Multinational Enterprise and Foreign Direct Investment: The Theory of Contracts, Finance and Ownership in International Business

Hidefumi Kasuga

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Introduction

In recent years, there has been an increase in the number of multinational enterprises (MNEs). Obviously, there are a number of reasons why firms become multinationals or engage in foreign direct investment (FDI). For example, a manufacturer establishes a new plant in a foreign country for low-wage workers or acquires a foreign company for advanced technology and skilled workers. In addition, policies implemented by host countries affect the behavior of MNEs. Clearly, trade restrictions such as tariffs and quotas lead to direct investment (tariff-jumping FDI). On the other hand, political instability decreases FDI inflows.

These complexities of multinational activities cause analytical difficulties; since there are too many aspects of multinationals, for example, the neoclassical trade model focuses on the impact of FDI on resource allocation and some researchers study FDI by focusing on market structure. Thus, it is difficult to capture the intricacies of the real-world MNEs in a single model. Nevertheless, over the past few decades, numerous attempts have been made by scholars to develop a general theory of MNEs. At present, in international business studies, transaction cost theory (internalization theory) of MNEs is widely accepted. This theory focuses on the choice of MNEs between inter-firm transactions and intra-firm transactions to investigate the nature of multinationals. Although the transaction cost approach cannot explain all the multinational activities, it provides a theoretical foundation to understand the boundaries of MNEs.

The theory of MNEs, unlike the neoclassical theory of international trade and investment, traditionally utilizes no rigorous mathematical models because it is difficult to describe the complexity of MNEs in a simple model. Unfortunately, the lack of mathematical sophistication leads to theoretical limitations as follows: (a) little is known about alliances between firms although various alliance forms are actually utilized by many MNEs for foreign operations; (b) the theory cannot explain the relationship between equity shares and control of subsidiaries; (c) little attention has been given to aggregate capital flows between countries in the theory of MNEs. These weaknesses arise because of the lack of formal models of internalization.

The purpose of this thesis is to solve these problems in the theory of MNEs. I utilize the theory of contracts to develop several formal models

of internalization (models of the choice between inter-firm transactions and intra-firm transactions) in this thesis.

Chapter 1 reviews existing theories of MNEs. This review shows defects in the prevailing explanation of multinational activities. The next three chapters provide three different formal models of MNEs to solve the problems of the conventional MNE theory presented above.

Chapter 2 utilizes an incomplete contract theory to explain various forms of alliances between independent firms. The basic model developed in Chapter 2 examines the MNE's choice between inter-firm transactions and intra-firm transactions. Although the conventional theory focuses on market failures, the model in Chapter 2 considers organizational failures and emphasizes the advantage of inter-firm transactions. The analysis shows that alliance forms such as original equipment manufacturing (OEM) and cross-licensing are chosen to encourage a business partner's unverifiable activity.

Chapter 3 explains why an MNE and a local firm collaborate in starting an equity joint venture in a simple model of financial contracts. Since the traditional theory focuses on full ownership, little is known about the ownership and financial structure of MNEs. This chapter investigates the following three foreign-investment forms: FDI, joint ventures and portfolio investment. In addition, the model developed in Chapter 3 demonstrates the relationship between control and equity shares in joint ventures. The model explicitly shows the equity share such that an MNE can be the controlling shareholder in a joint venture.

Chapter 4 considers the relationship between FDI flows and portfolio flows between countries. Since most studies of MNEs focus on the behavior of each firm, little attention has been given to aggregate capital movements in the theory of MNEs. As in other models in this thesis, a contract theoretical approach is utilized to develop a formal model of alliances. However, this chapter focuses on international capital movements and considers how each MNE's alliance choice relates to aggregate capital flows between countries.

Chapter 1

Theories of Multinational Enterprise

Why do firms extend their operations overseas? This fundamental question in the economic analysis of multinational enterprises (MNEs) has been studied by many researchers. The most influential approach in this field at present is the transaction cost theory of MNEs (internalization theory).

The theory of MNEs has developed independently of other economic theories such as the theory of international trade and the theory of industrial organization. Although the mathematical sophistication of models is important in other theories of economics, the MNE theory, which explains the complexity of the behavior of MNEs, does not utilize rigorous models.

Recently, in other fields of economics, theoretical models for institutional analysis are developing. However, these developed theories have not been fully utilized in the conventional theory of MNEs. This thesis is an attempt to explain various multinational activities by utilizing the new theories for institutional analysis. It is shown that using rigorous models can eliminate some defects of the conventional MNE theory.

Another important question posed in this thesis is as follows: How do firms extend their operations overseas? Some rigorous models based on the theory of contracts are developed here to answer this question. It is shown that the recent development of the theory enable us to analyze various multinational activities.

The remainder of this chapter is organized as follows. Section 1.1 provides an overview of the MNE theory. Section 1.2 shows some theoretical limitations of the conventional approach, which will be discussed in the following chapters. The final section shows the plan of the following chapters.

1.1 A survey of theories of multinationals

1.1.1 Hymer's hypothesis

The modern theory of MNEs was developed by Hymer (1960). In his theory, foreign direct investment (FDI) is distinguished from portfolio investment. A foreign investment is called FDI if a firm acquires a substantial controlling interest in another foreign firm or sets up a subsidiary in a foreign country. Hymer's theory of FDI is an attempt to explain post-war US corporate investment in Western European manufacturing industry.

How can foreign investing firms compete with indigenous producers, given the additional costs of foreign operations? Hymer poses this important question. His basic premise is that operating overseas costs more than operating at home because no foreigners have the same knowledge of the local environment, market and business conditions as indigenous competitors do. As Hymer suggests, if operating overseas is costly, foreign entrants must have some compensating advantage to compete with indigenous firms. Thus, Hymer argues that foreign investors possess various advantages over their rivals. This superiority of investors is called ownership advantages by Dunning (1988).

Why do investors choose FDI, instead of selling or renting their ownership advantages to indigenous firms by licensing? The argument of ownership advantage naturally leads to this question posed by Hymer. His answer to the second question is as follows: MNEs do not prefer licensing because markets for their ownership advantages, which are usually caused by intangible assets (such as technology and knowledge), are imperfect. Because of this imperfection, it is difficult for MNEs to sell their ownership advantages in markets. Hence, MNEs are willing to incur the cost of operating overseas. (Dunning's theory suggests that the benefit of avoiding the imperfection of markets confers "internalization advantage" on MNEs.) Thus, MNEs prefer exploiting their ownership advantage internally to selling their technology licenses through external markets. This answer to the second question of Hymer is based on market imperfections. To sum up, in Hymer's theory of FDI, the following conditions are necessary: (1) MNEs or foreign direct investors must have advantages to compensate the cost of operating overseas; (2) the market for technology licenses must be imperfect.

1.1.2 Structural and natural market imperfections

As Casson (1987), Dunning and Rugman (1985) and Hennart (1991b) state, Hymer (1960) fails to distinguish between two market imperfections: structural market imperfection and natural market imperfection. The structural market imperfection is caused by the monopolistic nature of ownership advantages, which is emphasized by Hymer. The natural market imperfection

is due to the fact that the neoclassical assumptions of perfect information and perfect enforcement are not realized.

The transaction cost theory, which is developed by Buckley and Casson (1976), Rugman (1980) and Hennart (1982, 1986), suggests that MNEs and FDI are explained by the natural market imperfection. This theory considers that FDI can reduce transaction costs due to the natural market imperfection by internalizing costly external transactions while Hymer views FDI as a method of maximizing monopoly power.

