Financial Globalization and the Roles of Competition-Restriction Policies*

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Abstract

This paper examines the effects of globalization on efficiency of fund allocation and the roles of competition-restriction policies through constructing a simple general equilibrium model of financial markets without credit rationing, which consists of loan markets with both perfect and imperfect information about borrowers' repayment possibilities, a deposit market, a call market and an international debt market. The main results are that the combination of entry restriction for large banks and prohibition on the international debt flow has a potential for increasing welfare, and that its potentiality is higher under conditions characteristic of developing countries. These conclusions show that even if there were no moral hazard in banking, credit rationing and instabilities stemming from international capital markets, globalization would not necessarily has positive effects on the efficiency of fund allocation if only adverse-selection effect exists in a part of domestic loan markets.

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1. Introduction

In this paper I examine the effects of globalization on the efficiency of fund allocation and the roles of competition-restriction policies. For that purpose, I construct a simple general equilibri-

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um model of financial markets without credit rationing, which consists of loan markets with both perfect and imperfect information about borrowers' repayment possibilities, a deposit market, a call market and an international debt market.

My main purpose is to bring out the implications for financial globalization[1] of thought that the existence of adverse-selection effect in loan markets may induce under-credits, which Stiglitz and Weiss (1981) showed as credit rationing, Mankiw (1986) illustrated as financial collapse in the first place and many studies have developed, by extending the domestic general equilibrium model which Domae (2000) proposed. The model presented here is close in spirit to those of Hellmann, Murdoch, and Stiglitz (1997, 2000). The common theme is that competition restriction policies can often have the effect of improving welfare. While those papers note the effects of giving banks the opportunity to create excess profit through deposit-rate controls for prudent bank behaviour, we note the re-allocation effects of funds between loan markets with imperfect information and others through differential entry restrictions for efficiency.

The theoretical results are as follows: (1) if the international debt flow is prohibited, the government can increase total surplus through entry restriction for large banks. In addition, the larger the degree of imperfect information is and the smaller the interest elasticity of demand for deposit is, then the number of optimal large banks is the smaller. (2) If the international debt flow has been liberalized, the government can increase total surplus through loosing entry restriction for large banks. (3) If the foreign interest rate is lower than the domestic one, the liberalization of international debt flow increases total surplus. If the foreign interest rate, however, is higher than the domestic one, the possibility that the liberalization of international debt flow may decrease total surplus appears. These imply that the combination of entry restriction for large banks and prohibition of international debt flow, which reduces domestic interest rates, has a potential for increasing total surplus, and that its potentiality is higher under conditions characteristic of developing countries.

Many studies that note the problems of financial globalization, insist on the importance of moral hazards in banking[2], credit rationing[3] and instabilities stemming from international capital markets[4]. But these conclusions suggest that even if there were no such problems, globalization would not necessarily has positive effects on the efficiency of fund allocation if only adverse-selection effect exists in a part of domestic loan markets.

1） In this paper I focus on loosening entry-restriction for foreign banks and liberalization of international debt flow.

2） See, for example, Hellmann, Murdoch, and Stiglitz (1997, 2000), Mishkin (2001).

3） See, for example, Stiglitz and Greenwald (2003).

4） See, for example, Eatwell and Taylor (2001), Tirole (2002), Henry and Lorentzen (2003).

The results emphasized here, while being the natural consequences of asymmetric information, often escape unnoticed. Understanding these conclusions, however, would help to recognize the effects of financial globalization and the roles of competition-restriction policies. In addition, it seems rare to analyze these themes from the viewpoint of efficiency by constructing a general equilibrium model without credit rationing, which includes loan markets with both perfect and imperfect information. In that sense, this article presents some new points of view for competition-restriction policies under the present rapid progress of globalization.

The rest of this paper is organised as follows: Section 2 presents the basic model. Section 3 examines the effects of entry restriction for large banks on economic welfare. Section 4 examines the effects of liberalization of international debt flow. Section 5 brings out some implications.

2. The Model

2. 1 Basic Assumptions

I adopt following 15 assumptions.

[1] There are 4-typed markets domestically, which are a loan market for large firms, a loan market for small and medium-sized firms, a deposit market and a call (inter-bank) market. In addition, there is an international debt market, in which only banks can participate.

[2] There are many large, small and medium-sized firms. Each has one project, which is indivisible.

[3] The scale of funding necessary for a large firm's project is large enough for banks to bear the cost of screening and monitoring. The scale of funding necessary for a small and medium-sized firm's project, however, is not large enough for banks to do so sufficiently.

This suggests that banks can know each borrower's repayment probability in a loan market for large firms, but not know it in a loan market for small and medium-sized firms.

[4] The scale of loan for each firm per bank is variable to be small one.

This means that several banks are able to lend to a firm.

[5] The return of project is a stochastic variable. Each return per fund (1+the rate of return) is as follows: R (>1) if successful and 0 if a failure. The combinations of R and success probability p ($\in(0, 1]$) are variable across firms.

[6] Firms are risk-neutral, have no alternative option other than borrowing from domestic loan markets to finance their projects and no collateral.

This implies that a firm's repayment probability is equal to the probability of the success of the firm's project.

[7] The success return of a large firm's project (and R_s) is distributed uniformly[5]. Every

success probability of a large firm's project (p_l) is equal in value. Banks can know these without too much screening.

This suggests that the success probability of a large firm's project becomes common knowledge. This is to simplify the analysis and it is easy to expand the analysis into one, which assumes that the number of large firm's success probabilities is many[6]. It should be noticed that banks are not able to know each firm's success probability without further screening in more general cases.

[8] The success return of each small and medium-sized firm's project (and R_s) is distributed continuously. This has a relation to the success probability (p_s) as follows: $p_s = p_s(R_s)$, $p'_s < 0$, $\eta_{P_sR_s} \equiv -(R_s/p_s)\cdot p'_s < 1$ ($\eta_{p_sR_s}$: the elasticity of the success probability with respect to the success return per fund). The density function of the success probability is $f(\bullet)$. Banks can know both this relation and the density function without sufficient screening.

It should be noticed that $p'_s < 0$ implies that the adverse selection occurs in a loan market for small and medium-sized firms, and that $\eta_{P_sR_s} < 1$ implies that the marginal expected return of a small and medium-sized firm's project ($p_s \cdot R_s$) become a decreasing function of borrowing.

[9] There are 2-types of banks domestically. One is the large bank, which can lend to both large and small and medium-sized firms. The other is a small and medium-sized bank, which lends only to small and medium-sized firms.

[10] Banks are risk-neutral. Banks have sufficient collaterals not to fail, and finance all funds for loans from a deposit, a call and an international debt market.

This again is to simplify the analysis. The latter is to exclude the effects stemming from the moral hazard concerning banks[7]. There is no reason to suppose that the market failure discussed below would disappear if banks are risk averse and have insufficient collateral. A major advantage of such assumptions is that it makes clear that the conclusions of the analysis are not necessary attributable to bank's moral hazard.

[11] The number of large banks is restricted to n.

This implies that the loan market for large firms is characterized by oligopoly. I adopt the Courno-Nash equilibrium as the concept of equilibrium here. This is mainly to focus on the effects of entry restrictions for large banks, which include domestic large and foreign banks[8].

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5) This implies that the large firm's demand curve for loans is linear.

6) For example, Domae (1993) discusses the role of competition-restriction policies in post-war Japan with such a model.

7) For example, Hellmann, Murdoch and Stiglitz (2000) states as follows: "banks choose a risky asset portfolio that pays out high profits or bonuses if the gamble succeeds but leaves depositors, or their insurers, with the losses if the gamble fails" (pp. 148).

8) For example, Japanese government continued to adopt such policies for a long time. The entry of domes-

[12] There are many small and medium-sized banks.

This suggests that the loan to small and medium-sized firms and the deposit market are competitive[9].

