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Noriyuki Yanagawa
University of Tokyo
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Financial Imperfection and Outsourcing Decision*

Noriyuki Yanagawa
Faculty of Economics,
University of Tokyo
yanagawa@e.u-tokyo.ac.jp

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Abstract

The relation between productivity level and the mode of organization remains an unsolved puzzle in international trade theory. As pointed out by Antràs and Helpman (2004), while some studies indicate that low productivity firms choose to outsource, other studies have derived results to the contrary. This paper attempts to solve the puzzle by taking into account the imperfections of financial markets. If the enforcement level of the financial market in the South country is low, only low productivity firms choose outsourcing in the South. On the other hand, if the enforcement level is sufficiently high in the South country, high productivity firms choose outsourcing in the South and low productivity firms choose integration in the North country. Thus, we demonstrate that the difference in the empirical results of previous studies arises from the different degrees of financial imperfections in the host country. Furthermore, we extend this model to a multi-country model.

Key Words: Outsourcing, Organization, FDI, Financial Imperfection, Imperfect Enforcement.

JEL Classification: F10, F23, F36, G28, G32

1 Introduction

This paper demonstrates that financial imperfections or imperfect enforcement in the financial markets of host countries is an important factor in understanding outsourcing decisions in the South countries. The relation

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between productivity level and the mode of organization remains unsolved puzzle in international trade theory. Antràs and Helpman (2004), the seminal paper in this field, mentioned, for example, that “[t]his sorting pattern differs from the sorting pattern derived by Grossman and Helpman (in press)¹ for organizational structures...Empirical evidence is needed to discriminate between them”(p 570). Although many empirical papers have been published that examine the behaviors of multinational firms², we do not have a clear answer to this puzzle as yet. It remains unclear why two different theories and empirical results coexist. This paper endeavors to unify the two contrasting results and solve the puzzle by taking into account the imperfections of financial markets.

Recently, several papers have focused on the imperfections of financial markets and international trade. For example, Matsuyama (2005) has focused on the roles of corporate governance or contract enforcement under imperfect credit market conditions and examined how these factors affect the patterns of international trade. Antràs and Caballero (2007) has examined the relation between international capital flow and international trade by taking into account the imperfections of financial markets. Antràs and Caballero (2007) have demonstrated that in less financially developed economies, trade and capital mobility are complementary. Moreover, the paper has revealed that trade liberalization always decreases the wage-rental ratio in the South. Manova (2008) has examined the effects of credit constraints on international capital flows. Manova (2008) has indicated that financially developed countries are more likely to export bilaterally and ship greater volumes when they become exporters.³ Thus, it has been recognized that the existence of imperfections in financial markets is an important element in the elaboration of international trade theory. However, the relation between imperfect financial markets and the choice of organization structure has not been examined intensively.⁴ Hence, the present paper focuses on this aspect and demonstrates that the degree of imperfection in the financial market of the host country is crucial for the realized mode of organization.

In general, financial contracts constitute a coordination device for agents.

¹This paper was published as Grossman and Helpman (2004).

²For example, Yeaple (2006) and Tomiura (2007). An excellent survey paper concerning this field is Bernard et al. (forthcoming).

³Other papers are Kletzer and Bardhan (1987), Beck (2002), Chaney(2005), Ju and Wei (2005), Becker and Greenberg (2005), Svaleryd and Vlachos (2005), and Wynne (2005).

⁴Antras et al.(2006) and Chor et al.(2008) examined the behavior of multinational firms and financial imperfections. However, since these paper did not examine the choice of organization mode, their purposes differ from the purpose of this paper.

If the financial system is imperfect, coordination among agents becomes imperfect, and this imperfection affects the choice of organization modes. We show that if the financial market is less developed and the enforcement level is low in a South country, low productivity firms choose outsourcing in the South. This result is consistent with the result of Grossman and Helpman (2004). On the other hand, if the enforcement level is sufficiently high in the South country, high productivity firms choose outsourcing in the South and low productivity firms choose the integration in the North country. This result is consistent with the result in Antràs and Helpman (2004). Thus, we reveal that the difference in the empirical results of the previous studies arises as a result of the different degree of financial imperfection in the host country. Why is imperfection of the financial market such a crucial element? An intuitive reason is as follows. If a financial market is less developed, it is difficult for a final-good producer to absorb the ex post gain from the South through the use of financial transfers. Hence, the outsourcing—which leads to the South enjoying higher bargaining power—is not a good strategy for productive final-good producers.

This result is consistent with empirical observations. For example, Grossman and Helpman (2004) referred to an empirical analysis by Lin and Png (2003) as evidence that supports their theory. The empirical test by Lin and Png (2003) examined the behavior of Taiwanese firms with respect to the period from 1987 to 1991, with China as the targeted host country. Hence, it appears that Lin and Png (2003) dealt with the case of less developed financial markets. Aw and Lee (2008), in a recent empirical analysis, also examined Taiwanese firms' foreign direct investments (FDIs) in China, and its results are more consistent with those of Antràs and Helpman (2004) and Helpman et al. (2004)⁵. Aw and Lee (2008) used the firm-level data in 2000. In the 90s, the Chinese economy had grown up and the financial market had developed. Hence, Aw and Lee (2008) dealt with a more developed financial market as compared with Lin and Png (2003). Marin (2006) has explored that because of the improvements in the contracting environment in Eastern Europe, outsourcing is increasing; however, firms prefer offshoring over outsourcing when the cost of holdup is high. Moreover, McKendrick et al. (2000) has illustrated as an example, that bigger and more productive firms are choosing to outsource more complicated productions such as the man-

⁵Aw and Lee (2008) have shown that less productive firms choose the integration strategy. Of course, the data set in Aw and Lee (2008) is different from that used in Lin and Png (2003), and Aw and Lee (2008) did not examine the difference between outsourcing and FDI. Hence, the results in Aw and Lee (2008) and Lin and Png (2003) are not necessarily contradictory.

ufacture of HDD drives provided the institutional environment of the host country is improved.

In order to clarify this point, we extend the model of Antràs and Helpman (2004). In order to focus on imperfection in the financial market, we assume that the manufacturing sector does not have initial wealth and that it has to borrow from outside investors to pay the up-front payments or setup costs. However, the manufacturing sector is financially constrained and it is difficult for them to borrow a sufficient amount even if the sector will get positive profits in the future. Instead, we assume that the level of fixed costs is independent of organization structure. Antràs and Helpman (2004) crucially assumed that the fixed cost payment depends upon the organization structure. Hence, in their model, the choice of organization structure is crucially affected by the assumption of a relative amount of fixed costs. In this paper, we assume that the fixed cost is independent of the organization mode. We can show that even under this assumption, the mode of organization is dependent on the productivity level of the firm.

The argument of this paper is in line with the literature examining heterogeneous productivity and international trade. There exist many important empirical papers including pioneer papers such as Bernard and Jensen (1995) (1997). Bernard et al. (2008) is a survey paper on the empirical analyses conducted in this field. Melitz (2003) is a seminal theoretical paper, while Helpman (2006) is a review of the important papers in this field. In addition, Nunn and Trefler (2008) examined the behavior of multinational firms by considering the heterogeneous productivity of each firm.

This paper contributes to the new research topic emphasizing the importance of infrastructure or institutional environments in international trade considerations. Nunn (2007) has shown that countries with good contract enforcement specialize in the production of goods for which relationship-specific investments. Bernard et al. (2008) is concerned with the enforcement of trade contracts. It has demonstrated that intra-firm trade is high for the products with low levels of contractibility. Yeaple and Golub (2007) examined the effect of infrastructure provision on industry-level productivity and international specialization. Levchenko (2007) stressed on institutional differences as a source of comparative advantage. Chor et al. (2007) examined how the level of financial development in host countries affects the spatial distribution of the sales of multinational corporations (MNCs).

In section 2, we present a basic model of this paper, and in section 3, we derive the optimal bargaining power of final-good producers when they can choose any level of ex post bargaining power. In section 4, we examine the choice of organization modes both when the enforcement level in the

South is low and when it is high. In section 5, we examine a multi-country model, and in section 6, we introduce the possibility of FDIs. In section 7, we conclude the paper and mention some extensions.