1.1.3 Transaction cost approach

As mentioned above, the transaction cost theory supposes that an MNE can bypass imperfections that are inherent attributes of markets. This theory is also known as internalization theory because it considers that multinational activities result from the internalization of imperfect transactions.

Hennart (1986) states that, in the early literature on the transaction cost theory such as Rugman (1980), firms are assumed to be more efficient than markets because firms can replace the imperfect external transaction by an efficient internal transaction. In other words, some transaction cost theorists suppose that intra-firm transactions can be efficient while inter-firm transactions are imperfect.

Hennart (1982, 1986) argues that markets (inter-firm transactions) and firms (intra-firm transactions) differ in the method they use to constrain behavior. He states that internalization avoids the imperfection of market transactions but reduces incentives to work and to collect information. Thus, this new transaction cost theory considers both market transaction costs and internal organization costs while the old version of the transaction cost theory focuses on market transaction costs.

Many researchers of the MNE theory attempt to integrate three separate theories: the theory of firms, the theory of international trade and the theory of international finance. It is clear that the multinational aspect of firms is emphasized in Hymer (1960). In contrast, the theory of firms developed by Coase (1937) exerts a strong influence on the recent transaction cost theory. It implies that, in the recent theory, the multinational aspect of firms is not emphasized necessarily; Casson (1987) states that the theory of *multinational* enterprises embraces the theory of *uninational* firms as a special case.[1]

[1]There are some fields unique to the study of multinational enterprises. For example, the analysis of international taxation and transfer pricing is a research area that is unique to the study of MNEs. (See, for example, Chapter 2, which shows that a difference in tax rates between countries gives firms an incentive to become multinational.) In general, the multinational aspect is essential when researchers focus on institutional, cultural and political differences between countries.

1.1.4 Other theories

This subsection surveys some of other main theories of multinational activities. Some researchers attempt to integrate MNEs into the model of international trade.[2] For example, Helpman (1984), Markusen (1984) and Dei (1991) develop the models of MNEs based on the theory of international trade. Although their studies consider the ownership advantage of MNEs, they do not focus on internalization, which is recognized as the central issue in the transaction cost theory. In contrast, Ethier (1986) analyzes internalization in the model of international trade.

Aliber (1970, 1993) emphasizes the financial aspect of the international operation of firms. He argues that strong-currency assets give an advantage to firms whose parent company is located in a strong currency area. This theory focuses on imperfections in international capital markets (foreign exchange markets) to explain FDI flows between countries.

Another influential approach to FDI is the product cycle theory developed by Vernon (1966). This theory focuses on technological innovations, which determine the pattern of trade and the distribution of production among countries. Vernon points out the relationship between the product life cycle and the shift from exports to FDI.

Dunning's (1977, 1988) eclectic paradigm offers a holistic framework to explain international production. Dunning asserts that three different advantages are necessary to explain the existence of MNEs: ownership advantage, internalization advantage and location advantage. An ownership advantage, which comes from owning superior technology, is necessary for MNEs to compete with indigenous producers. (See the first question of Hymer in the first subsection.) An internalization advantage implies that FDI, which internalizes imperfect external transactions, is profitable for MNEs. (See the second question of Hymer.) A location advantage implies that foreign production is more desirable than exports. Casson (1987) admits that these three advantages are sufficient to explain MNEs. However, he also claims that ownership advantages are not necessary because the benefits of internalization are sufficient to explain MNEs.

Most of the major theories reviewed above assume some market imperfections (transaction costs) to explain multinational activities. Hence, Hennart (1991b) and Casson (1987) conclude that internalization is the essential concept in the theory of MNEs. Thus, the transaction cost theory, which explains the choice between external market transactions and internal transactions within organizations, is recognized as the dominant explanation of MNEs. However, this approach has some limitations, which are given in the following section.

[2]Markusen (1995) surveys the contributions of international trade theorists to the analysis of MNEs.

1.2 Limitations of the conventional theory

1.2.1 Alliances

Recently, new forms of contractual agreements in international business such as joint ventures, cross-licensing and original equipment manufacturing (OEM) are often observed. These collaborative arrangements between several independent firms are discussed in Oman (1984) and Buckley (1985). However, there are no theoretical foundations for explanations of these alliances in the conventional MNE theory.

As mentioned earlier, the transaction cost theory, which is the essential framework for the analysis of MNEs, attempts to show that intra-firm transactions are more efficient than transactions between independent firms. Hence, only wholly owned subsidiaries are rationalized in the conventional theory. Thus, the orthodox theory of MNEs cannot explain various forms of alliances observed in international business.[3]

1.2.2 Ownership and control

FDI is an investment in which investors acquire a substantial controlling interest in a foreign firm. In practice, to become the controlling shareholder of a foreign firm, an MNE must acquire the foreign firm's stock or establish a (wholly owned or partially owned) subsidiary. Hence, it is evident that the theory of FDI must consider the relationship between ownership and control. Nevertheless, the conventional theory of MNEs does not explain this relationship explicitly. Hence, there are no clear distinctions between wholly owned subsidiaries and partially owned subsidiaries in the model of MNEs based on the transaction cost approach; The conventional theory does not explain various equity shares of MNEs in their subsidiaries although, in practice, MNEs differ greatly about equity shares.

1.2.3 International capital flows

As Hymer (1960) points out, the simple neoclassical theory of factor movements, which is based on factor price equalization, cannot explain two-way FDI and a backward FDI flow from a capital-importing country to a capital-exporting country. These FDI flows frequently observed are explained by the theory of MNEs. However, as shown in Section 1.1, the transaction cost theory focuses on the organization structure of each international firm. Hence, in the conventional theory of MNEs, surprisingly few studies have ever tried to explain the relationship between FDI and international capital movements.

[3]There are several exceptions. For example, Hennart (1991a, 1991b) attempts to explain joint ventures by utilizing the transaction cost approach.

It is clear that FDI is the internalization of imperfect inter-firm transactions. Nevertheless, it must be noted that FDI is an international capital movement, which plays a growing role in global economic integration. As Lipsey (1999) points out, FDI has a significant impact on the total international capital flows. However, the conventional theory of MNEs does not explain the direction of aggregate FDI flows between countries and the relationship between portfolio flows and FDI flows.

1.2.4 Lack of rigorous models

In the theory of MNEs, rigorous models are not traditionally used. The lack of mathematical sophistication is a reflection of the complexity of multinational activities. For the analysis of institutional elements, this approach can be useful. However, as shown in Section 1.1, the old transaction cost theory assumes that only inter-firm transactions are costly without considering the cost of intra-firm transactions. Then, by definition, internalization is the best policy for MNEs. This tautological explanation of MNEs is utilized by many authors as Hennart (1986) acutely points out. It is clear that the lack of rigorous models leads to this imperfect explanation.

Recently, new theories such as game theory and contract theory are utilized extensively to develop formal models of firms. These analytical developments are required also in the theory of MNEs.[4]

1.3 The plan of this thesis

As shown in the preceding section, the transaction cost approach has theoretical defects. In each chapter below, a rigorous model is developed to overcome the weakness of the conventional MNE theory.