[13] There are many depositors. The supply function of deposit is expressed as $\rho = \rho(D)$ ($\rho' > 0$, $\rho'' \geq 0$), where ρ is (1 + the deposit rate) and D is the market deposit supply.

[14] A call market is competitive.

[15] If the international debt flow is liberalized, then the domestic banks become able to lend or borrow funds in an international debt market at a given foreign interest rate ($\bar{r}_f \equiv 1 +$ the foreign interest rate).

This suggests that $r_c = \bar{r}_f$ is attained under liberalization of international debt flow because the call rate ($r_c \equiv 1 +$ the call rate) is bound to the given foreign interest rate through arbitrages between a call and an international debt market. In connection this, I suppose that the exchange rate is fixed implicitly.

2. 2 Formulation of the Model

First, I formulate the domestic general equilibrium model on the basis of assumption [1]～[14]. Then, I will expand it to a general equilibrium model under liberalization of international debt flow.

The Borrowing Activities of Firms

As there are many both large and small and medium-sized firms, firms act as price-takers in loan markets. The borrowing activity of each firm is as follows: it will borrow if the success return exceeds or equals the total amount with interest (or $R \geq r$), it will not borrow if not (or $R < r$), where r is the total amount with interest per fund ($\equiv 1 +$ the interest rate). The firm's demand functions for borrowing are derived from these as follows: $R_l(L_l) = r_l$, $R_s(L_s) = r_s$ ($R_l' < 0$, $R_s' < 0$), where L_l is the large firm's demand, L_s is the small and medium-sized firm's demand, each of $R_l(\bullet)$ and $R_s(\bullet)$ is the success return per fund of a marginal borrower ($\equiv 1 +$ the rate of marginal expected return) in the market.

If the interest rate rises, then the demand for borrowing in each market decreases. The rea-

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tic large and foreign banks had been restricted strictly in post war Japan (especially in the high-growth period).

9) Even if there are many small and medium-sized banks, there is a possibility that the loan market for small and medium-sized firms does not become sufficiently competitive. The reason why is that the information about small and medium-sized firms is local. We leave such possibility out of consideration here to focus on the effects of entry restriction for large banks. But it is easy to expand the analysis into one in the case that the loan market for small and medium-sized firms, also, is characterized by oligopoly.

son for this is that a rise in the interest rate spills out the borrowers whose projects have low success returns.

The Lending Activities of Banks

A large bank 'k,' expects the amounts of other large bank's credits in the loan market for large firms rationally and maximizes its profit, accepting the interest rates prevailing in the deposit, the call and the loan market for small and medium-sized firms and the average probability of repayments of small and medium-sized borrowing firms (P_a).

$$\max_{\{L_{lk},\, L_{sk},\, D_k\}} p_l \cdot R_l\left(L_{lk} + \sum_{i=1,\, i\neq k}^{n} L_{li}^{E}\right)\cdot L_{lk} + P_a(r_s)\cdot r_s \cdot L_{sk} - \rho \cdot D_k - r_c \cdot (L_{lk} + L_{sk} - D_k)$$

We can derive the first-order conditions for the profit maximum of bank k as follows:

$$p_l \cdot (R_l + R_l' \cdot L_{lk}) = r_c$$

$$P_a(R_s)\cdot r_s = r_c$$

$$\rho = r_c$$

Where L_{lk} is bank k's credit for large firms, L_{ls} is bank k's credit for small and medium-sized firms, L_{li}^{E} is bank k's expectation of bank $i(\neq \mathrm{k})$'s credit for large firms, D_k is the deposit for bank k and $L_{lk} + L_{sk} - D_k$ $(\equiv B_{ck})$ is bank k's borrowing in the call market.

A small and medium-sized bank 'j', which lends to small and medium-sized firms only, maximizes its profit as follows:

$$\max_{\{L_{sj},\, D_j\}} p_a(r_s)\cdot r_s \cdot L_{sj} + r_c \cdot (D_j - L_{sj}) - \rho \cdot D_j$$

The first-order conditions for profit maximum of bank j are derived as follows:

$$p_a(R_s)\cdot r_s = r_c$$

$$\rho = r_c$$

Where L_{sj} is the bank j' s credit for small and medium-sized firms, D_j is the deposit for bank j, $D_j - L_{sj} \equiv -B_{cj}$ is the bank j's credit in a call market.

The average probability of repayments of small and medium-sized borrowing firms is equal to the average of success probabilities of projects that the small and large borrowing firms have, which can be expressed as follows:

$$p_a(r_s) = \int_{p_{s0}}^{p_s(r_s)} p_s \cdot f(p_s)\, dp_s \Big/ \int_{p_{s0}}^{p_s(r_s)} f(p_s)\, dp_s$$

If the interest rate for small and medium-sized firms rises (the credit for small and medium-sized firms decreases), then the average probability of repayments falls. The reason is that the increase of the marginal borrower's expected return means the decrease of marginal borrower' s success probability (∵assumption [8]). This is expressed as follows: $p_a' < 0$, $dp_a/dL_s > 0$ and

also imply $p_a(r_s) < p_s(r_s)$.

In addition to this, as a bank's entry into and exit from the loan market for small and medium-sized firms are free, the excess profit of each bank from the credit for small and medium-sized firms is 0 in equilibrium. So $p_a(R_s) \cdot r_s = r_c$ is attained in equilibrium. Also, as both the deposit and the call market are competitive, if $\rho > r_c$, then every bank becomes a borrower and if $\rho < r_c$, then every bank becomes a lender in a call market. As a result, $\rho = r_c$ is attained in equilibrium.

Domestic Market Equilibrium

In domestic market equilibrium, the following equations are attained simultaneously.

$$R_l(L_l) = r_l, \quad p_l \cdot (R_l + R_l' \cdot L_{lk}) = r_c \quad (k = 1, \cdots, n)$$
$$R_s(L_s) = r_s, \quad p_a(r_s) \cdot r_s = r_c$$
$$D + B_c = L_l + L_s, \quad \rho(D) = r_c$$
$$B_c = 0$$

Where $L_l \left(\equiv \sum_{k=1}^{n} L_{lk} \right)$, $L_s \left(\equiv \sum_{k=1}^{n} L_{sk} + \sum_{j=1}^{m} L_{sj} \right)$ are the total credits in each loan market, $B_c \left(\equiv \sum_{k=1}^{n} B_{ck} + \sum_{j=1}^{m} B_{cj} \right)$ is the total borrowing in a call market, and m is the number of small and medium-sized banks.

The equations which rearrange the above equations, focusing on the total amounts of credits in loan markets and deposit $(L_l^e, L_s^e \text{ and } D^e)$ are (1) and (1)'.

(1) $\quad p_l \cdot \{R_l'(L_l^e) \cdot (L_l^e/n) + R_l(L_l^e)\} = p_a(R_s[L_s^e]) \cdot R_s(L_s^e) = \rho(L_l^e + L_s^e)$

(1)' $\quad D^e = L_l^e + L_s^e$

As the condition $\eta_{p_s R_s} < 1$ of assumption [8] implies $\eta_{p_a R_s} \equiv -(R_s/p_a) \cdot p'_a < 1$[10], we obtain the following conditions $d(p_a \cdot R_s)/dL_s = p_a \cdot R'_s \cdot (1 - \eta_{p_a R_s}) < 0$. This means that credit rationing does not occur in our model. Also, we assume that the condition $d^2(p_a \cdot R_s)/dL_s^2 \leq 0$ is satisfied.

Market Equilibrium under the liberalization of international debt flow

Next, I expand the above domestic model to the general equilibrium model under liberalization of international debt flow.

As banks are able to lend or borrow in both the call and the international debt market at the given foreign rate $(\bar{r}_f)$ from assumption [15], in equilibrium the following equations are attained simultaneously.