2 Model

Consider a world with one North country and one South country. (We extend this model to a multi-country model in a subsequent section.) A unique factor of production is labor, and all consumers worldwide have an identical preference that is given by

$$U = x_0 + \frac{1}{\mu} \sum_{j=1}^J X_j^\mu, \quad 0 < \mu < 1, \quad (1)$$

where

$$X_j = \left[\int x_j(i)^\alpha di \right]^{1/\alpha}, \quad 0 < \alpha < 1, \quad (2)$$

and x_0 is the consumption level of the numeraire good. In addition, X_j is an index of aggregate consumption in sector j , and μ is a parameter. Moreover, $x_j(i)$ is the consumption level of variety i in sector j , and the range of i will be determined endogenously. The elasticity of substitution between any two varieties in a given sector is $1/(1-\alpha)$, and we assume $\alpha > \mu$ as conventionally assumed in the related literature. Under the standard assumptions concerning the monopolistic competition setting, we can derive the following inverse demand function for variety i in sector j .

$$p_j(i) = X_j^{\mu-\alpha} x_j(i)^{\alpha-1}. \quad (3)$$

The production function of a final good is

$$x_j(i) = \theta \left[\frac{h_j(i)}{\eta_j} \right]^{\eta_j} \left[\frac{m_j(i)}{1-\eta_j} \right]^{1-\eta_j}, \quad 0 < \eta_j < 1. \quad (4)$$

Here, we assume that production requires two specific investments— $h_j(i)$ for headquarter services and $m_j(i)$ for manufactured components. Under the

demand function and the production function, the revenue function $R_j(i) = p_j(i)x_j(i)$ can be written as follows.

$$R_j(i) = X^{\mu-\alpha}\theta^\alpha \left[\frac{h(i)}{\eta_j} \right]^{\alpha\eta_j} \left[\frac{m(i)}{1-\eta_j} \right]^{\alpha(1-\eta_j)}. \quad (5)$$

Hereafter, since we focus solely on industry j , and thus we omit the subscript j from the remaining notations. As assumed in Antràs and Helpman (2004) or Helpman (2006), the final-good producers, H , who supply head-quarter services enter into contracts with the operators of manufacturing plants, M , who supply intermediate inputs. The sequence of the game is as follows. At date 0, a final-good producer, H , contracts with the operator of a manufacturing plant, M . As generally assumed in the related literature, we assume that there are many potential operators ex ante and that H has strong bargaining power over M at this time. Moreover, H must pay the setup cost of the plant, wT , at date 0. For simplicity, it is assumed that the setup cost wT is exogenously given and is independent of the organization structure or the location of the plant. Of course, H may be able to negotiate with M to share a portion of the setup cost. The negotiation process will be explained subsequently. At the beginning of date 1, h and m are chosen, and the costs for h and m and the fixed costs of production should be paid. Then, the final goods are produced and sold to consumers.

First, we examine the ex post sharing rule of profit. Since we employ the standard incomplete contracts approach, it is impossible to write complete contracts specifying any future complex contingency. Thus, after choosing $h(i)$ and $m(i)$, the two parties negotiate about the sharing of the ex post benefit. The bargaining power for the ex post negotiation is affected by the parties' organization structures. We will examine the optimal organization structure below.

We assume here that R is divided into βR and $(1-\beta)R$ and that β is determined by the chosen organization structure. Under the sharing rule, each party maximizes the following problems.

$$Max_h \beta R - wh - wkf, \quad (6)$$

$$Max_m (1-\beta)R - wm - w(1-k)f, \quad (7)$$

where wkf and $w(1-k)f$ are the fixed costs that H and M have to pay, respectively. We assume here that the total fixed cost, wf , is independent

of the organization structure. Thus, H has to pay wkf and M has to pay $w(1-k)f$. Moreover, k is a fixed parameter and depends on the place of operation as will be explained below. Of course, this is an extreme situation. The purpose of this assumption is to show that even though the total fixed cost is irrelevant to the outsourcing decision, there will be heterogenous choices in organization structure. This point is in contrast to the result of Antràs and Helpman (2004). Under the setting of Antràs and Helpman (2004), the fixed cost is dependent upon the organization structure, and the level of fixed cost is crucial for the optimal organization choice. Furthermore, we simply assume that the fixed cost is measured by the wage rate of the North. Our argument is not affected even though we change this assumption.

From the maximization problems, the equilibrium revenue R^* , which depends upon β , becomes as follows.

$$R^* = X^{(\mu-\alpha)/(1-\alpha)} \theta^{\alpha/(1-\alpha)} \left\{ \alpha \left(\frac{\beta}{w} \right)^\eta \left(\frac{1-\beta}{w^l} \right)^{1-\eta} \right\}^{\alpha/(1-\alpha)}, \quad (8)$$

$$wh^* = \alpha\eta\beta R^*, \quad (9)$$

$$wm^* = \alpha(1-\eta)(1-\beta)R^*. \quad (10)$$

Hence, at date 1, H can expect to obtain

$$\begin{aligned} g^H &= \beta R^* - wh^* - wkf \\ &= (1-\alpha\eta)\beta R^* - wkf, \end{aligned} \quad (11)$$

and M can expect to obtain

$$\begin{aligned} g^M &= (1-\beta)R^* - w^l m^* - w(1-k)f \\ &= (1-\alpha+\alpha\eta)(1-\beta)R^* - w(1-k)f. \end{aligned} \quad (12)$$

Next, we examine the negotiation over the payment of the setup cost wT . Since the final-good producer can expect the allocation of profit to be determined in the manner explained above, at date 0, H may request M to share the setup cost payment, t . Theoretically, this payment corresponds to the fixed up-front payment that M has to pay to H . We have assumed here that H has 100% bargaining power at date 0, as assumed in the literature. Hence, this t is used to absorb the ex post gain of M , that is, g^M . Even if M can expect to obtain g^M at date 1, it may not have sufficient cash at date 0. Hence, the amount of costs that the manufacturing plant can pay at date 0 is dependent upon the financial condition of the country to which M belongs. We will examine this point more carefully below.

(a) Perfect financial market

If M has a sufficient amount of assets, t will be set as $t = g^M$ to absorb all of M 's ex post gain. In this situation, the ex ante expected gain of the final-good producer becomes

$$\begin{aligned}\pi^* &\equiv g^H + t - wT = g^H + g^M - wT \\ &= R^* - wh^* - wm^* - wf - wT.\end{aligned}\tag{13}$$

This situation is consistent with that of Antrás and Helpman (2004), since the latter held the assumption that H uses the up-front payment to absorb all of M 's positive gain. In this situation, H can supply the product so long as $\pi^* \geq 0$.

The profit of each final producer whose productivity level is θ can be written as

$$\begin{aligned}\pi^*(\theta) &= R^*(\theta) - wh^*(\theta) - wm^*(\theta) - w(f + T) \\ &= [1 - \alpha\{\beta\eta + (1 - \beta)(1 - \eta)\}]R^*(\theta) - w(f + T).\end{aligned}\tag{14}$$

We define θ^* as the cutoff level of the productivity where $\pi^*(\theta^*) = 0$. In other words, firms whose productivity is $\theta \geq \theta^*$ can supply the product.

However, we assume that the operators of manufacturing plants have no initial wealth and must borrow to make the up-front payment t . Even so, H can absorb $t = g^M$ if the financial market is perfect, since it is possible for M to borrow g^M .

(b) Imperfect financial market

If the financial market is imperfect, however, M is only able to borrow an amount less than g^M . Given this situation, the final-good producer must set the up-front payment as less than g^M , even though H has the ex ante bargaining power.

We assume that the manufacturing sector can borrow to pay a maximum up-front payment of

$$t^*(\beta, \gamma) = \gamma g^M, \quad 0 \leq \gamma \leq 1. \quad (15)$$

Here, γ is the degree of imperfection in the financial market. There are various reasons why γ becomes less than 1 (see Matsuyama, 2005, or Antràs and Caballero, 2007). As Matsuyama (2005) mentions, “[i]t is possible to give any number of agency stories to justify the assumption” (P.715, fn1), such as the moral hazard opportunity of the manufacturing sector or strategic default possibilities. Here we simply assume that the problem of imperfect enforcement exists in the financial market. Consequently, while lenders can expect the manufacturing sector to earn g^M , it is impossible to capture the entire amount since the enforcement mechanism is imperfect. Thus, lenders can expect to recover (under any contracts) at most γg^M and lend at maximum γg^M .