1.3.1 Theory of incomplete contracts

As Parry (1995) suggests, the conventional theory of MNEs cannot explain joint ventures and other alliance forms. Accordingly, in Chapter 2, an incomplete contract theory is utilized to explain various forms of alliances between independent firms. This theory considers the choice between inter-firm transactions and intra-firm transactions in the model of vertical integration without specifying the transaction costs. Although the conventional theory focuses on market failures, the model in Chapter 2 focuses on organizational failures and emphasizes the advantage of transactions between independent firms. This model shows that various alliances are chosen to encourage a business partner's unverifiable activity.

[4]Some authors study MNEs by utilizing formal models. For example, see Svejnar and Smith (1984), Horstmann and Markusen (1987, 1996), Thomas and Worrall (1994), Froot and Stein (1991) and Yanagawa (1994).

In Chapter 2, it is shown that the theory of incomplete contracts is very useful to explain various alliance forms. In this model, because of contractual incompleteness, the contract between an MNE and a subcontractor only specifies the allocation of the property right on products supplied by the subcontractor. This ownership allocation affects the subcontractor's unverifiable input. Considering this effect, the MNE chooses a transaction form (the allocation of ownership). The model shows that the MNE may not choose intra-firm transactions to overcome organizational failures. This choice depends on the subcontractor's technology level and the MNE's ownership advantage. The same framework can be applied to the analysis of divestment, the host country's policy and transfer pricing.

1.3.2 Equity joint ventures

Chapter 3 considers organization forms for foreign investment without specifying transaction costs, and explains why an MNE and a local firm tie up to start an equity joint venture in a simple model of financial contracts. This model is utilized to investigate the choice of the MNE's ownership structure, that is, the choice between FDI and portfolio investment or the choice between equity joint ventures and wholly owned subsidiaries.

Since the traditional MNE theory focuses on full ownership, little is known about the relationship between control and equity shares in joint ventures.[5] Chapter 3 investigates this relationship using the model of equity joint ventures. This model focuses on the MNE's technological advantage (ownership advantage) and net worth to explain equity shares and the level of technology transfer in joint ventures.

It is shown that the MNE's large net worth promotes a wholly owned subsidiary and an equity joint venture controlled by the MNE. If the MNE is not wealthy, the joint venture is controlled by the local firm. These results are caused by incomplete financial markets. It is also shown that, with strong technological advantages, MNEs can control joint ventures or take over local firms even if their net worth is small.

1.3.3 Portfolio flows and two-way direct investment

Chapter 4 considers FDI and portfolio flows between countries. The relationship between these two capital movements is not examined in the conventional theory because researchers suppose that the two investment flows are totally different since Hymer's work. Kasuga (1996) studies the impact of these two investments; however, this study focuses on North-South capital movements and ignores two-way FDI between developed countries, which have similar factor endowments and technology.

[5]Ono (1985, Chapter 3 and 4) studies this relationship in a framework of two-stage bargaining game.

In Chapter 4, a formal model of alliances between firms is developed to investigate each MNE's choice between FDI and licensing. This internalization model, which is based on a theory of incomplete contracts, is utilized to study the relationship between portfolio investment flows and FDI in the simple model of international capital movements.

The model shows how each MNE's alliance mode choice relates to aggregate capital flows. The main result is as follows: the appreciation of assets in one country causes FDI flows to that country and portfolio flows from that country. This result is consistent with backward and two-way FDI flows, which cannot be explained in the simple neoclassical model of capital movements.

Chapter 2

International Business Alliances

2.1 Introduction[1]

In the theory of international economics, it has been assumed that firms develop international operations through exporting and investing overseas; the theory of international trade explains why export and import occur while the theory of multinational enterprises (MNEs) explains why MNEs prefer foreign direct investment (FDI) to exporting. Recently, however, "new forms" of international investment and alliances such as joint ventures, international subcontracting, original equipment manufacturing (OEM), and cross-licensing are frequently observed. Thus, MNEs can develop international operations without exporting and FDI. These new forms of international operations are discussed in Oman (1984), Buckley (1985) and Kojima (1992). These operation forms are contractual arrangements between an MNE and another independent firm. Hence, the traditional FDI theory, which attempts to explain why firms prefer wholly owned subsidiaries, cannot explain these alliances.

The conventional theory, which is developed by Buckley and Casson (1976) and Rugman (1980), supposes that markets for technology licenses are imperfect and that MNEs bypass the market imperfection by internalizing transactions. This theory is known as internalization theory (or the transaction cost theory of MNEs). Since this traditional theory assumes that the market is imperfect, it concludes that the optimal form of foreign investment for MNEs is a wholly owned subsidiary. Hence, as Parry (1985) suggests, the internalization theory cannot explain joint ventures and other forms of alliances.

Although the efficiency of internalization is emphasized in the theory of MNEs, Casson (1979) and Hennart (1986,1991a) point out that internal-

[1]The following analysis is based on Kasuga (1999).

ization increases internal organization costs. Hennart (1991a) shows that the transaction cost approach can explain joint ventures as follows: when purchasing intermediate inputs on the market entails high transaction costs and when it is costly to obtain them through full acquisition because of hierarchical failures, MNEs prefer joint ventures to wholly owned subsidiaries. Thus, the new transaction cost theory can explain alliances.[2] However, the analysis of the MNE's choice based on the transaction cost theory totally depends on the specification of transaction costs.

Kojima (1992) states that the internalization theory merely mentions too many motivations of internalization but fails to find the common determinants of a choice between internalization and externalized forms of international operations. He explains some cooperative arrangements by focusing on increasing returns to scale.

This chapter explains alliances between independent firms such as joint ventures, OEM, and cross-licensing in a simple framework without the ad-hoc assumption about transaction costs.[3] Instead of specifying the transaction cost to explain wholly owned subsidiaries, this chapter attempts to find the determinants of internalization or noninternalization. For the analysis of organization forms, the theory of incomplete contracts is utilized here. It is fair to apply the theory of incomplete contracts to the analysis of MNEs because the incompleteness seems to be more serious in international contracts because of cultural differences and difficulties of a lawsuit.[4] However, curiously this theory has been unrecognized in this field.[5]

Yanagawa (1994) applies the model of Grossman and Hart (1986) to the study of a choice between FDI and licensing. As in Grossman and Hart, Yanagawa focuses on the ownership of the physical asset, which affects the incentive of specific investment through the threat point. In contrast, this chapter adopts the model of Aghion and Tirole (1994) to focus on the ownership of the prerequisite factors traded between firms or divisions. Although these two models consider the MNE's choice between intra-firm transactions (internalization) and inter-firm transactions, they treat internalization (i.e., FDI) differently. Yanagawa supposes that the ownership of physical assets

[2]Beamish and Banks (1987) and Buckley and Casson (1988) also explain joint ventures using the transaction cost theory.

[3]The old transaction cost theory assumes that only inter-firm transactions are costly without considering the cost of intra-firm transactions. Then, it is clear that internalization is the best policy for MNEs. However, this ad hoc model does not clarify the determinants of internalization.

[4]Hart (1995), who developed the theory of incomplete contracts, suggests that the incompleteness of contracts is caused when contracting parties and an outside authority do not have a common language to describe states of the world and actions.

[5]The analysis of the boundary of firms was originally proposed by Coase (1937). Coase's theory of firms is applied to the analysis of MNEs by Buckley and Casson (1976). The theory of firms is elaborated by the theory of incomplete contracts. However, this new approach has not been fully utilized in the analysis of MNEs.

determines transaction type, while the model in this chapter focuses on the ownership of factors of production, which are supplied to the MNE by the subcontractor.