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10) We can derive following relation: $\eta_{p_a R_s} \equiv \eta_{p_s R_s} \cdot (p_s - p_a) \cdot (f(p_s)/F(p_s)) < 1$, where F(•) is the distribution function.

$$R_l(L_l)=r_l,\ \ p_l\cdot(R_l+R_l'\cdot L_{lk})=r_c\ \ (k=1,\cdots,n)$$
$$R_s(L_s)=r_s,\ \ p_a\cdot(r_s)\cdot r_s=r_c$$
$$D+B_c+B_f=L_l+L_s,\ \ \rho(D)=r_c$$
$$B_c=0,\ \ r_c=\bar{r}_f$$

The equations which rearrange above equations, focusing on the total amounts of credits, deposit and international debt inflow, are (2) and (2)'.

$$(2)\quad p_l\cdot\{R_l'(\widetilde{L}_l^e)\cdot(\widetilde{L}_l^e/n)+R_l(\widetilde{L}_l^e)\}=p_a(R_s[\widetilde{L}_s^e])\cdot R_s(\widetilde{L}_s^e)=\rho(\widetilde{D}^e)=\bar{r}_f$$
$$(2)'\quad \widetilde{B}_f^e=\widetilde{L}_l^e+\widetilde{L}_s^e-\widetilde{D}^e$$

Where ～ represents 'under liberalization' and $\widetilde{B}_f^e$ is the international debt inflow in equilibrium.

3. Entry Restriction for Large Banks and Economic Welfare

This section examines the effects of entry restriction for large banks on economic welfare in each case before and after liberalization of international debt flow and derives some propositions and corollaries[11].

3.1 Effect of Entry Restriction on Domestic Market Equilibrium

Failure of Fund Allocation in Unfettered Domestic Market Equilibrium

First, I would like to verify how the unfettered domestic market fails the fund allocation. In order to estimate the domestic market equilibrium from the viewpoint of efficiency, I define the total surplus before liberalization of international debt flow as follows:

$$W(L_l,L_s)=\int_0^{L_l}p_l\cdot R_l(L_l)\,dL_l+\int_0^{L_s}p_s(R_s[L_s])\cdot R_s[L_s]\,dL_s$$
$$-\int_0^{L_l+L_s}\rho(L_l+L_s)\,d(L_l+L_s)$$

Solving the following problem, the conditions for a maximum of total surplus before liberalization of international debt flow (3) is attained.

$$\max_{\{L_l,L_s\}}\ W(L_l,L_s)$$
$$(3)\quad p_l\cdot R_l(L_l^*)=p_s(R_s[L_s^*])\cdot R_s[L_s^*]=\rho(L_l^*+L_s^*)$$

Where $(L_l^*,L_s^*)=\arg\max_{\{L_l,L_s\}}W(L_l,L_s)$. We can derive following PROPOSITION1 from supposing $n=\infty$ and comparing equations (1) and (3).

PROPOSITION 1: Comparing the unfettered domestic market equilibrium $(L_l^e(\infty),L_s^e(\infty),D^e(\infty))$ and the first-best fund allocation before the liberalization of international debt flow $(L_l^*,$

11) Domae (2000) examines the effects of entry restriction for large banks on domestic market equilibrium. The discussions in 3.1 Effect of Entry Restriction on Domestic Market Equilibrium follow that.

$L_s^*, D^*)$, $L_l^e(\infty) > L_l^*$, $L_s^e(\infty) < L_s^*$, $D^e(\infty) < D^*$ are attained.

This is a natural consequence stemming from the existence of asymmetric information in the loan market for small and medium-sized firms.

Now let us suppose the credits in both markets and the deposit are the first-best levels. Then $p_l \cdot R_l = \rho = p_s \cdot R_s > p_a \cdot R_s$ come into being from equation (3) and $p_s > p_a$. As the bank's expected marginal return in the loan market for small and medium-sized firms ($p_a \cdot R_s$) is smaller than the deposit rate, the credit for small and medium-sized firms will decrease ($L_s^e(\infty) < L_s^*$). This means the deposit demand in equilibrium is smaller than the first-best level ($D^e(\infty) < D^*$) and the deposit-rate there is, also, smaller than the first-best level. The latter means the credit for large firms in equilibrium will become larger than the first-best level ($L_l^e(\infty) > L_l^*$).

These suggest that if the bank's expected marginal return in the loan market for small and medium-sized firms can be raised, then the domestic market equilibrium succeeds in the fund allocation. Corollary 1 shows such an example.

Corollary 1-1: If $n = \infty$ and the specific subsidy to the credit for small and medium-sized firms per fund are $[p_s(L_s^*) \cdot R_s(L_s^*) - p_a(L_s^*) \cdot R_s(L_s^*)]$, then the first-best fund allocation (L_l^*, L_s^*, D^*) is attained in domestic market equilibrium.

It is easy to verify Corollary1-1. If $n = \infty$ and the specific subsidy to the credit for small and medium-sized firms per fund are $[p_s(L_s^*) \cdot R_s(L_s^*) - p_a(L_s^*) \cdot R_s(L_s^*)]$, then equation (1) becomes equal to (3). This means the first-best fund allocation (L_l^*, L_s^*, D^*) is attained in domestic market equilibrium.

Effects of Entry Restriction

Next, I examine the effects of entry restriction for large banks on total surplus and show that it can be the alternative to the specific subsidy, although incomplete. For that purpose, I modify the function of total surplus before liberalization as follows:

$$W(n) = \int_0^{L_l^e(n)} p_l \cdot R_l(L_l)\, dL_l + \int_0^{L_s^e(n)} p_s(R_s[L_s]) \cdot R_s[L_s]\, dL_s$$

$$- \int_0^{D^e(n)} \rho(D)\, dD$$

Where ($L_l^e(n), L_s^e(n), D^e(n)$) express the general equilibrium before liberalization on condition that the number of large banks is n. It should be noticed that the total surplus here is redefined as one, which is consistent with market equilibriums[12]. Solving the following problem, the

12) Suzumura (1990) calls this 'the second-best total surplus'.

condition for maximum of second-best total surplus before liberalization of international debt flow (4) is attained.

$$\max_{\{n\}} W(n)$$

$$(4)\quad \frac{dW}{dn}=(p_l\cdot R_l-\rho)\cdot\frac{dL_l^e}{dn}+(p_s\cdot R_s-\rho)\cdot\frac{dL_s^e}{dn}=0$$

[a] $$\frac{dL_l^e(n)}{dn}=A\cdot\{\rho'-p_a\cdot R'_s\cdot(1-\eta_{p_aR_s})\}>0$$

[b] $$\frac{dL_s^e(n)}{dn}=A\cdot(-\rho')<0$$

[c] $$\frac{dD^e(n)}{dn}\equiv\frac{dL_l^e(n)}{dn}+\frac{dL_s^e(n)}{dn}=-A\cdot p_a\cdot R'_s\cdot(1-\eta_{p_aR_s})>0$$

Where A is as follows,

$$A=\frac{p_l\cdot R_l\cdot L_l^e\cdot n^{-2}}{p_l\cdot R_l'\cdot(1+n^{-1})\cdot p_a\cdot R_s'\cdot(1-\eta_{p_aR_s})-\rho'\cdot\{p_l\cdot R_l'\cdot(1+n^{-1})+p_a\cdot R_s'\cdot(1-\eta_{p_aR_s})\}}>0$$

It should be noticed that assumption [7] suggests that $R_l''=0$, $p_l\cdot R_l'\cdot(1+n^{-1})$ expresses the derivative of large bank's marginal expected return in the loan market for large firms and $p_a\cdot R_s'\cdot(1-\eta_{p_aR_s})$ expresses the derivative of bank's marginal expected return in the loan market for small and medium-sized firms.

