i(r_1, \cdots, r_n)$ is given in equation (9), and the superscript I indicates that the expression for profit takes into account the total cost of financing production. It is again individually rational for each firm to negotiate a loan commitment so that $r_i < r$. The equilibrium interest rate that results when all firms obtain the optimal loan commitment can be determined by finding r_i^*, $i = 1, \cdots, n$, that jointly solve:

$$\frac{\partial \Pi_i^{\mathrm{I}}}{\partial r_i}(r_1^*, \cdots, r_n^*) = 0. \tag{11}$$

The solution yields:

$$r_i^* = r - \frac{n-1}{n^2+1}(a^* - r). \tag{12}$$

This expression can be rearranged to show the reduction in each firm's marginal cost of borrowing resulting from the loan commitment:

$$r - r_i^* = \frac{n-1}{n^2+1}(a^* - r). \tag{13}$$

As the number of firms in the industry increases, the equilibrium interest rate on the loan commitment approaches the spot market rate. This occurs because the firm's ability to induce its rivals to reduce output by credibly committing to overproduce is diminished as their number increases. As the number of firms becomes larger, the increased output of a firm that obtains a loan committment with a low marginal interest rate is not matched by a sufficient decrease in the rivals' output, and the resulting price fall lowers the firm's profit. Hence each firm will find it individually rational to agree to a higher marginal cost of financing in its loan commitment and to thereby commit not to overproduce at Stage II.

As in the two-firm case, the loan commitments, while individually rational, result in a decline in the firms' profits in equilibrium. The extent of this decline depends on the number of firms in the industry and can be obtained by comparing the equilibrium profit of a representative firm $\Pi_i(r_1^*, \cdots, r_n^*)$ with that which would obtain if the loan commitment contract were not permitted $\Pi_i(r, \cdots, r)$. From equation (10) we obtain:

$$\Pi_i^{\mathrm{I}}(r_1^*, \cdots, r_n^*) = \frac{n(n+1)^2}{(n^2+1)^2} \Pi_i^{\mathrm{I}}(r, \cdots, r). \tag{14}$$

Define θ to be $n(n+1)^2/(n^2+1)^2$, the proportional decline in profit as a result of the loan commitment. Then:

$$\frac{\partial \theta}{\partial n} = \frac{n+1}{(n^2+1)^3}\,[1 + 3n(1 - n - n^2)]. \tag{15}$$

This expression is negative for all positive integers n. Thus, the introduction of loan commitments has a diminishing effect on profits as the number of firms in the industry increases.

So far we have assumed that all the n firms in the industry have access to loan commitments. This may not be the case if the firms differ in their preexisting liabilities or if differences in their internal monitoring systems make banks reluctant to enter into such agreements with some potential borrowers. We can examine the industry equilibrium that would result if only m, where $m \leq n$, firms are able to obtain bank loan commitments, and the remaining firms borrow in the spot market. Assuming that the first m firms can obtain optimal loan commitments, and holding the interest rate paid by the remaning $n - m$ firms at r, from (11) we obtain:

$$\rho_i = r - r_i^* = \frac{n-1}{n+1+m(n-1)}\,(a^* - r), \qquad i = 1, \cdots, m. \tag{16}$$

The magnitude of the reduction of the marginal cost of financing depends on both the number of firms in the industry, as before, and also on the number with access to loan commitments. As $\partial \rho_i/\partial m < 0$, the reduction becomes smaller as the number of firms with loan commitments increases. Firms that obtain loan commitments become more aggressive competitors and increase their outputs. If the reduction remained constant as the number of firms with commitments increased, the firms with commitments would produce too much in Stage II, driving profits down. To avoid this each firm would find it individually rational to accept a lower reduction at the time the commitment is acquired.