Although the internalization theory supposes that MNEs choose internalization, this chapter explains why MNEs do not choose internalization but do choose a variety of externalized forms of operations. In other words, this chapter investigates organizational failures, which are represented by the lack of incentives. The model in this chapter emphasizes the advantage of transactions between independent firms and shows that MNEs choose various alliances to overcome the organizational failure.

As in the model of vertical integration developed by Aghion and Tirole (1994), I suppose that the exact nature of the intermediate good produced by the subcontractor is ill defined ex ante. Then the contract only specifies the allocation of the property right on the product supplied by the subcontractor. This ownership allocation affects the subcontractor's unverifiable effort. Thus, in the framework of incomplete contracts, the ownership policy of the firm affects the performance of subcontractors. If the subcontractor does not have the property right (intra-firm transactions), the subcontractor obtains a small reward and hence makes a small amount of effort. The result of this analysis is as follows: (1) the MNE does not necessarily internalize transactions although internalization reduces payments to subcontractors; (2) the subcontractor's technology level as well as the ownership advantage of MNEs (which has been emphasized in the prevailing theory of MNEs), plays the essential role in determining organization forms of foreign operations.

The same framework can be applied to the analysis of divestment and the host country's policy, such as subsidies, taxes and local content requirements. The model provides a rationale for subsidies and local content requirements. In addition, the impact of taxation on the MNE's ownership structure is analyzed. This analysis shows that taxation affects the MNE's ownership structure and that transfer pricing changes the effect of taxation.

The remainder of this chapter is as follows. Section 2.2 analyzes the MNE's choice between inter-firm transactions and intra-firm transactions in a simple model of vertical integration based on Aghion and Tirole (1994). This model is also utilized to discuss divestment and the policy of host countries. Section 2.3 investigates the impact of taxation on the MNE's choice and transfer pricing. Section 2.4 provides a rationale for joint ventures, OEM, and cross-licensing using the model of vertical integration. Section 2.5 summarizes the main results of the chapter.

2.2 The model of vertical integration

2.2.1 The basic framework

In this chapter, a simplified version of the model of vertical integration by Aghion and Tirole (1994) is utilized. A subcontractor supplies a single unit of input to a firm (which is called an MNE). We treat the relationship between the MNE and the subcontractor in the model as a general vertical relation. Hence, this vertical relationship can be replaced by the relationship between the R&D division and the production division, between the parts maker and the assembly plant, and between the manufacturer and the distributor. Since the purpose of this thesis is to consider international business, I suppose that the MNE and the subcontractor are located in separate countries.[6]

The MNE can yield joint profits $\bar{V} > 0$ with a unit of prerequisite factors of production supplied by the subcontractor. However, the subcontractor may not produce factors properly. The probability of supplying the relevant factor-type, $p(e)$, depends on the unverifiable effort e of the subcontractor. This probability is assumed to be $p(e) = \alpha e + \beta$ for $e \in [0, (1-\beta)/\alpha]$ and $p(e) = 1$ for $e > (1-\beta)/\alpha$. It is also assumed that $p'(e) = \alpha > 0$ is sufficiently small and $0 < p(0) = \beta < 0.5$ for interior solutions ($e < (1-\beta)/\alpha$). The subcontractor's effort incurs disutility (in monetary units) $c(e)$. This disutility function is twice continuously differentiable with $c(0) = 0$, $c'(e) > 0$, $c''(e) > 0$ and $\lim_{e \to 0} C'(e) = 0$. The MNE and the subcontractor are risk neutral and have reservation utility 0.

To examine internalization (vertical integration) by the MNE, this chapter posits the incompleteness of contracts as follows:

Assumption 2.1 (Incomplete contracts)
The exact nature of the prerequisite factors of production supplied by the subcontractor is ill defined ex ante, so that the MNE and the subcontractor cannot make a contract for delivery of a specific type of input. This contract only specifies the allocation of the property right on the factors produced by the subcontractor.

Because of this assumption, we have two cases: (1) the case where the property right on the factor is allocated to the MNE (M-ownership); (2) the case where the property right is allocated to the subcontractor (S-ownership). M-ownership implies that the MNE internalizes the transaction (vertical integration). In this case, the MNE can freely use the factor produced by the subcontractor and the subcontractor receives only reservation utility 0.[7]

[6]This assumption is necessary to analyze international taxation and policies toward MNEs.

[7]Although internalization decreases the price of the factor of production, it causes organizational failures as Hennart (1986) suggests.

Then, the subcontractor chooses the minimum level of effort, which is normalized to be 0 as in Aghion and Tirole (1994). In contrast, if the MNE does not internalize the transaction (S-ownership), the MNE and the subcontractor bargain over the price after the realization of $\bar{V}$. For simplicity, suppose that the joint profit $\bar{V}$ is equally split ex post, as in the model of Aghion and Tirole. Then, the MNE pays a price equal to $\bar{V}/2$.[8] Thus, M-ownership (S-ownership) leads to the lower (higher) price of factors.[9]

The expected utilities of both parties in each case are as follows. Under M-ownership, $e = 0$ because the subcontractor receives no reward for effort. Hence, the expected utilities are

$$\begin{aligned} U_M &\equiv \beta\bar{V} \quad \text{for the MNE,} \\ U_S &\equiv 0 \quad \text{for the subcontractor.} \end{aligned}$$

Under S-ownership, after realization of the joint profit, the MNE and the subcontractor bargain over the price and each receives $\bar{V}/2$. Hence, the subcontractor chooses e to maximize $P(e)\bar{V}/2 - c(e)$. The first-order condition is $\alpha\bar{V}/2 = c'(e)$. Let $e(\bar{V}/2)$ denote the effort level that satisfies this first-order condition. The level of effort chosen by the subcontractor is an increasing function of $\bar{V}$. Hence, the expected utilities are

$$\begin{aligned} \tilde{U}_M &\equiv (\alpha e(\bar{V}/2) + \beta)\bar{V}/2 \quad \text{for the MNE,} \\ \tilde{U}_S &\equiv (\alpha e(\bar{V}/2) + \beta)\bar{V}/2 - c(e(\bar{V}/2)) \quad \text{for the subcontractor.} \end{aligned}$$

To focus on the transaction mode choice of the MNE, this chapter posits the following: (i) the MNE has ex ante bargaining power; (ii) there is a cash constraint on the subcontractor's side. By the first assumption, the allocation of property rights is determined by the MNE. The second assumption implies that the subcontractor cannot purchase the MNE. Since $\tilde{U}_S > U_S = 0$ holds for any $\bar{V} > 0$, the subcontractor prefers S-ownership to M-ownership. However, because of these assumptions, the allocation of the property right is determined by the MNE solely.[10]

If $\tilde{U}_M > U_M$, the MNE chooses S-ownership. If $\tilde{U}_M < U_M$, the MNE chooses M-ownership. Suppose $\tilde{U}_M < U_M$ and $\tilde{U}_M + \tilde{U}_S > U_M + U_S$. In this case, the allocation of the property right is inefficient (the MNE chooses M-ownership) because the cash-constrained subcontractor is unable to compensate the MNE for a transfer of the property right.

[8]Since the MNE is the only user and hence indispensable for the realization of the joint profit, the MNE obtains some (ex post) bargaining power. Hence, the MNE obtains $\bar{V}/2$ even if the subcontractor obtains the ownership. None of the conclusions would change if the MNE paid a higher or a lower price than $\bar{V}/2$.