Under the imperfect enforcement situation, the final-good producer’s profit $\Pi(\beta, \gamma)$ becomes as follows.

$$\begin{aligned} \Pi &= g^H + t^* - wT = g^H + \gamma g^M - wT & (16) \\ &= (1 - \alpha\eta)\beta R^* - wkf + \gamma \{(1 - \alpha + \alpha\eta)(1 - \beta)R^* - w(1 - k)f\} - wT \\ &= [\beta(1 - \alpha\eta) + \gamma(1 - \beta) \{1 - \alpha(1 - \eta)\}] R^* - \{k + \gamma(1 - k)\} wf - wT. \end{aligned}$$

However, we should be careful because g^M might be negative even when Π is positive. If g^M is negative, the lump-sum transfer t should be negative. In other words, the final-good producer is required to compensate for the negative profit of the manufacturing sector in order to realize production. In such cases, the imperfect enforcement problem is irrelevant so long as the final-good producer has sufficient wealth. In order to examine this point more carefully, we define the following threshold levels.

Let us define $\tilde{\theta}$ as the cutoff level of Π , that is, $\Pi(\tilde{\theta}) = 0$, and θ^M as the cutoff level of g^M , that is, $g^M(\theta^M) = 0$. If $\tilde{\theta} \geq \theta^M$, we need not be concerned with the possibility of a negative g^M . Since g^M is an increasing function of θ , $g^M(\theta) \geq 0$ falls in the range of $\theta \geq \tilde{\theta}$. On the other hand,

if $\tilde{\theta} < \theta^M$, H —whose productivity is smaller than θ^M — compensates for its negative profit, that is, g^M . Hence, $g^H + t^* = g^H + g^M = \pi^*$. In other words, the threshold productivity level becomes θ^* if $\tilde{\theta} < \theta^M$.

Pursuing this more rigorously, we get the following Lemma.

Lemma 1 When $\frac{T}{f} > \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$,

$$\Pi^*(\theta) = \begin{cases} [\beta(1-\alpha\eta) + \gamma(1-\beta)\{1-\alpha(1-\eta)\}]R^* & \text{if } \tilde{\theta} \leq \theta \\ -\{k + \gamma(1-k)\}wf - wT \geq 0 & \\ 0 & \text{if } \theta < \tilde{\theta}. \end{cases}$$

When $\frac{T}{f} \leq \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$,

$$\Pi^*(\theta) = \begin{cases} [\beta(1-\alpha\eta) + \gamma(1-\beta)\{1-\alpha(1-\eta)\}]R^* & \text{if } \theta \geq \theta^M \\ -\{k + \gamma(1-k)\}wf - wT > 0 & \\ [1-\alpha\{\beta\eta + (1-\beta)(1-\eta)\}]R^*(\theta) & \text{if } \theta^* \leq \theta \leq \theta^M \\ -wf - wT > 0 & \\ 0 & \text{if } \theta < \theta^* \end{cases}$$

Proof. Since Π is an increasing function of θ , $\tilde{\theta} \geq \theta^M$, and we need not have to be concerned with a negative g^M provided $\Pi(\theta^M) \leq 0$. On the other hand, if $\Pi(\theta^M) > 0$, then $\tilde{\theta} < \theta^M$ and $\Pi^*(\theta) = [1-\alpha\{\beta\eta + (1-\beta)(1-\eta)\}]R^*(\theta) - wf - wT > 0$ for $\theta^* \leq \theta^M$. Hence, we should examine check whether or not $\Pi(\theta^M) > 0$. From the definition of g^M , $R^*(\theta^M) = \frac{1-k}{(1-\alpha+\alpha\eta)(1-\beta)}wf$. Hence $\Pi(\theta^M) = g^H(\theta^M) - wT = wf\left\{\frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)} - \frac{T}{f}\right\}$. This implies $\Pi(\theta^M) > 0$ if and only if $\frac{T}{f} < \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$. We thus obtain the result. ■

Hereafter, we mainly focus on the case where $\frac{T}{f} > \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$

and the cutoff productivity level is $\tilde{\theta}$. We can easily show that $\tilde{\theta}$ is higher than θ^* and that this gap is a decreasing function of the enforcement level γ . In other words, less productive firms must exit from the market if the financial market of the country is less developed. If the financial market is developed and γ becomes sufficiently high, less productive firms can survive the market competition.

Proposition 2 *If $\frac{T}{f} > \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$, then $\tilde{\theta} \geq \theta^*$ and $\tilde{\theta} - \theta^*$ is a decreasing function of γ .*

Proof. From the proof of Lemma 1, $g^H(\tilde{\theta}) - wT < 0$ and $g^M(\tilde{\theta}) > 0$ if $\frac{T}{f} > \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$. Since $\pi^*(\tilde{\theta}) - \Pi(\tilde{\theta}) = (1 - \gamma)g^M(\tilde{\theta})$, $\pi^*(\tilde{\theta}) \geq 0$ and $\pi^*(\tilde{\theta})$ is a decreasing function of γ . This implies that $\tilde{\theta} \geq \theta^*$ and that $\tilde{\theta} - \theta^*$ is a decreasing function of γ . ■

Here, we should mention the timing of payment t . The question arises as to whether payment t can be made after production, then M does not have to borrow t from the financial market, and the above argument returns to the world of Antràs and Helpman (2004). Such intuition is not correct, however, since M may not pay the exact promised payment after production. In general, the late payment situation corresponds to the case where the final-good producer H lends t to M until the end of production. Hence, even if the lender is the final-good producer and not an outside investor, it is difficult for the lender to capture all of the gain so long as the financial market is imperfect.

However, there exists a possibility that in the negotiation over the financial payment, the final-good producer is a more powerful negotiator than outside investors, since H has bargaining power over M with regard to the sharing of R . In particular, in the case of vertical integration, H may have more bargaining power than outside investors, and the enforcement level γ may become higher since H has the right to seize the assets of the manufacturing sector. The existence of such a possibility does not affect our argument because we have already assumed that $\gamma^n > \gamma^s$. However, when we consider the possibility of FDI, it may be necessary to take into account this point, and the enforcement level under FDI should be higher than that under outsourcing at the South⁶. We will consider this case in a subsequent section.

3 Optimal bargaining power

First, we examine the optimal β given enforcement technology γ . Although we restrict the feasible β in the subsequent explanation as Antràs

⁶This situation is closely related to the argument in Antràs et al. (2007).

and Helpman (2004) have assumed, we first check the optimal β when the enforcement technology is given by the structure of the financial market. The optimal β given γ and η , $\beta^*(\gamma, \eta)$ is derived as follows.

$$\beta^*(\gamma, \eta) = \text{ArgMax}\Pi(\beta, \gamma; \eta). \quad (17)$$

From the first order condition, β^* should satisfy the condition

$$- \{1 - \alpha\eta - \gamma(1 - \alpha + \alpha\eta)\} \beta^2 + (1 - \alpha + \alpha\eta) \{1 - \alpha\eta - \gamma(1 + \alpha\eta)\} \beta + \alpha\eta(1 - \alpha + \alpha\eta) = 0, \quad (18)$$

while the second-order condition is

$$-2 \{1 - \alpha\eta - \gamma(1 - \alpha + \alpha\eta)\} \beta + (1 - \alpha + \alpha\eta) \{1 - \alpha\eta - \gamma(1 + \alpha\eta)\} \leq 0. \quad (19)$$

When $\eta = 0$, the first-order condition and second-order condition respectively become

$$- \{1 - \gamma(1 - \alpha)\} \beta^2 + (1 - \alpha)(1 - \gamma)\beta = 0, \quad (20)$$

$$-2 \{1 - \gamma(1 - \alpha)\} \beta + (1 - \alpha)(1 - \gamma) \leq 0. \quad (21)$$

Hence,

$$\beta^*(\gamma, 0) = \frac{(1 - \alpha)(1 - \gamma)}{1 - \gamma + \alpha}. \quad (22)$$

If $\gamma = 1$, it is evident that $\beta^* = 0$, as explored by Antràs and Helpman (2004). If $\gamma < 1$, however, $\beta^*(\gamma, 0) > 0$. This implies that even if η is sufficiently small, the final-good producer should not accord all the bargaining power to the manufacturing sector. An intuitive reason is as follows. When the financial market is perfect, the final-good producer can absorb the ex post rent of M through the up-front payment. Thus, the final-good producer need not be concerned with the loss of bargaining power. When η is sufficiently small, the incentive of the manufacturing sector is important, and this indicates that it is better to allocate bargaining power to the manufacturing. On the other hand, if $\gamma < 1$, the final-good producer cannot absorb the ex post rent of the manufacturing. Hence, it is not the best strategy for

the final-good producer to allocate the bargaining power, and thus the ex post rent, to the manufacturing.