First, I would like to discuss [a], [b], [c] briefly[13]. Now let us suppose that the government raises n. As the large bank's expected marginal returns in the loan market for large firms rise, the credit for large firms increases $(dL_l^e(n)/dn>0)$ and the deposit demand, also, increases $(dD^e(n)/dn>0)$. The latter induces the rise of the deposit rate. Consequently, part of the credit for small and medium-sized firms is crowded out $(dL_s^e(n)/dn<0)$. In this connection, it should be noticed that the increment of the credit for large firms is equal to the total amount of the decrement of credit for small and medium-sized firms and the increment of deposit $(dL_l^e(n)/dn\equiv -dL_s^e(n)/dn+dD^e(n)/dn)$.

We can derive following PROPOSITION 2 from equation (4) and [a], [b], [c].

PROPOSITION 2: If n satisfies $p_s\cdot R_s-p_l\cdot R_l=\left[-p_a\cdot R_s'\cdot(1-\eta_{p_aR_s})/\rho'\right]\cdot(p_l\cdot R_l-\rho)$, then the second-best total surplus before liberalization of international debt flow is maximized.

The left hand side of above equation expresses the decrement of total surplus, which is brought about through fund's transfer from the credit for the small and medium-sized firms to

13) Needless to say, [a], [b] and [c] are derived from equation (1) and (1)'.

one for large firms. On the other hand, the right hand side expresses the increment of surplus, which is brought about through the additional increase of credit for large firms and the increase of deposit. In this connection, it should be noticed following two points.

• $\left[-p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})/\rho'\right]$ is the marginal rate of transformation from the credit for small and medium-sized firms to the deposit $(-(dD^e(n)/dn)/(dL_s^e(n)/dn))$.

• The left hand side of equation is the increasing function of n, but the right hand side is the decreasing function of n. (See. Appendix1)

PROPOSITION 2 implies that following Corollary 2-1, 2-2 and 2-3 come into existence.

Corollary 2-1: The number of large banks that maximizes the second best total surplus before the liberalization of international debt flow (n_s) is finite.

It is easy to verify Corollary 2-1. Now, let us suppose that the second-best total surplus before liberalization of international debt flow is maximized on condition that $n_s=\infty$. Then $p_l \cdot R_l = \rho = p_a \cdot R_s < p_s \cdot R_s$ come into being from equation(1). On the other hand $p_l \cdot R_l = \rho$, also, means that $p_s \cdot R_s = p_l \cdot R_l$ comes into being from PROPOSITION 2. It is clear that a contradiction merges.

Corollary 2-1 shows that the government can increase the second-best total surplus through the entry restriction.

Corollary 2-2: The rise of the interest elasticity of average success probability of small and medium-sized firms $(\eta_{p_a R_s})$ and/or the rise of ρ' decrease n_s.

We can verify Corollary 2-2 as follows. Now, let us suppose that $\eta_{p_a R_s}$ and/or ρ' rise. Then following inequality comes into existence on condition that n is unchanged.

$$p_s \cdot R_s - p_l \cdot R_l > \left[-p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})/\rho'\right] \cdot (p_l \cdot R_l - \rho)$$

As the left hand side is the increasing function of n and that the right hand side is the decreasing function of n, it is clear that the decrease of n is necessary for restoring the equality of both sides.

Corollary 2-2 shows that the larger the extent of imperfect information is and the smaller the interest elasticity of deposit is, the smaller n_s is.

Corollary 2-3: If $\rho'=\infty$, then the government can realize the first-best fund allocation through entry restriction for large banks.

We can verify Corollary 2-3 as follows. Now, let us suppose that ρ' approaches infinity. Then each of [a], [b], [c] converges to following each value.

$$[a]\ \frac{dL_l^e(n)}{dn} \to \frac{-p_l \cdot R_l \cdot L_l^e \cdot n^{-2}}{p_l \cdot R_l' \cdot (1+n^{-1}) + p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})} > 0$$

$$[b]\ \frac{dL_s^e(n)}{dn} \to \frac{-p_l \cdot R_l \cdot L_l^e \cdot n^{-2}}{p_l \cdot R_l' \cdot (1+n^{-1}) + p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})} > 0$$

[c] $\dfrac{dD^e(n)}{dn} \equiv \dfrac{dL_l^e(n)}{dn} + \dfrac{dL_s^e(n)}{dn} \to 0$

These mean that $L_l + L_s = \overline{D}$ comes into being. Solving the following problem, the condition for a maximum of the first-best total surplus before liberalization of international debt flow in the case that $\rho' = \infty$ (5) is attained.

$$\max_{\{L_l, L_s\}} W(L_l, L_s)$$
$$s.t. \quad \overline{D} = L_l + L_s$$
$$(5) \quad p_l \cdot R_l(L_l^*) = p_s\left(R_s\left[\overline{D} - L_l^*\right]\right) \cdot R_s\left[\overline{D} - L_l^*\right]$$

On the other hand, when ρ' approaches infinity, the condition of maximum for the second-best total surplus, also, converges to $p_l \cdot R_l = p_s \cdot R_s$. It is clear that this is equal to (5).

3. 2 Effect of Entry Restriction on Market Equilibrium after Liberalization of International Debt Flow

Failure of Fund Allocation in Unfettered Market Equilibrium

Next, I would like to confirm how the unfettered market after liberalization of international debt flow also fails in fund allocation. For that purpose, I define the total surplus after liberalization of international debt flow as follows:

$$\widetilde{W}(\widetilde{L}_l, \widetilde{L}_s, \widetilde{D}) = \int_0^{\widetilde{L}_l} p_l \cdot R_l(\widetilde{L}_l)\, d\widetilde{L}_l + \int_0^{\widetilde{L}_s} p_s\left(R_s\left[\widetilde{L}_s\right]\right) \cdot R_s\left[\widetilde{L}_s\right] d\widetilde{L}_s$$
$$- \int_0^{\widetilde{D}} \rho(D)\, dD - \overline{r}_f \cdot \left(\widetilde{L}_l + \widetilde{L}_s - \widetilde{D}\right)$$

Solving the following problem, the conditions for maximum of total surplus (6) are attained.

$$\max_{\{\widetilde{L}_l, \widetilde{L}_s, \widetilde{D}\}} \widetilde{W}\left(\widetilde{L}_l, \widetilde{L}_s, \widetilde{D}\right)$$
$$(6) \quad p_l \cdot R_l\left(\widetilde{L}_l^*\right) = p_s\left(R_s\left[\widetilde{L}_s^*\right]\right) \cdot R_s\left[\widetilde{L}_s^*\right] = \rho\left(\widetilde{D}^*\right) = \overline{r}_f$$

Where $\left(\widetilde{L}_l^*, \widetilde{L}_s^*, \widetilde{D}^*\right) = \arg\max_{\{\widetilde{L}_l, \widetilde{L}_s, \widetilde{D}\}} \widetilde{W}\left(\widetilde{L}_l, \widetilde{L}_s, \widetilde{D}\right)$. It should be noticed that following equation (6)' is attained at the same time.

$$(6)' \quad \widetilde{B}_f^* = \widetilde{L}_l^* + \widetilde{L}_s^* - \widetilde{D}^*$$

We can derive following PROPOSITION 3 from comparing equations (2), (2)' and (6), (6)'.

PROPOSITION 3: Comparing the unfettered market equilibrium after the liberalization of international debt flow $\left(\widetilde{L}_l^e(\infty), \widetilde{L}_s^e(\infty), \widetilde{D}^e(\infty), \widetilde{B}_f^e(\infty)\right)$ and the first-best fund allocation $\left(\widetilde{L}_l^*, \widetilde{L}_s^*, \widetilde{D}^*, \widetilde{B}_f^*\right)$, $\widetilde{L}_l^e(\infty) = \widetilde{L}_l^*$, $\widetilde{L}_s^e(\infty) < \widetilde{L}_s^*$, $\widetilde{D}^e(\infty) = \widetilde{D}^*$ and $\widetilde{B}_f^e(\infty) < \widetilde{B}_f^*$ are attained.