[9]The price of M-ownership becomes 0 in this model because the reservation utility of the subcontractor is assumed to be 0. For a positive reservation utility, the price would become positive and hence $e > 0$. However, the result would be qualitatively similar.

[10]In Aghion and Tirole (1994), the allocation of the property right depends on the ex ante relative bargaining power of the two parties.

The relationship between the joint profit and the effort level is as follows. Differentiating the first-order condition $\alpha\bar{V}/2 = c'(e)$, we obtain

$$\frac{\alpha}{2}d\bar{V} = c''(e)de. \tag{2.1}$$

Accordingly, by the assumption of the function $c(e)$, e is a continuous function of $\bar{V}$, and we obtain $\lim_{\bar{V}\to 0} e(\bar{V}/2) = 0$ and $e'(\bar{V}/2) \equiv de/d\bar{V} = \alpha/2c''(e) > 0$. I assume that $c(e)$ is a quadratic function. In this case, $e'' = 0$ holds. This assumption simplifies the analysis of the choice between intra-firm transactions and inter-firm transactions without loss of insights.[11]

Under S-ownership, the expected utility of the MNE is described as follows. From the function $\tilde{U}_M(V) = (\alpha e(V/2) + \beta)V/2$, we obtain

$$\begin{aligned}
\frac{\partial \tilde{U}_M}{\partial V} &= \alpha\frac{\partial e}{\partial V}\frac{V}{2} + \left(\alpha e\left(\frac{V}{2}\right) + \beta\right)\frac{1}{2} > 0, \\
\frac{\partial^2 \tilde{U}_M}{\partial V^2} &= \alpha\frac{\partial e}{\partial V} > 0, \\
\lim_{V\to 0}\frac{\partial \tilde{U}_M}{\partial V} &= \frac{\beta}{2} < \lim_{V\to 0}\frac{\partial U_M}{\partial V} = \beta.
\end{aligned}$$

From these results, the function $\tilde{U}_M(V)$ is increasing and convex because the level of effort e rises with an increase in joint profits. The slope of the function $\tilde{U}_M(V)$ is smaller than that of $U_M(V)$ when V is close to 0 as shown in Figure 2.1. Let V^* be the value of $V > 0$ such that $\tilde{U}_M(V) = U_M(V)$. We have V^* that satisfies this equality if $2p(0) < 1$.[12] Since $\tilde{U}''_M(V) > 0$ for any $V > 0$ and $p(0) = \beta < 0.5$ in this case, as in Figure 2.1, there exists V^*. Note that $e = \beta/\alpha$ holds at $V = V^*$.

From this figure, it is clear that the MNE prefers M-ownership if $\bar{V} < V^*$ and S-ownership if $\bar{V} > V^*$. Under S-ownership, the level of effort increases as $\bar{V}$ rises. This implies that $\bar{V}/2$ is the reward for the subcontractor's effort. As this reward increases, the subcontractor chooses larger e. Since the subcontractor chooses a small amount of effort under M-ownership, the MNE chooses S-ownership. In other words, S-ownership is chosen because of organizational failures (lack of incentives). The result can be summarized as follows.

[11]The purpose of this chapter is to investigate organizational failures in the model of internalization. The analysis below shows that the MNE switches from intra-firm transactions to inter-firm transactions at the point V^* (where the expected utility of intra-firm transactions are equal to that of inter-firm transactions) because of organization failures. As shown in Figure 2.1, there exists V^* if $e'' = 0$. Thus, it is possible to investigate organizational failures if $c(e)$ is a quadratic function. The analysis below is valid if there exists V^* (even if $e'' \neq 0$). If V^* does not exist, the MNE always chooses intra-firm transactions.

[12]The joint profit $V = V^* > 0$ satisfies $2p(0) = p(e(V/2))$. Since $p(e) \leq 1$, the equation never holds if $2p(0) > 1$.

Proposition 2.1
When $p(0) < 0.5$, there exists a joint profit V^* such that $\tilde{U}_M(V) = U_M(V)$ if $V = V^*$, $\tilde{U}_M(V) < U_M(V)$ if $V < V^*$, and $\tilde{U}_M(V) > U_M(V)$ if $V > V^*$. Thus, at $V = V^*$, the MNE switches to S-ownership because of organizational failures.

In Aghion and Tirole (1994), the value V^* is not obtained explicitly; we obtain V^* by neglecting the customer's investment in Aghion and Tirole's paper (the MNE's investment here) and by specifying the probability $p(e)$. The value V^* is important in the theory of MNEs because the MNE rejects internalization (M-ownership) if the joint profit is larger than V^*. In this case, the MNE refuses the lower price of intra-firm transactions, which causes organizational failures. Thus, these simplifications show that the level of joint profits determines the choice between intra-firm transactions and inter-firm transactions.

Proposition 2.1 is utilized below to explain various alliance forms. It is also useful for the analysis below to define the subcontractor's technology level as follows.

Definition 2.1
Technology of subcontractor S_1 is superior to that of subcontractor S_2 if $p_1(0) = p_2(0)$ and $\alpha_1 > \alpha_2$, where $p_j(e) = \alpha_j e + \beta_j$ $(j = 1, 2)$ denotes subcontractor S_j's probability of supplying the relevant type of factors.

Suppose that all the subcontractors have the same $\beta_j = \beta$ below. Then, the parameter α_j represents the level of the subcontractor's technology. If S_1 has superior technology, from the first-order conditions, $e_1'(\bar{V}/2) > e_2'(\bar{V}/2)$ holds for any given $\bar{V} > 0$, where $e_j(\bar{V}/2)$ denotes the effort level of subcontractor S_j. Note that the function p_j represents subcontractor S_j's ability of quality control because it denotes the probability of supplying the relevant type of factors.

If the MNE contracts with a subcontractor with superior technology, the MNE's expected utility $\tilde{U}_M$ shifts upward as shown in Figure 2.1 because the effort level rises. In contrast, the level of the subcontractor's technology has no impact on U_M because the effort level is always 0 under M-ownership. From Figure 2.1, we obtain the following.

Proposition 2.2
The value V^* decreases as the subcontractor's technology improves. Then, the range of M-ownership becomes small.

The proof of this proposition is as follows. From $\tilde{U}_M = U_M$ at $V = V^*$,

$e = \beta/\alpha$ holds.[13] Differentiating this, we obtain

$$\frac{dV^*}{d\alpha} = -\frac{e + \alpha \partial e/\partial \alpha}{\alpha \partial e/\partial V} < 0. \tag{2.2}$$

This result implies that contracting with a subcontractor with a large α decreases V^*. Thus, V^* represents the technology level of the subcontractor (which the MNE contracts with). Note that $\bar{V}$, which is a joint profit the MNE can yield with a unit of the relevant factors, represents the MNE's technological advantage (ownership advantage).

2.2.2 Divestment

Boddewyn (1983) analyzes divestment, which is the reverse of FDI, in the framework of the FDI theory. In the model of vertical integration, divestment is defined as disintegration.

This subsection investigates the case where the MNE replaces intra-firm transactions with inter-firm transactions. Suppose that the MNE has $\bar{V}$, which is smaller than V^*. Then, M-ownership is chosen. If the subcontractor's technology improves, $\tilde{U}_M$ shifts upward and hence V^* decreases as in Figure 2.1. When $V^* < \bar{V}$, the MNE switches to inter-firm transactions because an outside supplier performs well although the MNE must pay a higher price. Thus, the improvement of the subcontractor's technology causes voluntary divestment even if the MNE's technological advantage ($\bar{V}$) does not change.