Moreover, we can easily see from (22) that

$$\frac{\partial \beta^*(\gamma, 0)}{\partial \gamma} < 0. \quad (23)$$

Proposition 3 *Provided $\gamma < 1$, $\beta^*(\gamma, \eta) > 0$ and $\frac{\partial \beta^*(\gamma, \eta)}{\partial \gamma} < 0$ even if $\eta = 0$.*

Proof. Those are directly derived from (22) and (23). ■

This result deviates considerably from the result of Antràs and Helpman (2004). The intuitive reason is as follows. Under the imperfect enforcement problem, the final-good producer cannot absorb all the ex post rent that is thus allocated to the manufacturing sector. Hence, it is not the best strategy to allocate all the bargaining power to the manufacturing sector if the financial market is imperfect. However, this result is not inconsistent with the empirical results that support Antràs (2003) and Antràs and Helpman (2004). Those results (for example, Antràs, 2003; Yeaple, 2006; Nunn and Treffer, 2007) do not directly examine the cases where $\eta = 0$. They have tested, for example, the positive relationship between intra-firm trade shares and headquarter service intensity.⁷ Moreover, even in our argument, β^* is an increasing function of η . Thus, our argument is not inconsistent with the results. In other words, this result suggests that the effect might be observed more clearly in empirical examinations that are more concerned with the financial market condition of host countries.

When $\eta = 1$, the first-order condition becomes

$$-(1 - \alpha - \gamma)\beta^2 + \{1 - \alpha - \gamma(1 + \alpha)\}\beta + \alpha = 0 \quad (24)$$

while the second-order condition becomes

$$-2(1 - \alpha - \gamma)\beta + 1 - \alpha - \gamma(1 + \alpha) \leq 0. \quad (25)$$

The best strategy is to choose $\beta = 1$, since the feasible set of β is $0 \leq \beta \leq 1$. Hence, this result is consistent with Antràs and Helpman (2004).

Note that the condition $\frac{T}{f} > \frac{(1-k)(1-\alpha\eta)\beta-k(1-\alpha+\alpha\eta)(1-\beta)}{(1-\alpha+\alpha\eta)(1-\beta)}$ is violated when $\beta = 1$. This implies that the final-good producer with a low θ is required to compensate for the ex post negative profit of the manufacturing sector. Even so, $\beta = 1$ is the optimal allocation of bargaining power, and

⁷Nunn and Treffer (2007) called this effect the ‘‘Antràs effect’’.

the final-good producer should compensate for the ex post negative profit. The intuitive reason is simple. Even for such final-good producers, the profit after compensation is maximized at $\beta = 1$, since the best strategy is $\beta = 1$ even if $\gamma = 1$.

4 Organization Choice

Here, we compare vertical integration in the North and outsourcing in the South. We assume here that

$$w^n > w^s, \gamma^n > \gamma^s, \beta^n > \beta^s, k^n > k^s. \quad (26)$$

The above assumptions are natural in our setting. First, we assume that the wage rate of the North is higher than that of the South. This is a standard assumption in the literature. It is natural to assume that the financial market of the North is more efficient than that of the South. Hence, we assume that the enforcement level of the North, γ^n , is higher than that of the South, that is, γ^s . The third assumption arises from the difference in the organizational structure. As Antràs and Helpman (2004) have explored, it is natural to assume that the bargaining power of the final-good producer under the integration, β^n , is higher than that under the outsourcing, that is, β^s . Lastly, we assume that under the outsourcing, the manufacturing sector is required to pay a relatively higher fixed cost, that is, $k^n > k^s$.

To examine the optimal organization structure, we rewrite the profit function as follows.

$$\Pi^l(\theta) = \Phi^l X^{(\mu-\alpha)/(1-\alpha)} \theta^{\alpha/(1-\alpha)} - K^l w^n f - w^n T, \quad l = n, s, \quad (27)$$

where

$$\Phi^l = \frac{\beta^l(1-\alpha\eta) + \gamma^l(1-\beta^l)\{1-\alpha(1-\eta)\}}{\left\{ \alpha \left(\frac{\beta^l}{w^n} \right)^\eta \left(\frac{1-\beta^l}{w^l} \right)^{1-\eta} \right\}^{(1-\alpha)/\alpha}}, \quad (28)$$

$$K^l = k^l + \gamma^l(1-k^l). \quad (29)$$

If $\Pi^n(\theta) \geq \Pi^s(\theta)$ (and $\Pi^n(\theta) \geq 0$), a final-good producer with productivity θ chooses integration in the North. On the other hand, if $\Pi^n(\theta) < \Pi^s(\theta)$ (and $\Pi^s(\theta) \geq 0$), a final-good producer with productivity θ chooses outsourcing in the South. Moreover, if $\Pi^n(\theta) < 0$ and $\Pi^s(\theta) < 0$, a final-good producer with productivity θ exits the market. Of course, $\Pi^n(\theta)$ and $\Pi^s(\theta)$ are dependent upon γ . We can easily see that Φ^l and K^l are increasing functions of γ .

Here, we focus on γ^s , that is, the enforcement level of the South country.

Case(1) Low enforcement level

First, we examine the case where γ^s is sufficiently low and the following conditions are satisfied.

$$\Phi^s < \Phi^n \quad (30)$$

and

$$K^s < K^n. \quad (31)$$

Even if $w > w_s$, the above inequality is satisfied as long as γ^s is sufficiently low.

We depict this situation in Figure 1. The South Outsourcing (SO) line shows $\Pi^s(\theta)$ and the North Integration (NI) line shows $\Pi^n(\theta)$. Since γ^s is low and the above two conditions are satisfied, NI line is steeper than the SO line. Hence, as seen in Figure 1, low productivity firms choose outsourcing in the South while high productivity firms choose integration in the North. The cutoff levels are as follows.

$$\theta_L = X^{(\alpha-\mu)/\alpha} \left[\frac{K^s w^n f - w^n T}{\Phi^s} \right]^{(1-\alpha)/\alpha}, \quad (32)$$

$$\theta_M = X^{(\alpha-\mu)/\alpha} \left[\frac{(K^n - K^s) w^n f}{\Phi^n - \Phi^s} \right]^{(1-\alpha)/\alpha}, \quad (33)$$

The firms whose productivity is lower than θ_L will exit the market, and the firms whose θ is in the range of $[\theta_L, \theta_M]$ will choose outsourcing in the South. The firms whose θ is higher than θ_M will choose integration in the North.

More rigorously, this is the case where $\frac{K^s w^n f - w^n T}{\Phi^s} \leq \frac{K^n w^n f - w^n T}{\Phi^n}$. If $\frac{K^s w^n f - w^n T}{\Phi^s} > \frac{K^n w^n f - w^n T}{\Phi^n}$, all the firms whose θ is higher than

$$X^{(\alpha-\mu)/\alpha} \left[\frac{K^n w^n f - w^n T}{\Phi^n} \right]^{(1-\alpha)/\alpha}$$

choose integration in the North.

