The Long-run Equilibrium of the Consumer Loan Market†

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Abstract

We investigate whether non-banks excessively or insufficiently enter the consumer loan market. Not only large non-banks such as Acom, Takefuji and Promise, but many small ones operate in the Japanese consumer loan market. These non-banks borrow most of the necessary funds from a few financial institutions such as banks and insurance companies. The market structure observed between these non-banks and firms that supply funds to them is a market with a vertical structure. Therefore, we developed a model of consumer loan markets as an oligopolistic market with a vertical structure, i.e. one upstream monopolistic bank and multiple non-banks. We show that non-banks insufficiently enter the consumer loan market in the long-run equilibrium. This result contrasts the well known “excess entry” theorem.

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1. Introduction

Recently, some banks have been trying to supply an unsecured loan to individual consumers as a new profitable business besides a loan to firms. Until now, consumer loan companies (non-banks) mainly supply an unsecured loan to individual consumers. In the Japanese consumer loan market, there are some large non-banks such as ACOM, TAKEFUJI and PROMISE. Historically, many new firms entered this market to look for a profit, and many incumbents could not make a positive profit and exited from it. In the long-run equilibrium after many firms enter the market and exit from it, are there a sufficient number of non-banks surviving in the consumer loan market from the viewpoint of social welfare?

Mankiw and Whinston [4] (1986), Suzumura and Kiyono [7] (1987) and others analyzed welfare property of the long-run equilibrium in the oligopoly market where firms compete in a Cournot fashion, that is, each firm chooses its output to maximize its own profit given other’s output.† They showed that the excess entry theorem is valid in the long-run equilibrium after no more entry and exit of firm occurs. This theorem states that more firms survive in the long-run equilibrium than in the second best equilibrium that maximizes the

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social welfare. In their research, they assumed that the output market is oligopolistic but ignored the market structure of the input market.

The consumer loan companies borrow most of the necessary funds from few financial institutions such as banks and insurance companies. These firms possess a market power against the consumer loan companies. Because the market where consumer loan companies raise the fund is not competitive, we should also examine the market that consumer loan companies raise the fund as well as the consumer loan market if we evaluate the consequence in the long-run equilibrium of the market.

A market structure observed between the consumer loan companies and the firms supplying funds to them is called a market with vertical structure. The structure means that an oligopoly market structure exists in both two markets (an upstream market and a downstream market) that have a vertical relation such as intermediate goods and final goods markets or wholesale and retail markets, and so on. Usually, researchers suppose that the supply sides possess a market power both in the upstream and the downstream markets and investigate both markets. There are many studies about a successive oligopoly that analyze the effect of the vertical integration, the efficiency of the exclusive territory, and the optimal franchise fee etc. However, there are very few researches that examine whether or not there are a sufficient number of firms under the oligopoly with vertical structure. Kühn and Vives [2] (1999), Ghosh and Morita [1] (2007) are such few examples.

Kühn and Vives [2] (1999) assume that the upstream market is a monopoly and the downstream one is a monopolistic competition, and show that vertical integration enhances the economic welfare under a specific condition. In this case, the vertical integration has the same effect as an entry regulation into the downstream market. Ghosh and Morita [1] (2007) suppose that in both the upstream and the downstream markets, the firms play a Cournot competition, and show that in the long-run equilibrium new firms may enter insufficiently the upstream market from the viewpoint of social welfare if the number of firms in the downstream market is fixed.

We examine whether or not in the long-run equilibrium there are a sufficient number of non-banks in the consumer loan market from the viewpoint of social welfare. We suppose that the consumer loan industry has a vertical structure. That is, in the downstream market, non-banks supply loan to individual consumers and engage in Cournot competition while in the upstream market, monopoly firm provides the fund to these non-banks.

The rest of the paper is organized as follows: In the next section, we develop the model. In section 3, we examine the short-run equilibrium of this model in which the number of operating non-banks is fixed. Then we investigate the long-run Cournot equilibrium in which the entry-exit of non-banks is possible. In section 5, we characterize the second best equilibrium that maximizes the social surplus, and compare the result with that of the long-run Cournot equilibrium.