This, also, is a natural consequence stemming from the existence of asymmetric information in the loan market for the small and medium-sized firms and small country assumption ([15]).

Now, let us suppose that the credits in loan markets, the deposit and the international debt flow are the first-best levels. Then $p_l \cdot R_l = p_s \cdot R_s = \rho = \bar{r}_f > p_a \cdot R_s$ come into being from equation (6) and $p_s > p_a$. As the bank's expected marginal return in the loan market for small and medium-sized firms ($p_a \cdot R_s$) is smaller than the deposit rate, the credit supply there will decrease ($\widetilde{L}_s^e(\infty) < \widetilde{L}_s^*$). This movement, however, does not influence the credit for large firms ($\widetilde{L}_l^e(\infty) = \widetilde{L}_l^*$) and the deposit demand ($\widetilde{D}^e(\infty) = \widetilde{D}^*$), because their opportunity costs are equal to the constant foreign interest rate. These mean that the demand for international debt flow in unfettered equilibrium becomes smaller than the first-best level ($\widetilde{B}_f^e(\infty) < \widetilde{B}_f^*$).

This also suggests that if the expected marginal return of banks can be raised, then the market equilibrium after liberalizations of international debt flow succeeds in fund allocation. Corollary 3-1 shows such an example.

Corollary 3-1: If $n = \infty$ and the specific subsidy to the credit for small and medium-sized firms per fund were $\left[p_s(\widetilde{L}_s^*) \cdot R_s(\widetilde{L}_s^*) - p_a(\widetilde{L}_s^*) \cdot R_s(\widetilde{L}_s^*) \right]$, then the first-best fund allocation ($\widetilde{L}_l^*$, $\widetilde{L}_s^*$, $\widetilde{D}^*$, $\widetilde{B}_f^*$) is attained in the market equilibrium after liberalization of international debt flow.

It is easy to verify Corollary 3-1. If $n = \infty$ and the specific subsidy to the credit for small and medium-sized firms per fund are $\left[p_s(\widetilde{L}_s^*) \cdot R_s(\widetilde{L}_s^*) - p_a(\widetilde{L}_s^*) \cdot R_s(\widetilde{L}_s^*) \right]$, then equation (2) becomes equal to (5). This means the first-best fund allocation ($\widetilde{L}_l^*$, $\widetilde{L}_s^*$, $\widetilde{D}^*$, $\widetilde{B}_f^*$) is attained in market equilibrium after the liberalization of international debt flow.

Effects of Entry Restriction

Next, I examine the effects of entry restriction on total surplus and show that it cannot become the alternative to a specific subsidy in this case. For that purpose, I modify the function of total surplus after liberalization as follows:

$$\widetilde{W}(n) = \int_0^{\widetilde{L}_l^e(n)} p_l \cdot R_l(L_l)\, dL_l + \int_0^{\widetilde{L}_s^e(n)} p_s(R_s[L_s]) \cdot R_s[L_s]\, dL_s$$

$$- \int_0^{\widetilde{D}^e(n)} \rho(D)\, dD - \bar{r}_f \cdot \{\widetilde{L}_l^e(n) + \widetilde{L}_s^e(n) - \widetilde{D}^e(n)\}$$

Where $\left(\widetilde{L}_l^e(n),\ \widetilde{L}_s^e(n),\ \widetilde{D}^e(n)\right)$ express the general equilibrium after liberalization under condition that the number of large banks is n. It should be noticed that the total surplus is re-defined as the second best one, which is consistent with market equilibrium.

We can derive the condition of maximum for the second best total surplus (7) from solving following problem.

$$\max_{\{n\}} \widetilde{W}(n)$$

$$(7) \quad \frac{d\widetilde{W}}{dn} = (P_l R_l - \rho) \cdot \frac{d\widetilde{L}_l^e}{dn} = 0$$

$$[\widetilde{a}]\ \frac{d\widetilde{L}_l^e(n)}{dn}=\frac{\widetilde{L}_l^e}{n\cdot(n+1)}>0$$

$$[\widetilde{b}]\ \frac{d\widetilde{L}_s^e(n)}{dn}=0$$

$$[\widetilde{c}]\ \frac{d\widetilde{D}^e(n)}{dn}=0$$

$$[\widetilde{d}]\ \frac{d\widetilde{B}_f^e(n)}{dn}\equiv\frac{d\widetilde{L}_l^e(n)}{dn}+\frac{d\widetilde{L}_s^e(n)}{dn}-\frac{d\widetilde{D}^e(n)}{dn}=\frac{\widetilde{L}_l^e}{n\cdot(n+1)}>0$$

First, I would like to discuss $[\widetilde{a}]\sim[\widetilde{d}]$ briefly[14]. Now let us suppose that the government raises n. Then the credit for large firms increases $(d\widetilde{L}_l^e(n)/dn>0)$ because the large bank's expected marginal returns in the loan market for large firms rise. It should be noticed that this increases the bank's demand for fund, but does not influence the bank's opportunity costs (= the constant foreign interest rate). This means that the credit for small and medium-sized firms and the deposit demand remain as those are $(d\widetilde{L}_s^e(n)/dn=0,\ dD^e(n)/dn=0)$ and the international debt flow increases to the same amount as the credit for large firms does $(d\widetilde{B}_f^e(n)/dn=d\widetilde{L}_l^e(n)/dn>0)$.

Next, I would like to note that $p_l\cdot R_l>\rho$ always comes into being for every finite number of n from (2). This suggests that the following inequality comes into being.

$$(8)\quad \frac{d\widetilde{W}}{dn}=(P_lR_l-\rho)\cdot\frac{d\widetilde{L}_l^e}{dn}=\frac{(P_lR_l-\rho)\cdot\widetilde{L}_l^e}{n\cdot(n+1)}>0\ \text{(For every finite number of n)}$$

Inequality (8) shows that the larger n is, the larger the second best total surplus is, and that $d\widetilde{W}/dn$ converges to 0 as n approaches infinity. We can derive PROPOSITION 4 from these considerations.

PROPOSITION 4: The larger the number of large banks is, the larger the second-best total surplus after the liberalization of international debt flow is. And the second-best total surplus is maximized on condition that $n=\infty$.

PROPOSITION 4 means that if the international debt flow has been liberalized, then the government cannot improve the total surplus through entry restriction for large banks and the total surplus is maximized in the unfettered market equilibrium. These implications are definitely different from those of PROPOSITION 2. The fundamental reason why is that the government cannot affect the bank's opportunity cost (especially of credit for small and medium-

14) Needless to say, $[\widetilde{a}]$, $[\widetilde{b}]$, $[\widetilde{c}]$ and $[\widetilde{d}]$ are derived from equation (2) and (2)'.

sized firms) through entry restriction for large banks at all. After all, the entry restriction for large banks induces nothing but the decrease of credits for large firms and international debt flow below the second-best levels.

4. Liberalization of International Debt Flow and Economic Welfare

This section examines the effects of liberalization of international debt flow on economic welfare. For that purpose, I suppose that n is given here.