The situation is consistent with the results of Grossman and Helpman (2004). If the enforcement technology of the south is sufficiently low, low productivity firms choose outsourcing. Since the enforcement level is low, it is difficult for final-good producers to absorb the ex post gain of the manufacturing. On the other hand, this implies that the effective fixed cost for final-good producers should decrease, since H has to pay only $\gamma^s(1 - k^s)$. Hence, outsourcing is attractive for low productivity firms; however, high productivity firms prefer integration.

Case(2) High enforcement level case

We now consider the case where γ^s is sufficiently high. In this case, the organization structure may become quite different. High productivity firms may choose outsourcing. To pursue this more rigorously, we consider the case where γ^s is sufficiently high and the following conditions are satisfied.

$$\Phi^s > \Phi^n \tag{34}$$

and

$$K^s > K^n. \tag{35}$$

First, we examine the case where $\frac{K^n w^n f - w^n T}{\Phi^n} \leq \frac{K^s w^n f - w^n T}{\Phi^s}$. This situation is presented in Figure 2. In this case the SO line is steeper than the NI line and the tangent of the SO line is higher than that of the NI line. Hence, as indicated in figure 2 shows, only high productivity firms choose outsourcing. Rigorous cutoff levels are as follows.

$$\theta_l = X^{(\alpha-\mu)/\alpha} \left[\frac{K^n w^n f - w^n T}{\Phi^n} \right]^{(1-\alpha)/\alpha}, \tag{36}$$

$$\theta_m = X^{(\alpha-\mu)/\alpha} \left[\frac{(K^s - K^n) w^n f}{\Phi^s - \Phi^n} \right]^{(1-\alpha)/\alpha}. \tag{37}$$

The firms whose productivity is lower than θ_l will exit the market while the firms whose θ is in the range of $[\theta_l, \theta_m]$ will choose integration in the North. The firms whose θ is higher than θ_m will choose outsourcing in the South.

If $\frac{K^n w^n f - w^n T}{\Phi^n} > \frac{K^s w^n f - w^n T}{\Phi^s}$, all the firms whose θ is higher than

$$X^{(\alpha-\mu)/\alpha} \left[\frac{K^s w^n f - w^n T}{\Phi^s} \right]^{(1-\alpha)/\alpha}$$

choose outsourcing.

This result is consistent with the result of Antràs and Helpman (2004). However, we should stress that we have assumed the amount of fixed cost wf to be independent of organization structure. This assumption is quite different from that of Antràs and Helpman (2004). They assumed that outsourcing in the South requires high fixed cost, and thus, only high productivity firms choose outsourcing. The result of this paper has demonstrated that the assumption of Antràs and Helpman (2004) is not a necessary condition for obtaining the above result.

Moreover, our results have solved the paradox concerning outsourcing decisions. Here, we have established that the results of Grossman and Helpman (2004) and Antràs and Helpman (2004) are not inconsistent. The difference in their results arise from differences in the imperfections of financial markets or differences of enforcement technology in financial markets. If the financial market of the South is very imperfect, high productivity firms choose the integration strategy, and only low productivity firms choose the outsourcing strategy. This is the picture that Grossman and Helpman (2004) have projected and is consistent with the empirical evidences that they cited. Actually Grossman and Helpman (2004) assumed that final-good producers do not use the up-front payments. This implies that they have implicitly assumed the existence of some kinds of financial imperfection.

(3) Comparative Statics

In order to clarify the above argument, we examine some comparative statics to derive more complete picture of the above argument. We examine which type of organization pattern emerges when γ^s and w^s change. As explored in the above arguments, the crucial factors for the determination of organization pattern are Φ and K . Since K depends only on γ and does not depend on w , let us define γ^{s*} as γ^s , which realizes $K^s = K^n$, that is,

$$k^s + \gamma^{s*}(1 - k^s) = k^n + \gamma^n(1 - k^n).$$

Hence, K^s is smaller (larger) than K^n if and only if γ^s is smaller (larger) than γ^{s*} . Next let define $W_1^s(\gamma^s)$ as the wage rate of the south w^s which realizes $\Phi^s = \Phi^n$ given γ^s . Since $\partial\Phi^s/\partial w^s < 0$ and $\partial\Phi^s/\partial\gamma^s > 0$, we obtain $dW_1^s/d\gamma^s > 0$. Similarly, let us define $W_2^s(\gamma^s)$ as the wage rate of the south w^s which realizes

$$\frac{K^s w^n f - w^n T}{\Phi^s} = \frac{K^n w^n f - w^n T}{\Phi^n}.$$

When $\gamma^s = \gamma^{s*}$, $K^s = K^n$ from the definition of γ^{s*} , and thus, Φ^s must be equal to Φ^n for satisfying the above equation. Hence, we can state that $W_1^s(\gamma^{s*}) = W_2^s(\gamma^{s*})$. Furthermore, if $\gamma^s < \gamma^{s*}$, K^s is smaller than K^n , and Φ^s must be smaller than Φ^n for satisfying the above equation. This implies $W_1^s(\gamma^s)$ is smaller than $W_2^s(\gamma^s)$, since $\partial\Phi^s/\partial w^s < 0$. On the other hand, if $\gamma^s > \gamma^{s*}$, Φ^s must be smaller than Φ^n for satisfying the above equation, and $W_1^s(\gamma^s) > W_2^s(\gamma^s)$. In summary, we obtain the relations given below. These relations are also summarized in Figure 3.

$$\begin{aligned} W_1^s(\gamma^s) &< W_2^s(\gamma^s), & \text{if } \gamma^s < \gamma^{s*}, \\ W_1^s(\gamma^s) &> W_2^s(\gamma^s), & \text{if } \gamma^s > \gamma^{s*}. \end{aligned}$$

First, we examine the situation in which $\gamma^s < \gamma^{s*}$, that is, $K^s < K^n$. Obviously, if $\Phi^s \geq \Phi^n$, all firms choose outsourcing in the South. In other words, if $w^s \leq W_1^s(\gamma^s)$, outsourcing becomes the optimal strategy for all firms. On the other hand, if $\Phi^s \leq \Phi^n$ and $\frac{K^s w^n f - w^n T}{\Phi^s} \geq \frac{K^n w^n f - w^n T}{\Phi^n}$, all firms choose integration in the North. Hence, if $w^s \geq W_2^s(\gamma^s)$, integration becomes the optimal strategy for all firms. Therefore, if $W_2^s(\gamma^s) \geq w^s \geq W_1^s(\gamma^s)$, low productivity firms choose the South outsourcing strategy and high productivity firms choose the North integration strategy, that is, the Grossman = Helpman type situation is realized, since $\Phi^s \leq \Phi^n$ and $\frac{K^s w^n f - w^n T}{\Phi^s} \leq \frac{K^n w^n f - w^n T}{\Phi^n}$.

Next, we examine the situation in which $\gamma^s \geq \gamma^{s*}$, that is, $K^s \geq K^n$. In this situation, all firms choose integration in the North if $w^s \geq W_2^s(\gamma^s)$, since Φ^s becomes smaller than Φ^n . On the other hand, if $w^s \leq W_1^s(\gamma^s)$, all firms choose outsourcing in the South since $\Phi^s \geq \Phi^n$ and $\frac{K^s w^n f - w^n T}{\Phi^s} \leq \frac{K^n w^n f - w^n T}{\Phi^n}$. Thus, if $W_1^s(\gamma^s) \geq w^s \geq W_2^s(\gamma^s)$, low productivity firms choose the North integration strategy and high productivity firms choose the South outsourcing strategy, that is, the Antràs = Helpman type situation is realized, since $\Phi^s \geq \Phi^n$ but $\frac{K^s w^n f - w^n T}{\Phi^s} \geq \frac{K^n w^n f - w^n T}{\Phi^n}$. These are summarized in Figure 3.