The effect of loan commitments on the profits of firms obtaining them is given by:

$$\Pi_i^{\mathrm{I}}(r_1^*, \cdots, r_m^*, r, \cdots, r) = \frac{n(n+1)^2}{(n+1+m(n-1))^2}\, \Pi_i^{\mathrm{I}}(r, \cdots, r),$$
$$i = 1, \cdots, m \quad (17)$$

From equation (16) it can be seen that as the number of firms acquiring commitments m increases, the profits of those firms that possess commitments m increases, the profits of those firms that possess commitments decline. However, if sufficiently few firms in the industry have loan commitments, the profits of these firms may be higher than they would have been if no firm had access to loan commitments. While loan commitments cause those rivals that possess them to be tougher competitors, firms with commitments gain as a group at the expense of firms that do not have commitments. These two effects act in opposite directions, and the one which predominates depends on the number of firms with loan commitments. The firms with commitments will gain if $\Pi_i^{\mathrm{I}}(r_1^*, \cdots, r_m^*, r, \cdots, r) > \Pi_i^{\mathrm{I}}(r, \cdots, r)$. Letting $\hat{m}$ be the maximum number of firms that can gain obtain loan commitments and still realize greater profits than if loan commitments were not available:

$$\frac{n(n+1)^2}{(n+1+m(n-1))^2} > 1 \Rightarrow \hat{m} < \frac{n+1}{n-1}(\sqrt{n}-1). \quad (18)$$

If a sufficiently small proportion of firms, $(\hat{m}/n)$ are able to obtain loan commitments, these firms will experience an increase in profits. Since $\partial\hat{m}/\partial n > 0$, this proportion is greater in industries with a larger number of firms. The remaining $n - m$ firms without loan commitments realize a profit of:

$$\Pi_i^{\mathrm{I}}(r_1^*, \cdots, r_m^*, r, \cdots, r) = \frac{(n+1)^2}{(n+1+m(n-1))^2}\, \Pi_i^{\mathrm{I}}(r, \cdots, r),$$
$$i = m+1, \cdots, n, \quad (19)$$

which is unambiguously lower than it would be in the absence of loan commitments for all $m > 0$ and decreases as the number of firms with commitments increases.

IV. Conclusion

This paper provides an explanation for the prevalence of loan commitments. It was shown that bank loan commitments can be used by individual firms from imperfectly competitive industries to increase profits. Loan commitments are of value to the firm because they permit it to threaten to produce a greater quantity than it otherwise would in response to the rival's output decision and so improve the firm's strategic position. The threat is credible because the loan contract commits the bank to provide financing on terms which subsidize the firm in carrying out its threat. It was also shown that when all the firms attempt to create value by acquiring bank loan commitments they are worse off than they would be if commitments were unavailable. However, despite the resulting decline in profits of all firms in equilibrium, it is always individually rational for each firm to acquire a bank loan commitment. The model differs from those that have been offered previously in that the results were obtained in a model where all the agents are fully informed and risk-neutral, and the contracts are rationally priced. Even in this framework the structure of the loan contract is relevant, and financial market arbitrage on a firm-by-firm basis cannot restore irrelevancy.

The explanation for loan commitments advanced here is in accord with the practitioner's view as reported by James (1981) that loan commitments assure borrowers of ready availability of credit even if the borrower's financial position deteriorates (perhaps as a result of increased production by rivals). The model has several directly testable empirical predictions about the terms of the equilibrium loan commitment. First, the model predicts that all firms in an industry will wish to purchase commitments. Second, as the number of firms in the industry increases the equilibrium interest rate on the commitment approaches the spot rate. Third, if only some of the firms are able to acquire loan commitments, the interest rates on the commitments will be lower than would have been the case if all firms were able to obtain them. The higher the proportion of firms with loan commitments, the higher the interest rate. The model also predicts that the acquisition of a competitively priced loan commitment will affect the market value of firms. If all the firms in an industry are able to purchase commitments the value of all the firms will decline. This effect is greater the smaller the number of firms in the industry. If only a few firms in an industry are able to purchase commitments the effect on value is ambiguous. When the proportion of firms obtaining commitments is small the value of those firms will increase, and the value of the firms without commitments will fall. If the proportion acquiring commitments is large the value of all firms is reduced, with the firms not obtaining commitments experiencing larger declines.

The results of this paper indicate that the analysis of contractual arrangements between banks and borrowers should be extended to take into account market structure of the industries to which the borrowers belong. The insight that the availability of bank commitments introduces a new dimension to the competition between firms and that firms will attempt to gain advantage by obtaining commitments can be applied to a wide range of strategic options facing the firm. Thus, for example, the approach can be adapted to design equilibrium financing strategies and derive the resulting announcement effects for firms facing entry into their markets by a competitor or for firms embarking on a strategy of predatory pricing.

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