Casson (1987) states that divestment is to replace an intermediate product market that is internal to the MNE with a similar market external to the MNE. He claims that improved methods of quality control in upstream production reduce the incentive for the downstream producer to monitor production in the upstream plant and hence cause divestment. The analysis of Casson is consistent with the second proposition of this paper.

A decrease in profits may be the main cause of divestment in practice. In the model developed above, however, poor profits never cause divestment. To explain divestment due to poor profits, the fixed cost of integration must be introduced. Suppose that the additional expenses are necessary for intra-firm transactions.[14] Then, U_M shifts downward as in Figure 2.2 and hence M-ownership is chosen when $\bar{V} < V^{*L}$. The figure shows that the MNE chooses divestment if $\bar{V} < V^{*L}$ or $\bar{V} > V^{*H}$. This result implies that not only low profits but the improvement of the subcontractor's technology can be the cause of divestment.

[13] From the first-order condition of the subcontractor's problem, e is an increasing function of α and V.

[14] This idea is consistent with the fundamental assumption of the MNE theory developed by Hymer (1960). He points out that foreign operations are costly because of differences in legal, political and economic systems and cultures.

2.2.3 Policies toward MNEs

This subsection investigates (1) the efficiency of the ownership allocation determined by the MNE, and (2) the best policy toward MNEs for the host country. Suppose that the MNE from a foreign country makes a contract with the local subcontractor. It is assumed that lump-sum taxes and transfers are possible.

Now compare the total expected utilities $U \equiv U_M + U_S$ (under M-ownership) and $\tilde{U} \equiv \tilde{U}_M + \tilde{U}_S$ (under S-ownership). Figure 2.3 illustrates a function $\tilde{U}(V)$ and $U = U_M$. Since

$$\begin{aligned} \frac{\partial \tilde{U}}{\partial V} &= \alpha e + \beta + c' \frac{\partial e}{\partial V} > 0, \\ \frac{\partial^2 \tilde{U}}{\partial V^2} &= \alpha \frac{\partial e}{\partial V} + c'' \left(\frac{\partial e}{\partial V} \right)^2 > 0, \\ \lim_{V \to 0} \frac{\partial \tilde{U}}{\partial V} &= \beta = \lim_{V \to 0} \frac{\partial U}{\partial V}, \end{aligned}$$

M-ownership is always inefficient ($U < \tilde{U}_M$). Nevertheless, M-ownership is chosen by the MNE, which has the ex ante bargaining power, if $\bar{V} < V^*$. Thus, a small joint profit causes the inefficient allocation of the property right. Note that, since only the subcontractor has an unverifiable input in this model, M-ownership is inefficient.[15]

Now consider the effect of host country's policy toward foreign MNEs. This model shows that the local ownership policy, which restricts M-ownership, increases the local subcontractor's expected utility and the total expected utility as follows. Suppose that income tax t_M on MNEs that choose M-ownership only. Then the expected utility of the MNE is $U_M = \beta V(1 - t_M)$ and the slope $\beta(1 - t_M)$ decreases as t_M rises. Hence, V^* decreases as the tax rate increases. If the tax rate is large enough, $V^* < \bar{V}$ holds and then the MNE never chooses M-ownership. Thus, the allocation of the property right can be efficient by imposing the income tax only on M-ownership (intra-firm transactions).[16]

In theory, this tax policy is effective. However, in practice, foreign MNEs, which attempt to trade with the local subcontractor, are banished from the country with higher tax rates if they can choose an attractive location for FDI. Actually, many countries, which attempt to promote inward FDI,

[15] Aghion and Tirole (1994) consider the case where both agents have unverifiable factors of production. If the MNE had an unverifiable input, which is more important than the subcontractor's effort, M-ownership (internalization) could be efficient as the traditional MNE theory states. Since this mechanism is clear and since the efficient M-ownership has been discussed enough, I need not elaborate on this point; it is treated in much more adequately in Chapter 3.

[16] Note that there are no tax revenues in this case because the MNE never chooses M-ownership.

provide incentives for MNEs. Considering negative tax rates ($t_M < 0$), it is possible to examine the effect of incentives in this model. It is clear that a subsidy to M-ownership raises the MNE's expected utility (U_M). This subsidy increases V^* and promotes inefficient M-ownership. However, the local subcontractor obtains no income under M-ownership. Thus, this policy has a negative effect on the local subcontractor's expected utility because it promotes M-ownership (even if this incentive is financed by a lump-sum tax on an outsider's income).

Nevertheless, this result does not imply that incentives for MNEs have negative impacts in general. There is an alternative subsidy policy. Suppose that the host country gives lump-sum transfer T to the MNE contracting with a local subcontractor when the MNE obtains the joint profit successfully no matter which ownership is chosen. If $\bar{V} + T > V^*$ holds, the MNE chooses S-ownership because of this subsidy. This policy is the combination of subsidies to MNEs located in the host country and local content requirements, which oblige MNEs to contract with local subcontractors. This subsidy policy with local content requirements increases the subcontractor's expected utility and leads to the efficient allocation of ownership. This combination is the prevalent real-world policy of host countries.[17]

2.3 Taxation and transfer pricing

Imposing a tax on profits of MNEs is one of the most important policy issues of the international economy. The differences in tax rates and systems among countries affect the behavior of the MNE. For example, taxation affects the location of the subsidiary and transfer pricing. This section examines the impact of different tax rates between countries.

First, I will investigate the effect of international taxation without considering transfer pricing. Suppose that the MNE (with $\bar{V}$) in Country 1 makes a contract with the subcontractor (with $p(e)$) in Country 2. In Country 1, the tax rate t_1 is imposed on income. In Country 2, the tax rate t_2 is imposed. Then, under M-ownership, the MNE's expected utility is

$$U_M = \beta \bar{V}(1 - t_1).$$

Under S-ownership, the expected utility is

$$\tilde{U}_M = \left(\alpha e \left(\frac{\bar{V}(1 - t_2)}{2} \right) + \beta \right) \frac{\bar{V}(1 - t_1)}{2}.$$

[17] Actual public policies toward MNEs have various goals. The fuller study of the policies lies outside the scope of this chapter because this model, which attempts to explain alliances, just focuses on the subcontractor's incentive. Nevertheless, this model clarifies the characteristics of the real-world policies. For example, the model suggests that host countries must provide subsidies (or tax incentives) to promote inward FDI because MNEs do not invest in a country with high tax rates. In addition, the goal of local content requirements in this model is to protect the local firm's profit.

By the definition of V^*, the equation

$$\beta V(1-t_1) = \left(\alpha e\left(\frac{V(1-t_2)}{2}\right) + \beta\right)\frac{V}{2}(1-t_1) \tag{2.3}$$

holds at $V = V^* > 0$. From this equation, we obtain $dV^*/dt_1 = 0$ and $dV^*/dt_2 > 0$. The first result implies that t_1 does not affect V^* because a rise in t_1 decreases U_M and $\tilde{U}_M$ at the same rate. The second result shows that V^* depends on t_2 because a rise in t_2 reduces $\tilde{U}_M$ only (high tax rates on the subcontractor decrease the effort level and the MNE's expected utility under S-ownership). This relationship between t_2 and V^* implies that high tax rates on the subcontractor promote M-ownership.