5 Multi-country model

We can naturally extend the above argument to a multi-country model. Of course many possibilities emerge with the extension of the above argument to multi-country cases. Hence, we focus on a simple and interesting case. In order to focus on differences in enforcement structures, we assume that there is one North country and two South countries. The enforcement level γ^{s1} and wage rate w^{s1} of one South country are low whereas those of the other South country, that is γ^{s2} and w^{s2} , are high. We assume that

$$\gamma^{s1} < \gamma^{s2} < \gamma^n, \quad (38)$$

$$w^{s1} < w^{s2} < w^n. \quad (39)$$

The other aspects of these South countries remain the same.

$$\Phi^l = \frac{\beta^l(1 - \alpha\eta) + \gamma^l(1 - \beta^l) \{1 - \alpha(1 - \eta)\}}{\left\{ \alpha \left(\frac{\beta^l}{w^n} \right)^\eta \left(\frac{1 - \beta^l}{w^l} \right)^{1 - \eta} \right\}^{(1 - \alpha)/\alpha}}, \quad (40)$$

$$K^l = k^l + \gamma^l(1 - k^l). \quad (41)$$

Obviously $\Phi^{s1} < \Phi^{s2}$ and $K^{s1} < K^{s2}$. Hence, if $\Phi^{s1} < \Phi^n < \Phi^{s2}$ and $K^{s1} < K^n < K^{s2}$, we obtain the following clear separation. Low θ ($\theta_1 \leq \theta \leq \theta_2$) firms choose outsourcing in the South country with γ , while high θ firms ($\theta_3 \leq \theta$) choose outsourcing in the South country with high γ . Only firms with middle θ ($\theta_2 \leq \theta \leq \theta_3$) choose integration in the North country. This situation is consistent with the result derived by Grossman and Helpman (2004). Figure 4 depicts this situation.

6 Possibility of FDI

In the previous sections, we have assumed that there are only two organization structures, namely integration in the North and outsourcing in the South. In this section, we introduce another alternative, namely FDI. Even

if we introduce the additional choice of FDI, the basic argument is not affected. From the argument of the previous section, we understand that there are two major differences between FDI (integration in the South) and outsourcing in the South: the ex post bargaining power β and the enforcement level γ . Let us define β^f as the bargaining power of H under the FDI strategy and that γ^f as the enforcement level of H under the FDI strategy. As explored in the previous literature⁸, it is natural to assume that $\beta^f > \beta^s$, since integration generates a stronger threat to the manufacturing sector under the bargaining process. Moreover, as examined in the previous section, we assume that $\gamma^f > \gamma^s$, since final-good producers may have stronger power in capturing the profit of the manufacturing sector. From the definition of Φ , $\partial\Phi/\partial\beta > 0$ when η is sufficiently high and $\partial\Phi/\partial\gamma > 0$. Moreover, K is an increasing function of γ . Hence, provided that the sector under consideration is headquarter-intensive, that is, η is sufficiently high, we can derive that

$$\Phi^s < \Phi^f, \quad (42)$$

$$K^s < K^f. \quad (43)$$

We can easily obtain that under low enforcement levels, $\Phi^s < \Phi^f < \Phi^n$ and $K^s < K^f < K^n$. Therefore, low productivity firms choose outsourcing in the South and middle productivity firms choose FDI and high productivity firms choose integration in the North. This situation is consistent with Grossman and Helpman (2004). On the other hand, if the enforcement level in the South is sufficiently high, then $\Phi^n < \Phi^s < \Phi^f$ and $K^n < K^s < K^f$. Hence, low productivity firms choose integration in the North, middle productivity firms choose outsourcing in the South and high productivity firms choose FDI. This situation is consistent with the argument of Antràs and Helpman (2004). The results are summarized in Figure 5.

Once again, we should stress that we have derived the above situations with the assumption that the fixed cost does not varies with organization structure. Even if the total fixed cost is irrelevant to the organization and its location choices, several types of organization structures should be chosen. This point is important for understanding the FDI choice. Under the argument of Antràs and Helpman (2004), the difference in fixed cost between FDI and outsourcing in the South is crucial for the argument of Antràs and Helpman (2004).

Our argument is consistent with the empirical finding by Chor et al. (2007), which examined the relation between the financial condition of a host

⁸For example, Antràs (2003) and Antràs and Helpman (2004).

country and the decisions to undertake FDI. Chor et al. (2007) have shown that “stronger financial development in the host country has a negative effect on the share of MNC affiliate sales that remain in the host country.” Our argument has also shown that firms that had chosen the FDI strategy previously may change to the integration strategy or outsourcing strategy if the enforcement level in the financial market has improved.

7 Conclusion and Extension

In this paper, we have demonstrated that the optimal mode of organization is crucially dependent upon the financial market condition of the host country. If the financial market of the host country is not too developed and the enforcement level is low, only the final-good producers whose productivity is low choose outsourcing in the South. On the other hand, if the financial market is developed and the enforcement level is high, only the final-good producers whose productivity level is high choose outsourcing in the South. This result can solve the puzzle which was pointed out by Antràs and Helpman (2004). We have also shown that the empirical results cited by Antràs and Helpman (2004) and Grossman and Helpman (2004) are not inconsistent. The mode of organization varies depending upon the condition of the financial market in the host country.

By extending the above result, we will be able to obtain several implications about product cycle arguments. For example, the question arises, quite naturally, as to why outsourcing is gaining popularity in the world economy, even though the wage rates of the South countries are rising gradually. It is difficult to answer this question on the basis of the argument in Antràs and Helpman (2004). In their model, the range of outsourcing should decrease when the wage rate in the South increases. By using the above result, we can answer the question. If both the wage rate and enforcement level increase in the South, the range of outsourcing should expand; moreover, high productivity firms choose the outsourcing strategy.

Let us take the example of a developing country. In the beginning, the financial market of this country is quite immature, and the enforcement mechanism does not work well. Under the development process, the legal mechanisms pertaining to the financial market are developed and the enforcement level is increased. Hence, if the enforcement level and the wage rate of the South country have improved, the situation moves from the one illustrated in Figure 1 to the one illustrated in Figure 2. This suggests that high productivity firms will choose outsourcing in the South. In other words, this

argument demonstrates that it is important to examine the change in wage rate and change of market imperfections of the South.

The results of this paper establish that even considering outsourcing or FDI decisions, we should be concerned with the conditions of the financial markets of the host countries, particularly those pertaining to the conditions of institutional quality or enforcement levels. Recently, the importance of institutional aspects has been stressed in several papers (for example, Nunn, 2007; Bernard et al., 2008; Yeaple and Golub, 2007; Levchenko, 2007; and Chor et al., 2007). However, those papers do not focus on outsourcing decisions intensively. The results of this paper suggest that careful examinations of the relation between firms' productivity levels and enforcement level in each host country are important for an in-depth understanding of outsourcing and FDI decisions.