The variation of second-best total surplus from the liberalization of international debt flow ($\Delta\widetilde{W}(n) \equiv \widetilde{W}(n) - W(n)$) can be expressed as follows.[15)]

$$
\begin{aligned}
\Delta\widetilde{W}(n) &= \int_{L_l^e(n)}^{\widetilde{L}_l^e(n)} p_l \cdot R_l(L_l)\, dL_l + \int_{L_s^e(n)}^{\widetilde{L}_s^e(n)} p_s(R_s[L_s]) \cdot R_s[L_s]\, dL_s - \int_{D^e(n)}^{\widetilde{D}^e(n)} \rho(D)\, dD \\
&\quad - \bar{r}_f \cdot \{\widetilde{L}_l^e(n) + \widetilde{L}_s^e(n) - \widetilde{D}^e(n)\} \\
&= \int_{L_l^e(n)}^{\widetilde{L}_l^e(n)} p_l \cdot R_l(L_l)\, dL_l - \bar{r}_f \cdot \{\widetilde{L}_l^e(n) - L_l^e(n)\} \\
&\quad + \int_{L_s^e(n)}^{\widetilde{L}_s^e(n)} p_s(R_s[L_s]) \cdot R_s[L_s]\, dL_s - \bar{r}_f \cdot \{\widetilde{L}_s^e(n) - L_s^e(n)\} \\
&\quad - \int_{D^e(n)}^{\widetilde{D}^e(n)} \rho(D)\, dD + \bar{r}_f \cdot \{\widetilde{D}^e(n) - D^e(n)\} \\
&= \Delta\widetilde{W}_l(n) + \Delta\widetilde{W}_s(n) + \Delta\widetilde{W}_d(n)
\end{aligned}
\tag{9}
$$

$$
[\,\alpha\,]\quad \Delta\widetilde{W}_l(n) \equiv \int_{L_l^e(n)}^{\widetilde{L}_l^e(n)} \{p_l \cdot R_l(L_l) - \bar{r}_f\}\, dL_l
$$

$$
[\,\beta\,]\quad \Delta\widetilde{W}_s(n) \equiv \int_{L_s^e(n)}^{\widetilde{L}_s^e(n)} \{p_s(R_s[L_s]) \cdot R_s[L_s] - \bar{r}_f\}\, dL_s
$$

$$
[\,\gamma\,]\quad \Delta\widetilde{W}_d(n) \equiv \int_{D^e(n)}^{\widetilde{D}^e(n)} \{\bar{r}_f - \rho(D)\}\, dD
$$

We can derive PROPOSITION 5, 6, 7 and Corollary 7-1 from examining equation (9).

PROPOSITION 5: If $\rho(L_l^e + L_s^e) > \bar{r}_f$, then $\Delta\widetilde{W}_l(n) > 0$, $\Delta\widetilde{W}_s(n) > 0$, $\Delta\widetilde{W}_d(n) > 0$ and $\Delta\widetilde{W}(n) > 0$ are attained.

Now let us suppose that $\rho(L_l^e + L_s^e) > \bar{r}_f$. Then banks become able to finance their credits at the lower interest rate through liberalization. So, the equilibrium and the total surplus change as follows.

---

15) It should be noticed that $\widetilde{B}_f^e = (\widetilde{L}_l^e - L_l^e) + (\widetilde{L}_s^e - L_s^e) - (\widetilde{D}^e - D^e)$ is derived from (1)' and (2)'.

First, bank's credits for both the large and the small and medium-sized firms increase till their marginal expected returns fall to a equal level with $\bar{r}_f$. This means that the following relations come into existence.

$$p_l \cdot R_l\left(L_l^e\right) > p_l \cdot R_l\left(\widetilde{L}_l^e\right) = \bar{r}_f \quad \cdots (n = \infty)$$
$$p_l \cdot R_l\left(L_l^e\right) > p_l \cdot R_l\left(\widetilde{L}_l^e\right) > \bar{r}_f \quad \cdots (n \neq \infty)$$
$$p_s\left(R_s\left[L_s^e\right]\right) \cdot R_s\left[L_s^e\right] > p_s\left(R_s\left[\widetilde{L}_s^e\right]\right) \cdot R_s\left[\widetilde{L}_s^e\right] > \bar{r}_f$$

It should be noticed that the marginal expected returns of a firm's projects, which also fall, are equal to[16] or larger than those of banks. The above relations show that the increases of bank's credits ($L_l^e < \widetilde{L}_l^e$, $L_s^e < \widetilde{L}_s^e$) are accompanied by increases of firm's projects whose marginal expected returns are above foreign interest rate. Therefore, $\Delta\widetilde{W}_l(n) > 0$ and $\Delta\widetilde{W}_s(n) > 0$ come into being.

Next, the deposit demand decreases till the deposit rate falls to the equal level with $\bar{r}_f$ ($= \rho\left(\widetilde{L}_l^e + \widetilde{L}_s^e\right) < \rho\left(L_l^e + L_s^e\right)$). This means that part of a deposit whose marginal cost is above the foreign interest rate is substituted for the international debt ($D^e > \widetilde{D}^e$). Therefore $\Delta\widetilde{W}_d(n) > 0$ come into being.

As every term of right hand side of (9) is positive, $\Delta\widetilde{W}(n) > 0$ is attained.

PROPOSITION 5 shows that if the foreign interest rate is lower than the domestic one, then the liberalization of international debt flow increases the second best total surplus.

PROPOSITION 6: If $\rho\left(L_l^e + L_s^e\right) = \bar{r}_f$, then $\Delta\widetilde{W}_l(n) = \Delta\widetilde{W}_s(n) = \Delta\widetilde{W}_d(n) = \Delta\widetilde{W}(n)$ is attained.

It is easy to verify this. Now let us suppose that $\rho\left(L_l^e + L_s^e\right) = \bar{r}_f$. Then the equation (2) is equal to (1). As the liberalization of international debt flow does not change the equilibrium at all, $\Delta\widetilde{W}_l(n) = \Delta\widetilde{W}_s(n) = \Delta\widetilde{W}_d(n) = \Delta\widetilde{W}(n)$ is attained.

PROPOSITION 6 shows that if the foreign interest rate is equal to the domestic one, then the liberalization of international debt flow does not affect the second best total surplus.

PROPOSITION 7: If $\rho\left(L_l^e + L_s^e\right) < \bar{r}_f$, then $\Delta\widetilde{W}_d(n) > 0$ is attained, but $\Delta\widetilde{W}(n)$ is indefinite of the mark because the marks of $\Delta\widetilde{W}_l(n)$ and $\Delta\widetilde{W}_s(n)$ vary as follows.

(I) The case of $p_l \cdot R_l\left(\widetilde{L}_l^e\right) = \bar{r}_f > p_l \cdot R_l\left(L_l^e\right)$ —— $\Delta\widetilde{W}_l(n) > 0$

(II) The case of $p_{l(s)} \cdot R_{l(s)}\left(\widetilde{L}_{l(s)}^e\right) > \bar{r}_f > p_{l(s)} \cdot R_{l(s)}\left(L_{l(s)}^e\right)$ —— the marks of $\Delta\widetilde{W}_{l(s)}(n)$ are indefinite

(III) The case of $p_{l(s)} \cdot R_{l(s)}\left(\widetilde{L}_{l(s)}^e\right) > p_{l(s)} \cdot R_{l(s)}\left(L_{l(s)}^e\right) \geq \bar{r}_f$ —— $\Delta\widetilde{W}_{l(s)}(n) < 0$

16) If $n = \infty$, then the difference between the marginal expected return of a firm's project and the one of a bank's credit disappears in market for large firms.

Now let us suppose that $\rho\left(L_l^e+L_s^e\right)<\bar{r}_f$. Then banks become able to invest their funds at the higher interest rate in the international debt market through liberalization. So, the equilibrium and the total surplus change as follows.

First, banks switch part of their credits for domestic firms to those for foreign banks $\left(L_l^e>\widetilde{L}_l^e,\ L_s^e>\widetilde{L}_s^e\right)$ till their marginal expected returns rise to the equal level with $\bar{r}_f$. This means that following relations come into existence.