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[2] For example, the balance sheet of ACOM shows that it mainly raises a long-term fund from banks such as Mitsubishi Trust Bank and life insurance companies such as Meiji Yasuda Life Insurance Company.
2. The Model

We develop a model of consumer loan market with vertical structure. In this market, there are identical non-banks (down-stream firms) such as consumer loan companies in Japan. They raise the fund by borrowing from a upstream firm such as banks or organizations to invest, and supply an unsecured loan to individual consumers. We assume that there is a monopolistic supplier in the upstream market. Non-banks have to borrow the necessary fund from this firm at the interest rate \( r_b \) that it settles. Then non-banks lend consumers money at the rate of interest \( r \). We assume that non-banks also incur a fixed cost, \( f \), to lend money in addition to raising the fund. The cost function of the non-bank \( i \) is expressed as follows.\(^3\)

\[
C_i(x_i) = r_b x_i + f
\]

(1)

We assume that the market of consumer loan is oligopolistic and the non-banks engage in Cournot competition. Each non-bank decides its volume of loan to maximize its profit, given the loan of the others and \( r_b \). The demand for consumer loan is

\[
r(X) = a - X,
\]

where \( X \) is the sum of loans of all the non-banks and \( r \) shows the interest rate of loan. We assume that \( a > 4 \sqrt{f} \). The assumption means that the market size of consumer loan is sufficiently large compared with the fixed cost of each non-bank. It is assumed that the upstream firm has no other use of the fund that it possesses. Then, there is no opportunity cost of the fund for the upstream monopolist. This firm settles the interest rate \( r_b \) of the loan to the non-banks and lend as much as they demand.

We examine a two-stage game. In the first stage of the game, the firm providing the fund settles the level of \( r_b \). In the second stage of the game, the non-banks choose the volume of the loan to consumers, given the loan of other non-banks and \( r_b \).

3. The short-run Cournot equilibrium

We examine the short-run Cournot equilibrium in which the number of non-banks \( N \) is invariant in the market. To compute the equilibrium, we backwardly solve the game from the second stage. After observing \( r_b \), the non-bank \( i \) chooses its loan volume so as to maximize its profit given the loan of others. At the second stage, since \( r_b \) is given, the profit \( \pi_i \) of non-bank \( i \) is given by

\[
\pi_i(x_i) = [1 + r(X)] x_i - (1 + r_b) x_i - f = (a - r_b - X) x_i - f.
\]

(3)

Differentiating the equation (3) gives the first order condition of profit maximization.

\[
\frac{\partial \pi_i}{\partial x_i} = a - r_b - X - x_i = 0
\]

(4)

\(^3\) For the simplicity of analysis, we ignore the default risk of consumer loan that non-banks supply, although the existence of the risk plays an important role in the consumer loan market. It is the theme of future research to incorporate the default risk into our model.
Equation (4) implies that $x_i = x_j = x$ because $x_i = a - r_b - X$. Equation (4) gives the loan of each non-bank

$$x = \frac{1}{N+1} (a - r_b).$$  

(5)

The sum of the fund (that is, the sum of loan) that non-banks require is also the function of $r_b$, and expressed as follows.

$$X(r_b) = \frac{N}{N+1} (a - r_b)$$

(6)

We turn to the first stage of the game. The upstream firm chooses the interest rate $r_b$ so as to maximize its profit by taking account of the fund demand function of the non-banks (equation (6)). Its profit $\pi_b$ becomes the function of $r_b$.

$$\pi_b(r_b) = r_b X(r_b)$$

$$= \frac{N r_b (a - r_b)}{N+1}$$

(7)

We differentiate the equation (7) and obtain the first order condition of profit maximization.

$$\frac{d\pi_b}{dr_b} = -\frac{N}{N+1} (a - 2 r_b) = 0$$

(8)

The equation (8) gives the interest rate that the firm providing fund settles.

$$r_b = \frac{a}{2}$$

(9)

Note that $r_b$ does not depend on the number of downstream non-banks. Substituting $r_b$ in the equations (5) and (6), we obtain the fund required by the non-bank $i$ and all the non-banks respectively.

$$x_i = \frac{a}{2(N+1)}$$

(10)

$$X = \frac{Na}{2(N+1)}$$

(11)

We find that the profit of the non-bank $i$ is

$$\pi_i = \frac{a^2}{4(N+1)^2} - f.$$  

(12)

### 4. The long-run Cournot equilibrium

We derive the long-run Cournot equilibrium where non-banks can enter (exit from) the market. In the short-run equilibrium in which the number of non-banks is fixed, they might enjoy a positive profit. Then, new non-banks enter the market to seek possible profit. On the contrary, if an incumbent non-bank loses, it exits from the market. New non-banks enter the market or the incumbent exits as long as they earn positive profit or loss. When incumbent non-banks earn zero-profit, neither entry nor exit behaviors occur. This is the long-run Cournot equilibrium.