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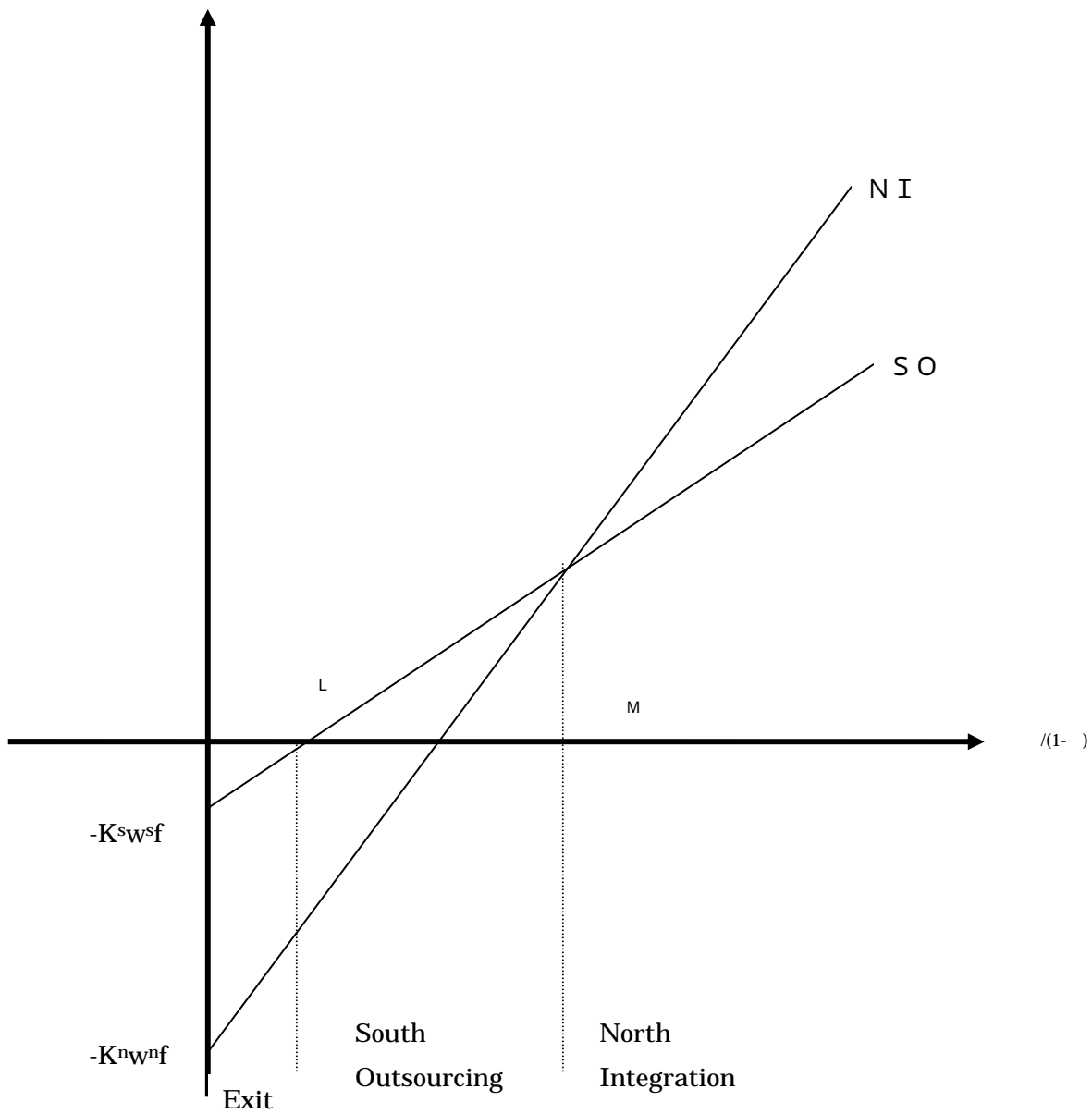