Now consider transfer pricing in this model. When operating a business in two countries with different tax rates, the MNE can adjust the price of goods supplied by the subcontractor in order to realize profits in the low tax jurisdiction. This internal price is called a transfer price. It is assumed that the MNE can set an internal price freely in intra-firm trade.[18]

Suppose that MNEs prefer transferring income from the headquarter to a division of the same MNE group to paying tax. In other words, I assume that MNEs maximize the total expected utility $U_M + U_S$ if M-ownership is chosen. Note that, if S-ownership is chosen, they maximize $\tilde{U}_M$ as in the section above because subcontractors do not belong to the same MNE group. This assumption implies that transfer pricing is feasible only if M-ownership is chosen. As in the previous section, it is assumed that the subcontractor obtains the reservation utility 0 under M-ownership even if the subcontractor receives ex post income by transfer pricing.

The MNE may give the subcontractor ex post income $\gamma\bar{V}$, where $\gamma \in [0,1]$, to maximize $U_M + U_S$ by minimizing the taxable income in the country with high tax rates. By assumption, this transfer pricing does not affect the effort level even if the subcontractor receives the ex post income $\gamma\bar{V}$ through transfer pricing.

Under M-ownership, the total expected utility from the after-tax profit of the MNE is given by

$$U_M + U_S = \beta(1-\gamma)\bar{V}(1-t_1) + \beta\gamma\bar{V}(1-t_2). \tag{2.4}$$

The first term on the right-hand side is the expected utility from taxable income in Country 1. The second term is the expected utility from taxable income in Country 2. The MNE chooses $\gamma \in [0,1]$ to maximize the total expected utility. By differentiating (2.4) with respect to γ, we obtain $\beta\bar{V}(t_1 - t_2)$. Hence, if $t_1 > t_2$, the MNE chooses $\gamma = 1$ and $U_M + U_S = \beta\bar{V}(1-t_2)$ holds. If $t_1 < t_2$, the MNE chooses $\gamma = 0$ and hence $U_M + U_S = \beta\bar{V}(1 -$

[18]The real-world MNE may not set an internal price freely because of regulation by the authorities. However, in practice, it is very difficult to monitor transfer pricing for intangible goods and assets that have no market prices.

t_1). Thus, the relative size of tax rates affects the MNE's total expected utility under M-ownership. Accordingly, when transfer pricing is possible, the equation (2.3) is rewritten as follows.

$$\beta V^*(1-t_2) = \left(\alpha e\left(\frac{V^*(1-t_2)}{2}\right)+\beta\right)\frac{V^*}{2}(1-t_1) \quad \text{if} \quad t_1 > t_2, \tag{2.5}$$

$$\beta V^*(1-t_1) = \left(\alpha e\left(\frac{V^*(1-t_2)}{2}\right)+\beta\right)\frac{V^*}{2}(1-t_1) \quad \text{if} \quad t_1 < t_2. \tag{2.6}$$

From (2.5), we obtain

$$\frac{dV^*}{dt_1} = \frac{\alpha e+\beta}{\alpha(1-t_1)\partial e/\partial V^*} > 0, \tag{2.7}$$

$$\frac{dV^*}{dt_2} = \frac{-2\beta-\alpha(1-t_1)\partial e/\partial t_2}{\alpha(1-t_1)\partial e/\partial V^*}. \tag{2.8}$$

If $t_1 > t_2$, from (2.7), high tax rates in Country 1 promote M-ownership. The impact of taxation in Country 2 is given by (2.8). If $-2\beta-\alpha(1-t_1)\partial e/\partial t_2 < 0$ in (2.8), $dV^*/dt_2 < 0$ holds. Thus, transfer pricing affects the impact of taxation on the MNE's choice in this case. (When transfer pricing is impossible, we obtain $dV^*/dt_1 = 0$ and $dV^*/dt_2 > 0$.) If $t_1 < t_2$, transfer pricing does not change the effect of taxation because (2.6) is identical with (2.3).

These results can be summarized as follows. If tax rates are higher in the home country of the MNE, the MNE transfers income to the subcontractor to minimize the taxable income. Since transfer pricing is feasible only if M-ownership is chosen, high tax rates in the home country promote intra-firm transactions (M-ownership).

2.4 Alliances

In this section, the model of internalization (vertical integration) is utilized to explain various arrangements commonly observed in international business.[19]

2.4.1 Joint ventures and OEM

This subsection provides a rationale for joint ventures and OEM (original equipment manufacturing). The model developed above is utilized to explain why several MNEs sometimes contract with a common integrated supplier (joint ventures) and why an MNE utilizes a division of another MNE (OEM). In this paper, these two alliance forms are defined as follows.

[19]The analysis of this section is applicable to alliances between domestic firms.

Definition 2.2 (Joint ventures)
Joint ventures are contractual arrangements in which two or more MNEs contract with a single integrated supplier. This joint venture form is called symmetric backward integration in Buckley and Casson (1988).

Definition 2.3 (OEM)
OEM is an arrangement in which an MNE contracts with an outside supplier that is integrated by another MNE.

We frequently observe these contractual arrangements. For example, an MNE, which seeks a production facility in the developing country to take advantage of low labor costs, sets up a joint venture with a local firm or another MNE. Alternatively, the MNE may look for OEM suppliers, which have their own brands and also make products for other firms.[20]

For a large MNE, it is possible to start intra-firm transactions, which lead to a low unit cost, by acquiring the local firm's facility. However, some firms contract with outside suppliers at a higher unit price. Thus, inter-firm transactions are commonly observed. In fact, firms often produce parts for themselves as well as for their competitors. Kojima (1992) explains this alliance in a model with the minimum efficient scale. However, in his model, the difference between joint ventures and OEM is not clear. Casson (1987) also states that joint ventures are caused by economies of scale. Thus, it has been established that economies of scale lead to these alliances. However, little is known about alliance forms. This subsection investigates the MNE's choice of alliance forms by focusing on the subcontractor's incentive.

Suppose that there is the minimum efficient scale for the subcontractor's technology. Then it is desirable for the subcontractor to supply goods to several MNEs. For simplicity, it is assumed that the minimum efficient scale is 2. Then, the subcontractor S supplies goods to two MNEs M_1 and M_2. Suppose that M_i obtains joint profit $\bar{V}_i$ $(i = 1, 2)$ and that $\bar{V}_1 < \bar{V}_2$. When the subcontractor's supply capacity is large, the subcontractor determines the level of effort for each MNE independently. In this case, there is no interaction between M_1 and M_2.

Suppose that the subcontractor's technology level is low such that $\bar{V}_1 < V^*$ holds. Then, M_1 chooses intra-firm transactions. If $\bar{V}_2$ is placed immediately next to $\bar{V}_1$, we obtain $\bar{V}_1 < \bar{V}_2 < V^*$ and hence M_2 also chooses intra-firm transactions. In this case, the two MNEs jointly internalize the transactions (establish a joint venture) as in Figure 2.4 (a). On the contrary, if $\bar{V}_2$ is large enough, $\bar{V}_1 < V^* < \bar{V}_2$ holds and hence M_2 chooses inter-firm transactions. In this case, the subcontractor is a division of M_1's group but supplies parts to M_2 as an outside supplier. This OEM case is illustrated in Figure 2.4 (b). If $V^* < \bar{V}_1 < \bar{V}_2$ (the subcontractor has far superior

[20]For example, Acer is a Taiwanese PC supplier with its own brand and also an OEM supplier for Japanese and European makers (Dobson, 1997).

technology), both M_1 and M_2 choose inter-firm transactions as in Figure 2.4 (c).