The equations (10) and (12) give the profit of the non-bank $i$ as the function of the number
of non–banks.

\[ \pi_t(N) = [x_t(N)]^2 - f \]  
(13)

We differentiate the equation (13) with respect to the number of the non–banks \( N \) and obtain

\[ \pi_t'(N) = 2x_t(N)x_t(N) = -\frac{a^2}{2(N+1)^2} < 0. \]  
(14)

Because \( a > 4\sqrt{f} \) we have

\[ \pi_t(1) = \frac{a^2}{16} - f > 0. \]  
(15)

Because \( \lim_{N \to \infty} \pi_t(N) = -f < 0 \) holds, the equilibrium profit is negative when there are a huge number of non–banks. Figure 1 illustrates the relation between \( \pi_t \) and \( N \).

Figure 1 teaches us there is a unique number \( N_e \) of the non–banks that satisfies \( \pi_t(N_e) = 0 \). That is, \( N_e \) is the number of long–run Cournot equilibrium. The equation (12) and the zero profit condition give \( N_e \) as

\[ N_e = \frac{a}{2\sqrt{f}} - 1. \]

We show the following lemma:

**Lemma:**

The unique long–run Cournot equilibrium exists. The equilibrium number of the firms \( N_e \) is given by \( N_e = a/2\sqrt{f} - 1. \)
5. The efficiency of long-run Cournot equilibrium

We evaluate the long-run Cournot equilibrium from the viewpoint of social welfare. To this end, we derive the second best equilibrium when the regulatory agency can control the number of operating non-banks, but can not intervene the oligopolistic behavior of each non-bank. Then we compare the result with that in the long-run Cournot equilibrium.

The regulatory agency tries to maximize the social surplus. The social surplus is the sum of the profit of the firm providing fund, the whole profit of non-banks, and the consumer surplus. When there are \( N \) non-banks in the market, the social surplus \( W(N) \) is defined as follows:

\[
W(N) = r_b X + N(r x_i - r_b x_i - f) + \int_0^{X(N)} r(s) ds - rX
= \int_0^{X(N)} r(s) ds - Nf
\]  

We differentiate the equation (16) with respect to \( N \) and examine the effect of the number of non-banks on the social surplus.

\[
W'(N) = r'(X(N)) X'(N) - f \tag{17}
\]

\[
W''(N) = r'(X(N))[X'(N)]^2 + r(X(N))X''(N) \tag{18}
\]

The second order condition \( W''(N) < 0 \) holds, because \( r'(X) = -1 \) and \( X''(N) = \frac{a}{(N+1)^3} < 0 \). We denote the second best number of firms by \( N_{sb} \) that satisfies \( W'(N_{sb}) = 0 \).

Evaluating \( W'(N) \) at \( N = N_{sb} \), we have the following result.

\[
W'(N_{sb}) = \frac{(N_{sb} + 2)a^2}{4(N_{sb} + 1)^3} - \frac{a^2}{4(N_{sb} + 1)^2} \tag{19}
\]

\[
= \frac{a^2}{4(N_{sb} + 1)^2} > 0
\]

We summarize the above results and have the following proposition.

**Proposition (Insufficient Entry Theorem):**

In the long-run equilibrium of the consumer loan industry, non-banks insufficiently enter the downstream market from the viewpoint of social welfare when a monopolistic firm operates in the upstream market.

When non-banks raise fund at the fixed interest rate, or there is no vertical structure, we can show that non-banks excessively enter the market from the welfare viewpoint. That is, the excess entry theorem is concluded. However, if we consider the upstream market where the firm provides the fund to non-banks in addition to the consumer loan market, the result is quite contrary as we have shown.