Figure 1: Case of low

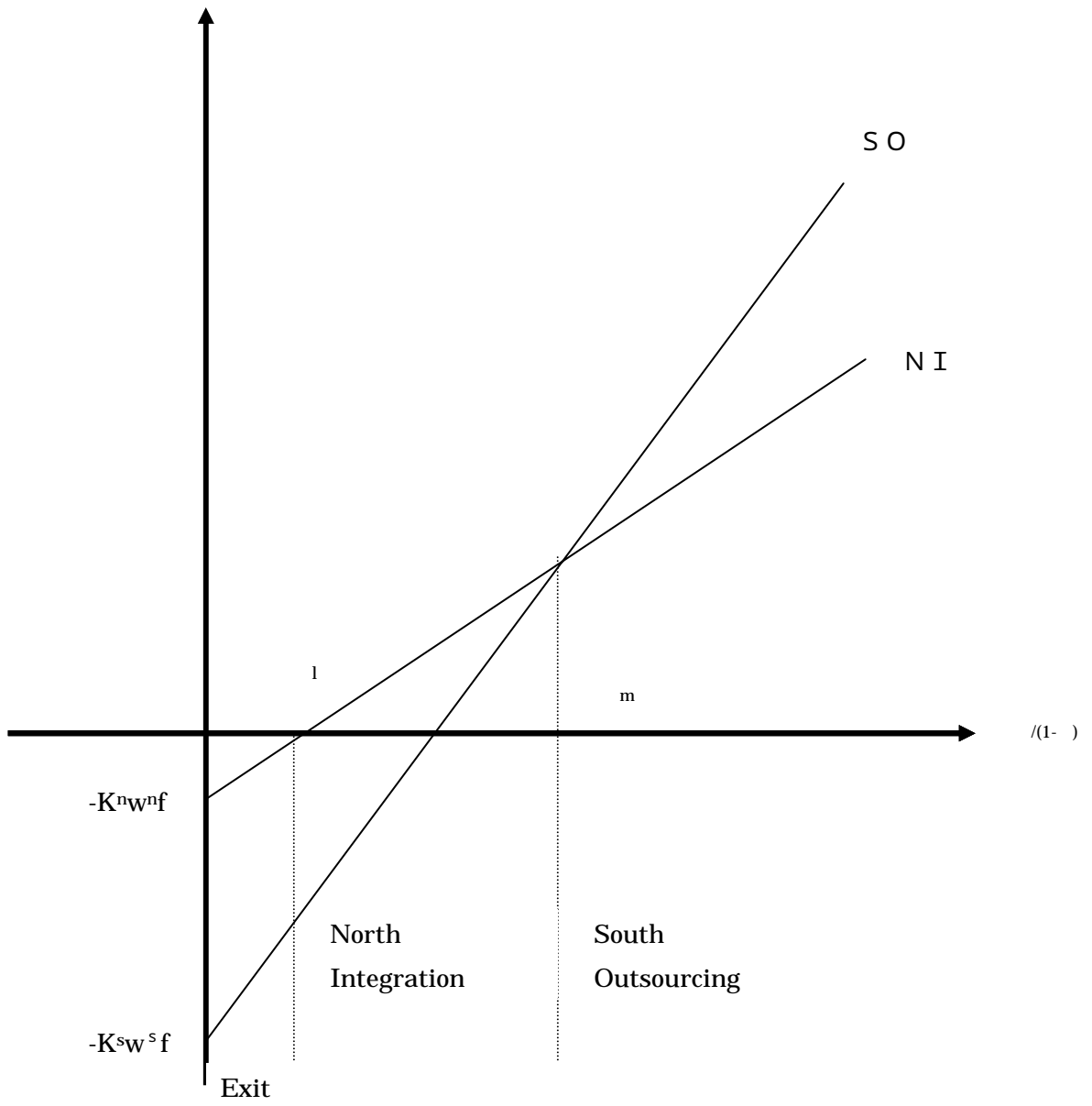


Figure 2: Case of high

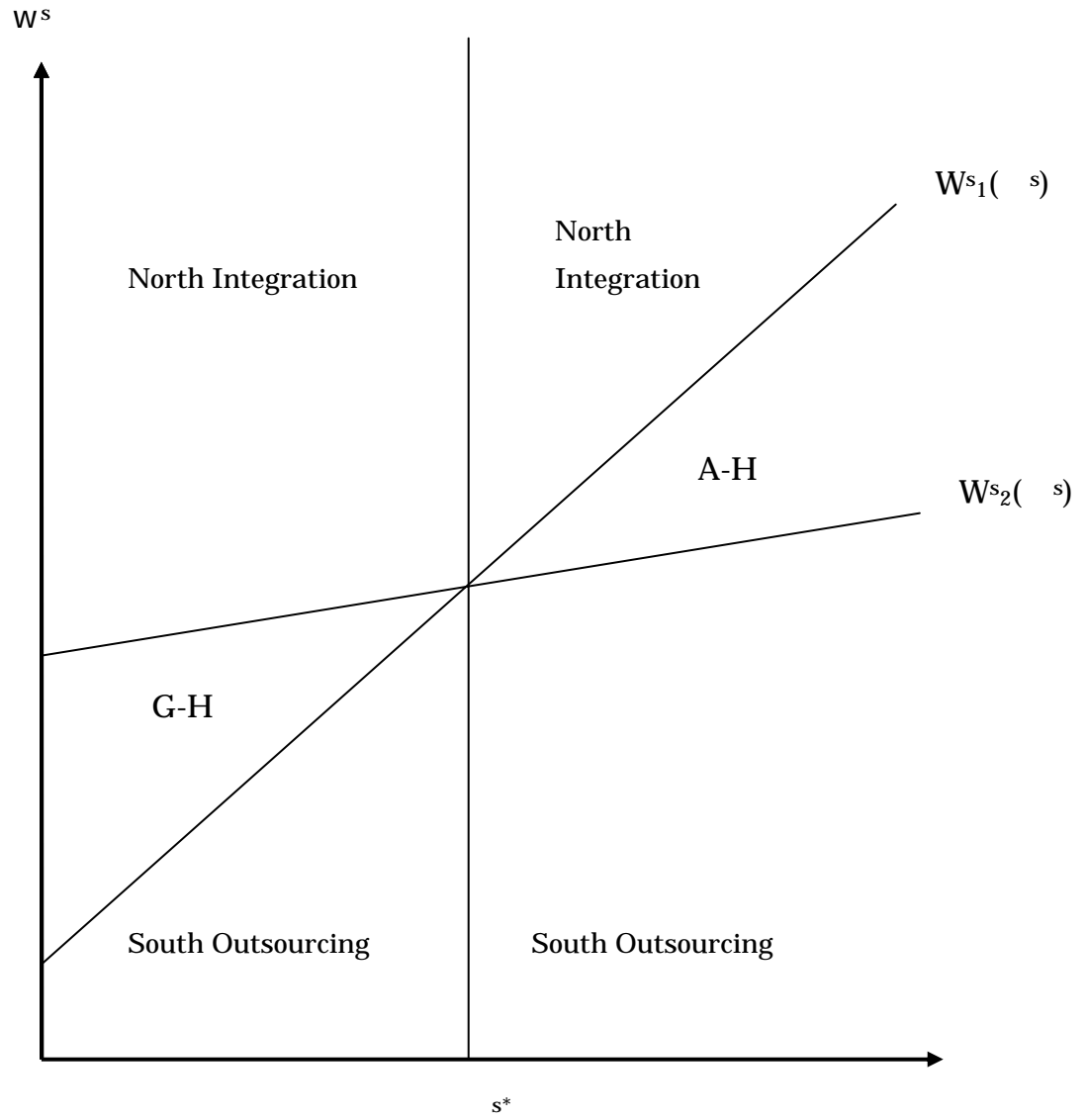


Figure 3: Comparative Statistics

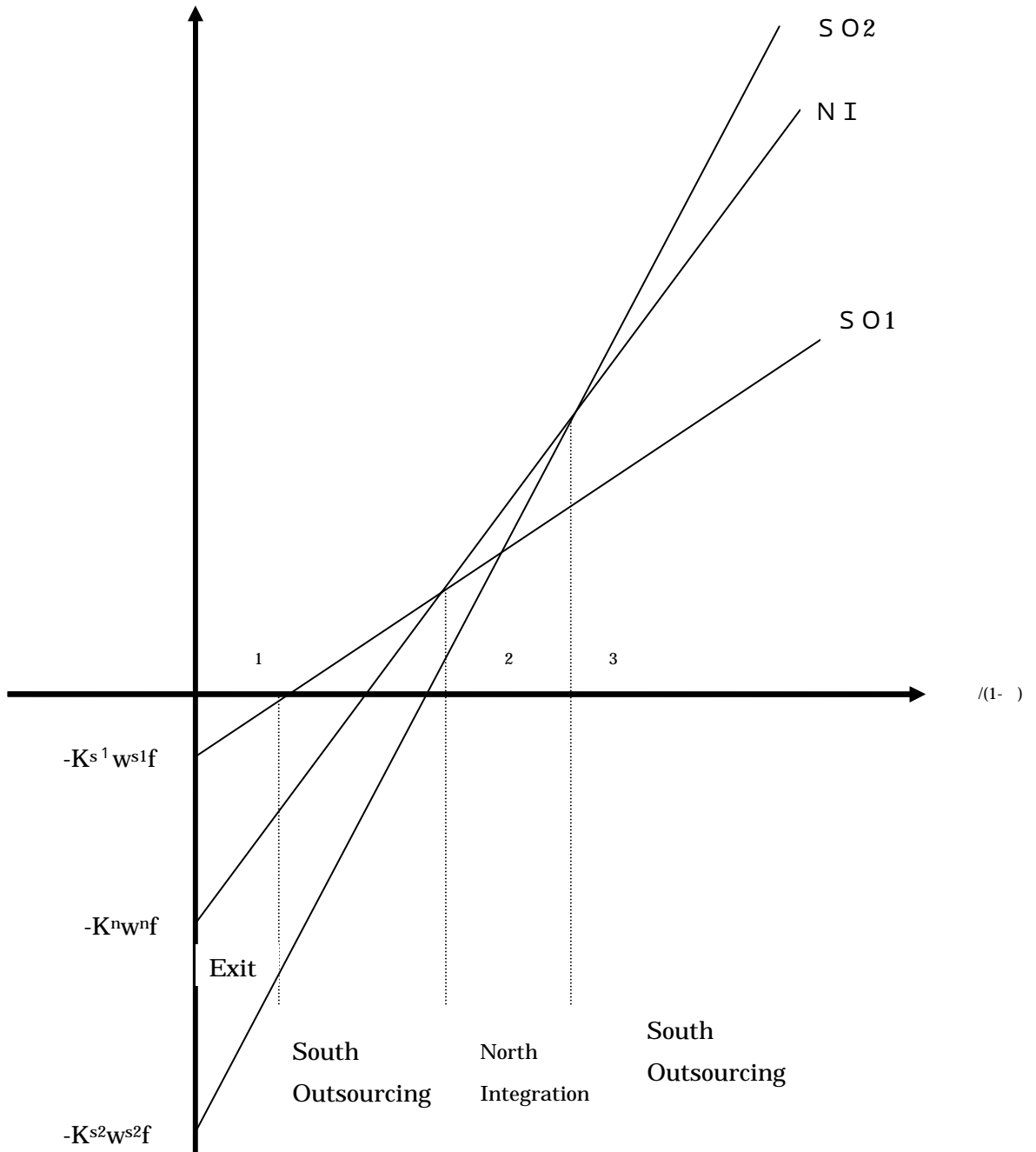
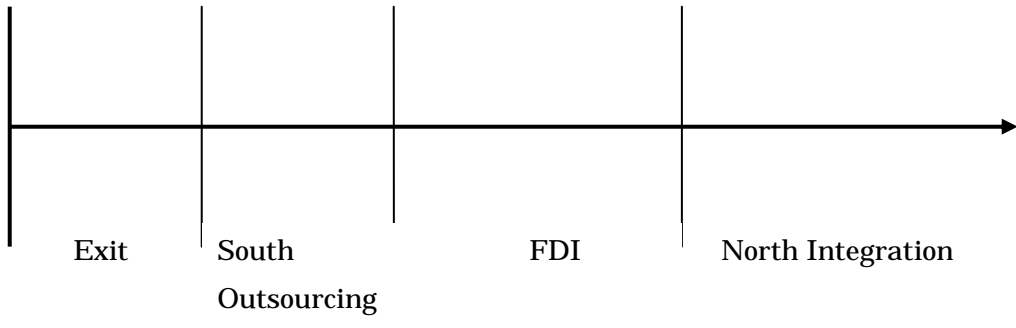
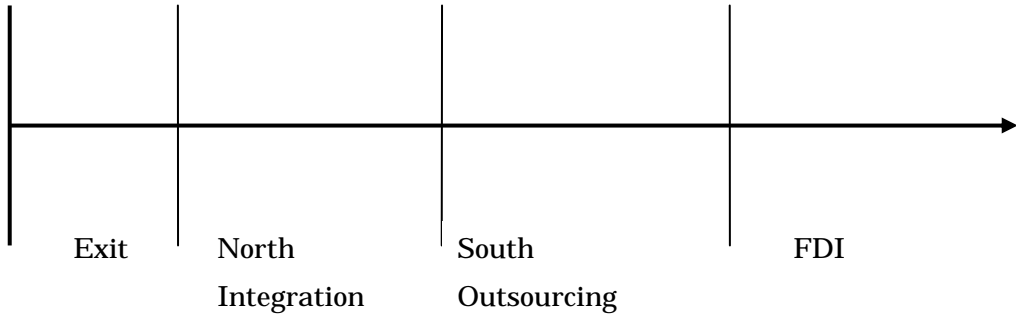


Figure 4: Multi-Country Case



Case of low



Case of high

Figure 5