$p_l\cdot R_l\left(\widetilde{L}_l^e\right)=\bar{r}_f>p_l\cdot R_l\left(L_l^e\right)\cdots(n=\infty)$ [17]

$p_l\cdot R_l\left(\widetilde{L}_l^e\right)>\bar{r}_f>p_l\cdot R_l\left(L_l^e\right)$, or $p_l\cdot R_l\left(\widetilde{L}_l^e\right)>p_l\cdot R_l\left(L_l^e\right)\geq\bar{r}_f\cdots(n\neq\infty)$

$p_s\cdot R_s\left(\widetilde{L}_s^e\right)>\bar{r}_f>p_s\cdot R_s\left(L_s^e\right)$, or $p_s\cdot R_s\left(\widetilde{L}_s^e\right)>p_s\cdot R_s\left(L_s^e\right)\geq\bar{r}_f$

It should be noticed that the marginal expected returns of firm's projects, which also rise, are equal to or larger than those of banks. The effects of liberalization on $\Delta\widetilde{W}_{l(s)}$ are complicated just a little as follows.

(I) When $p_l\cdot R_l\left(\widetilde{L}_l^e\right)=\bar{r}_f>p_l\cdot R_l\left(L_l^e\right)$ come into being, the decrease of a large bank's credits are accompanied by a decrease of large firm's projects whose marginal expected returns are <u>below</u> foreign interest rate. Therefore, $\Delta\widetilde{W}_l(n)>0$ comes into being.

(II) When $p_{l(s)}\cdot R_{l(s)}\left(\widetilde{L}_{l(s)}^e\right)>\bar{r}_f>p_{l(s)}\cdot R_{l(s)}\left(L_{l(s)}^e\right)$ come into being, the decreases of a bank's credits are accompanied by decreases in both firm's projects whose marginal expected returns are <u>below</u> foreign interest rate and ones <u>above</u> the foreign interest rate. Therefore, the marks of $\Delta\widetilde{W}_{l(s)}(n)$ become indefinite.

(III) When $p_{l(s)}\cdot R_{l(s)}\left(\widetilde{L}_{l(s)}^e\right)>p_{l(s)}\cdot R_{l(s)}\left(L_{l(s)}^e\right)\geq\bar{r}_f$ come into being, the decreases of bank's credits are accompanied by the decreases of firm's projects whose marginal expected returns are <u>above</u> the foreign interest rate. Therefore, $\Delta\widetilde{W}_{l(s)}(n)<0$ come into being.

Next, the deposit demand increases till the deposit rate rises to the equal level with $\bar{r}_f\,(=\rho\left(\widetilde{L}_l^e+\widetilde{L}_s^e\right)>\rho\left(L_l^e+L_s^e\right))$. This means that the domestic fund becomes utilized till its marginal cost rises to the foreign interest rate $(D^e<\widetilde{D}^e)$. Therefore $\Delta\widetilde{W}_d(n)>0$ comes into being.

It is obvious that the mark of $\Delta\widetilde{W}(n)$ depends on the marks and magnitudes of each term. Consequently, $\Delta\widetilde{W}(n)$ is indefinite of the mark.

PROPOSITION 7 suggests that if the foreign interest rate is higher than the domestic one, then the possibility appears that the liberalization of international debt flow decreases the total surplus. Corollary 7-1 shows such an example.

Corollary 7-1: If $p_{l(s)}\cdot R_{l(s)}\left(L_{l(s)}^e\right)\geq\bar{r}_f>\rho\left(L_l^e+L_s^e\right)$ and $\rho'=\infty$, then $\Delta\widetilde{W}_l(n)<0$, $\Delta\widetilde{W}_s(n)<0$, $\Delta\widetilde{W}_d(n)=0$ and $\Delta\widetilde{W}(n)<0$ are attained.

From the above consideration of PROPOSITION 7, it is obvious that if $p_{l(s)}\cdot R_{l(s)}\left(L_{l(s)}^e\right)\geq\bar{r}_f>$

17) If $n=\infty$, then $p_l\cdot R_l\left(\widetilde{L}_l^e\right)=\bar{r}_f>p_l\cdot R_l\left(L_l^e\right)=\rho\left(L_l^e+L_s^e\right)$ comes into being from equation (1) and (2).

$\rho\left(L_l^e+L_s^e\right)$, then the liberalization of international debt flow decreases bank's credits for the large and the small and medium-sized firm's projects whose marginal expected returns are above the foreign interest rate. Therefore, $\Delta\widetilde{W}_{l(s)}(n)<0$ come into being. On the other hand, when ρ' approaches infinity, $\widetilde{D}^e(n)$ converges to $D^e(n)$. Therefore, $\Delta\widetilde{W}_d(n)=0$ and $\Delta\widetilde{W}(n)<0$ come into being.

5. Implications

This section brings out some implications for financial globalization from the above theoretical results. For that purpose, I would like to rearrange and re-express some of the main theoretical results up to this point, as follows.

(A) If the international debt flow is prohibited, the government can increase the total surplus through entry restriction for large banks, and that the larger the degree of imperfect information is and the smaller the interest elasticity of demand for deposit is, the smaller is the number of optimal large banks (n_s) (PROPOSITION 2, Corollary 2-1, 2-2).

(B) If the international debt flow has been liberalized, then the government can increase the total surplus through loosening entry restriction for large banks and the optimal number of large banks is infinity (PROPOSITION 4).

(C) If the foreign interest rate is lower than the domestic one and the number of large banks is given, the liberalization of international debt flow increases the total surplus (PROPOSITION 5).

(D) If the foreign interest rate is higher than domestic one and the number of large banks is given, the possibility appears that the liberalization of international debt flow decrease the total surplus (PROPOSITION 7, Corollary 7-1).

Sequencing Financial Liberalization

The theoretical results suggest that the government should proceed with domestic liberalization gradually till the conditions characteristic of developing countries have varied sufficiently (∵(A)) and make an over-all liberalization once the international debt flow has liberalized (∵(B)). It seems that these suggestions present new insights as to how the entry of foreign banks should be. Many studies insist that the entry of foreign banks has many positive effects on efficiency[18]. But, here, I would like to note the facts that foreign bank's information base with respect to small and medium-sized domestic firms is often weaker than that of domestic banks[19] and foreign banks tend to lend to large firms. This means that there is a possibility

18) See Mishkin (2001).

19) Stiglitz and Greenwald (2003) states as follows: "the foreigner's information base is often markedly

that the entry of foreign banks before liberalization of international debt flow has the same negative effect as the loosening of entry restriction for domestic large banks does.

Financial Restrictions vs. Financial Globalization

The theoretical results also suggest that there is a possibility that the combination of entry restriction on large banks and prohibition of international debt flow is superior to the removal of such restrictions and that its likelihood is higher under following conditions characteristic of developing countries.

- The demand for funds is large in comparison with domestic savings, in other words, if there were no domestic restrictions, the deposit rate has a tendency to be higher than the foreign interest rate ($\rho(L_l^e([\infty]+L_s^e[\infty])\geq\bar{r}_f$)
- The degree of imperfect information is high
- The interest elasticity of demand for deposit is low

I would like to verify this implication through comparing developing countries' total surpluses in following 2 cases.

Financial Restrictions

The government maximizes the total surplus through entry restriction for large banks on condition that the international debt flow is prohibited.

In this case, the total surplus is $W(n_s)$ and the domestic deposit has the tendency to go to a sharply lower range of interest because the number of optimal large banks (n_s) is small ($\because$ (A)). The latter implies, it is quite possible that the deposit rate falls below the foreign interest rate. Here, we consider such a situation[20], when the following relations come into being.

$$(10)\quad \underline{p_s(L_s^e[n_s])\cdot R_s(L_s^e[n_s])>p_l\cdot R_l(L_l^e[n_s])}>p_l\cdot R_l(L_l^e[\infty]) \\ =\rho(L_l^e[\infty]+L_s^e[\infty])>\bar{r}_f>\rho(L_l^e[n_s]+L_s^e[n_s])$$

It should be noticed that the first inequality is derived from the fact that the government selects n_s as the decrement of surplus brought about through the transfer of funds from the credit for the small and medium-sized firms to one for large firms becomes equal to the increment of surplus through the additional increase of credit for large firms financed by the increment of deposit (PROPOSITION2).