We explain why insufficient entry occurs in our model. The consumer loan industry consists of the upstream market where non-banks raise their fund and the downstream market where they supply a loan to individual consumers. Consequently, the number of non-banks in the downstream market (consumer loan market) influences the welfare in the upstream market (raising fund market). The firms in the downstream market exert exter-
nality on the firm in the upstream market through their behavior.

We decompose the total welfare into the welfare in the upstream market \( W_u(N) \) and that in the downstream market \( W_d(N) \). That is,

\[
W(N) = W_u(N) + W_d(N)
\]

(20)

where

\[
W_u(N) = r_NX,
\]

(21)

\[
W_d(N) = \int_0^{X(N)} r(s) ds - r_NX - Nf.
\]

(22)

We differentiate the equations (21) and (22) with respect to \( N \) and examine the effect of the number of non-banks on the welfare in the both markets.

\[
W_u'(N) = \frac{a^2}{4(N+1)^2} > 0
\]

(23)

\[
W_d'(N) = \frac{a^2}{4(N+1)^2} - f
\]

(24)

The equation (23) shows that the welfare in the upstream market (that is, the profit of the firm providing fund) is enhanced if there are more non-banks, because the upstream demand increases with the number of non-banks. That is, the behavior of the firm in the downstream market generates positive external effect.

We evaluate the marginal change of the social welfare in the downstream market at the long-run Cournot equilibrium number of non-banks \( (N_e) \) and obtain

\[
W_d'(N_e) = f\left(\frac{2\sqrt{f}}{a} - 1\right) < 0.
\]

(25)

The equation (25) indicates that in the long-run equilibrium, the social welfare in the downstream market deteriorates if a new firm enters the market as the excess entry theorem show. On the other hand, we have

\[
W_u'(N_e) = f > 0,
\]

when we evaluate the marginal change of the social welfare in the upstream market at the long-run equilibrium number of non-banks. Consequently, the sum of the effect that the entry of a new non-bank has on the social welfare of both markets is as follows.

\[
W'(N_e) = W_u'(N_e) + W_d'(N_e)
\]

\[
= \frac{2f\sqrt{f}}{a} > 0
\]

The positive external effect in the upstream market dominates the negative effect in the downstream market and in the long-run equilibrium, there are insufficient number of non-banks in the market from the viewpoint of social welfare (that is, the insufficient entry theorem holds).

6. Concluding remarks

In the theory of industrial organization, many researchers are interested in whether or not there are a sufficient number of the firms in the oligopoly market in the long-run
equilibrium from the viewpoint of social welfare. It is indicated that in the long-run equilibrium, Cournot competition in the oligopoly market result in more firms than in the second best equilibrium. This result is valid when we are only interested in output market or assume that the factor markets are competitive.

There are not many non-banks in the consumer loan industry. They mainly raise the necessary fund for lending from few financial institutions such as banks. So the non-banks raise their fund not in a competitive market but in an oligopolistic one, and the firms providing the fund have a market power, that is, the industry is considered a successive oligopoly. A successive oligopoly means that an oligopolistic market structure is observed in both markets that have vertical relation such as intermediate goods and final goods markets. Because the consumer loan industry is in a situation of a successive oligopoly, it is necessary to analyze an upstream market (of raising fund) in addition to a downstream one if we examine whether or not there are a sufficient number of non-banks from the standpoint of social welfare.

We construct the following successive oligopoly model that consists of a raising fund market in addition to a consumer loan market, and investigate theoretically whether or not there are a sufficient number of non-banks in the long-run Cournot equilibrium from the standpoint of social welfare. In the downstream market (of consumer loan), non-banks choose their loan volume to consumer so as to maximize their profit given the other’s loan. In the upstream market (of raising fund), a monopolistic firm settles the interest rate of lending fund and supplies as much as these non-banks require.

We compare the number of non-banks in the long-run Cournot equilibrium with that of the second best equilibrium that maximizes the social surplus. We confirm that there are fewer non-banks in the long-run Cournot equilibrium than in the second best equilibrium if we take into consideration the market of raising fund in addition to consumer loan market. This result is contrary to the excess entry theorem. The excess entry theorem shows that there are more firms in the long-run equilibrium than in the second best equilibrium that maximizes the social surplus. This theorem is valid when only a consumer loan market is of our interest and the analysis does not contain a market of raising fund. Our result indicates that it is important to take into consideration both markets in the successive oligopoly.

References