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weaker, at least with respect to small and medium-sized domestic firms, than is that of domestic banks" (pp. 234). They discuss the effects of entry restriction for foreign banks intuitively, focusing on the difference of loans for between foreign firms and domestic ones.

20) Even if the fall of domestic deposit rate stops above the foreign interest rate, the conclusion of this section does not essentially change.

Financial Globalization

The government maximizes the total surplus through the removal of entry restriction for large banks on condition that the international debt flow is liberalized.

In this case, the total surplus is $\widetilde{W}(\infty)$ and the marginal expected return of large firm's project becomes equal to $\bar{r}_f$ because the optimal number of large banks is infinity (∵(B)). On the other hand, the marginal expected return of small and medium-sized firm's project becomes larger than one in the case of Financial Restrictions because the liberalization of international debt flow enables the banks to invest their funds at the higher interest rate as compared with one in the case of Financial Restrictions. This means that following relations come into being.

$$(11)\quad \underline{p_s(\widetilde{L}_s^e[\infty])\cdot R_s(\widetilde{L}_s^e[\infty]) > p_s(L_s^e[n_s])\cdot R_s(L_s^e[n_s])}_{(a)}$$
$$> \underline{p_l\cdot R_l(L_l^e[n_s]) > p_l\cdot R_l(\widetilde{L}_l^e[\infty])}_{(b)} = \bar{r}_f = \underline{\rho(\widetilde{D}^e[\infty]) > \rho(L_s^e[n_s]+L_s^e[n_s])}_{(c)}$$

Here, let us consider the case that the government changes the policy from Financial Restrictions to Financial Globalization, and examine how the total surplus varies through this policy change. The variation of total surplus can be expressed as follows.

$$\widetilde{W}(\infty) - W(n_s) = \int_{L_l^c(n_s)}^{\widetilde{L}_l^c(\infty)} \{p_l\cdot R_l(L_l) - \bar{r}_f\}\, dL_l$$
$$+ \int_{L_s^c(n_s)}^{\widetilde{L}_s^c(\infty)} \{p_s\cdot R_s(L_s) - \bar{r}_f\}\, dL_s + \int_{D^c(n_s)}^{\widetilde{D}^c(\infty)} \{\bar{r}_f - \rho(D)\}\, dD$$
$$= \int_{L_l^c(n_s)}^{\widetilde{L}_l^c(\infty)} \{p_l\cdot R_l(L_l) - \bar{r}_f\}\, dL_l + \Delta\widetilde{W}_s(n_s) + \Delta\widetilde{W}_d(n_s)$$

It should be noticed that the removal of entry restriction for large banks has no influence on the credit for small and medium-sized firms and the deposit ($\widetilde{L}_s^e(n_s)=\widetilde{L}_s^e(\infty)$, $\widetilde{D}(n_s)=\widetilde{D}(\infty)$) and as the foreign interest rate is higher than domestic one in the case of Financial Restrictions, there is a possibility that the liberalization of international debt flow decreases total surplus (∵(D)). It is easy to verify that the mark of each term of right hand side of the above equation is as follows from (11).

- The mark of 1st term —— positive

The reason why is that the increase of bank's credit for large firms is accompanied by the increase of firm's projects whose marginal expected returns are above the foreign interest rate (∵underline (b) of (11)). This means that the combination of international debt flow and removal of entry restriction for large banks enables the large firms to put every project whose marginal expected return exceeds the foreign interest rate into practice.

- The mark of 2nd term —— negative

The reason why is that the decrease of a bank's credits is accompanied by the decrease of firm's projects whose marginal expected returns are above the foreign interest rate (∵under-

line (a) of (11)). This means that the liberalization of international debt flow induces a situation wherein the small and mediam-sized firms cannot implement the larger part of their projects whose marginal expected returns are above the foreign interest rate. Here, we should make a special mention of the fact that the decrement of surplus through the unit decrease of a small and medium-sized firm's project is larger than the increment of surplus through the unit increase of a large firm's project, and the larger the extent of imperfect information is, the larger the difference is (∵underline (a), (b) of (11)).

- The mark of 3rd term —— positive

The reason why is that the deposit increases till the deposit rate has risen to the equal level with the foreign interest rate (∵underline (c) of (11)). This means that the domestic fund becomes utilized till its marginal cost rises to the equal level with the foreign interest rate. But, it should be noticed that the increment of deposit becomes small when the interest elasticity of demand for deposit is low. So we can consider the absolute value of 3rd term small.

Consequently, we can conclude that it is quite possible[21] that the policy change from Financial Restrictions to Financial Globalization has a negative effect on the total surplus under conditions characteristic of developing countries[22].

6. Conclusion

Many studies that note the problems of financial globalization, insist on the importance of moral hazard in banking, credit rationing and instabilities stemming from international capital markets. But the conclusions in this article suggest that even if there were no such problems, globalization would not necessarily has positive effects on the efficiency of fund allocation if only adverse-selection effect exists in a part of domestic loan markets. The results emphasized in this article, while natural consequences of asymmetric information, often escape unnoticed. But understanding these conclusions would help to recognize the effects of financial globalization and the roles of competition-restriction policies.

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21) For example, let us consider the case that $\rho' = \infty$ and $\rho(L_l^e[\infty] + L_s^e[\infty]) = \bar{r}_f$ come into being. Then we can verify that $\tilde{L}_l^e(\infty) + \tilde{L}_s^e(\infty) = L_l^e(n_s) + L_s^e(n_s)$, $\tilde{L}_l^e(\infty) > L_l^e(n_s)$, $\tilde{L}_s^e(\infty) < L_s^e(n_s)$ come into existence. In this case, the mark of 3rd term is 0 and the absolute value of 2nd term dominates one of 1st term because the increment of large firm's project becomes equal to the decrement of small and medium-sized firm's project, therefore, it is obvious that the policy change from Financial Restriction to Financial Globalization induces the decrease of total surplus.

22) This conclusion is close in spirit to those of Hellmann, Murdoch, and Stiglitz (1997, 2000). But it should be noticed that while they note the effects of giving banks the excess profit opportunity through deposit-rate controls for prudent bank behaviour and name such policy Financial Restraint, we note the re-allocation effects of funds through differential entry restrictions for efficiency and name this Financial Restriction.

［Appendix1］

It is easy to verify that the left hand side of conditional equation in PROPOSITION 2 is the increasing function of n, but the right hand side is the decreasing function of n as follows.

$$d(p_s \cdot R_s - p_l \cdot R_l)/dn = \overbrace{(p_s \cdot R_s)'}^{\ominus} \cdot \overbrace{(dL_s/dn)}^{\ominus} - \overbrace{(p_l \cdot R_l)'}^{\ominus} \cdot \overbrace{(dL_l/dn)}^{\oplus} > 0$$

$$d\{[-p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})/\rho'] \cdot (p_l \cdot R_l - \rho)\}/dn$$

$$= \overbrace{\{1/(\rho')^2\}}^{\ominus} \cdot \left\{ \overbrace{[-p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})]'}^{\ominus} \cdot \overbrace{(dL_s/dn)}^{\ominus} \cdot \overbrace{\rho'}^{\oplus} - \overbrace{[-p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})]}^{\ominus} \cdot \overbrace{\rho''}^{0\oplus} \cdot \overbrace{(dD/dn)}^{\oplus} \right\}$$

$$\cdot \overbrace{(p_l \cdot R_l) - \rho}^{0\oplus} + \overbrace{[-p_a \cdot R_s' \cdot (1-\eta_{p_a R_s})/\rho']}^{\oplus} \cdot \left\{ \overbrace{(p_l \cdot R_l)'}^{\ominus} \cdot \overbrace{(dL_l/dn)}^{\oplus} - \overbrace{\rho'}^{\oplus} \cdot \overbrace{(dD/dn)}^{\oplus} \right\} < 0$$

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