The result in the analysis above is summarized as follows. If two MNEs have different joint profits, a division of one MNE's group can be utilized by another MNE. Thus, OEM is caused by the difference in ownership advantage (joint profits). Several MNEs agree about the joint venture partnership only if the difference between their joint profits is small.

2.4.2 Cross-licensing

R&D activities are important but expensive for a single MNE. Accordingly, sometimes several MNEs jointly own a research project or exchange R&D facilities, technology, and staff with each other by making a cross-licensing agreement. This subsection provides a rationale for the cross-licensing agreement, which is described in Figure 2.5.

Suppose that there are two MNEs (M_1 and M_2) and two R&D units (S_1 and S_2). Let V_j^* $(j = 1, 2)$ denote the joint profit of the MNE contracting with the R&D unit S_j such that $\tilde{U}_{M_i}(V_i) = U_{M_i}(V_i)$, where V_i $(i = 1, 2)$ is the joint profit of M_i. Suppose that M_1 and M_2 first contract with S_1 and S_2, respectively. As shown in Figure 2.6, it is assumed that $V_1^* < V_2^*$, $\bar{V}_1 < \bar{V}_2$, $\bar{V}_1 < V_1^*$ and $\bar{V}_2 < V_2^*$. Then, both of the MNEs choose M-ownership (intra-firm transactions) and hence S_1 (S_2) is a division of M_1's (M_2's) group. In this case, the expected utility of M_1 is

$$U_{M1} = \beta \bar{V}_1,$$

and that of M_2 is

$$U_{M2} = \beta \bar{V}_2.$$

The expected utilities of the subcontractors are $U_{S1} = U_{S2} = 0$ because they are not outside suppliers in this case.

Now suppose that these MNEs reach a cross-licensing agreement to exchange R&D facilities and technology with each other. Then, as in Figure 2.5, M_1 makes a contract with S_2 and M_2 makes a contract with S_1. Since $\bar{V}_1 < V_2^*$ as in Figure 2.6, S_2 is not an outside supplier. Hence, the cross-licensing agreement does not change the expected utilities of M_1 and S_2. If $V_1^* < \bar{V}_2$ holds as in Figure 2.6, S_1 becomes an outside supplier for M_2. Then, the expected utility of S_1 is positive and larger than $U_{S1} = 0$. Further, the expected utility of M_2, which contracts with S_1, also increases by the cross-licensing agreement. Thus, this arrangement increases the expected utility of S_1 and M_2 because the MNE gains from the superior research unit and the research unit gains from the larger ownership advantage of the MNE.

Next consider the total expected utilities of the two MNE groups. Let U^c_{Mi} and U^c_{Sj} ($\tilde{U}^c_{Mi}$ and $\tilde{U}^c_{Sj}$) denote the expected utilities under M-ownership (under S-ownership) from the cross-licensing agreement for M_i and S_j, respectively. As described in Figure 2.6, M_1 and S_2 choose intra-firm transactions while M_2 and S_1 choose inter-firm transactions by the cross-licensing agreement. This arrangement does not affect the expected utility of M_1 and S_2 and hence $U_{M1} = U^c_{M1}$ and $U_{S2} = U^c_{S2}$. However, since S_1 becomes an outside research unit for M_2, we obtain $U_{S1} < \tilde{U}^c_{S1}$ and $U_{M2} < \tilde{U}^c_{M2}$. Hence, the total expected utilities of the two MNE groups are as follows.

$$U_{M1} + U_{S1} < U^c_{M1} + \tilde{U}^c_{S1}, \tag{2.9}$$

$$U_{M2} + U_{S2} < \tilde{U}^c_{M2} + U^c_{S2}. \tag{2.10}$$

Inequality (2.10) shows that, by contracting M_2 that has the larger joint profit, S_1 becomes an outside research unit and obtains a higher expected utility. Hence, this arrangement increases the total expected utility of M_1's group. As (2.10) shows, the cross-licensing agreement also increases the total expected utility of M_2's group because M_2 can utilize the superior technology of S_1. Thus, the cross-licensing agreement increases the total expected utilities of both MNE groups.

Thus, if $V_1^* < \bar{V}_2$ holds, the cross-licensing benefits each MNE group because there is synergy between the MNE with the large ownership advantage and the research unit with the superior technology. Note that the cross-licensing does not affect the expected utility of M_1 itself ($U_{M1} = U^c_{M1}$) but increases the total expected utility of M_1's group.

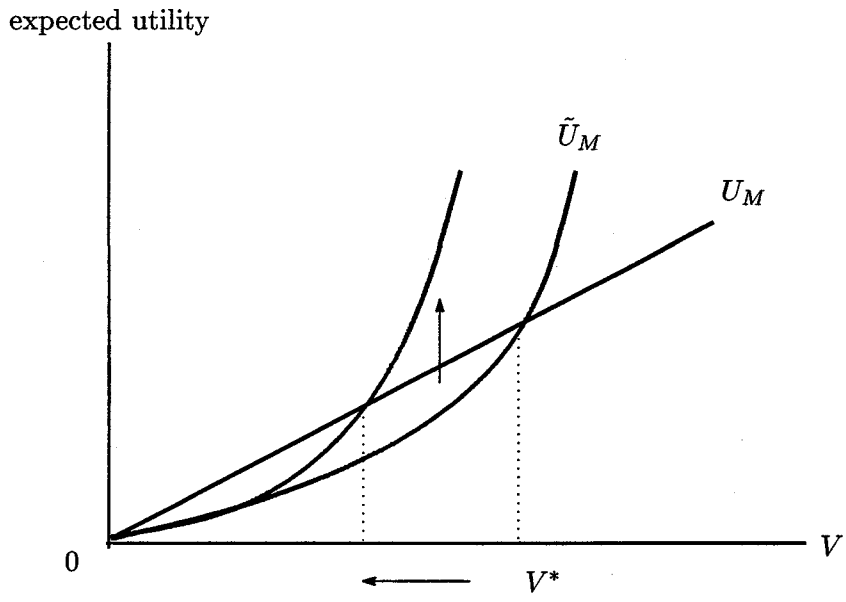
2.5 Conclusions

Over the past few decades, a considerable number of studies have been made on MNEs. Many of those studies emphasize the benefit of internalization to provide a rationale for large MNEs by specifying transaction costs. The analysis of this chapter shows that internalization is sometimes costly without specifying transaction costs; intra-firm transactions are less expensive but may cause organizational failures. The model, which is based on the theory of incomplete contracts, emphasizes the incentive of subcontractors to provide a rationale for cooperative contractual arrangements between rival firms. As in the traditional MNE theory, the ownership advantage of MNEs also plays the essential role here.

Obviously, no one model can capture the intricacies of the real-world cooperative arrangements. In practice, alliance forms depend on the resource of MNEs, the patterns of market competition, and regulations in the host country; however, in this model, alliance forms are determined by the degree of organizational failures. Although this explanation for alliances is partial,

the approach clarifies the large MNE's organizational problem, which can be a rationale for all of the cooperative arrangements.

In this chapter, some policy issues are discussed. The analysis shows that taxation that restricts internalization can improve efficiency and that subsidies may have the adverse effect. In addition, the model suggests that the combination of incentives and local content requirements can be the best policy to maximize the local firm's profit. Needless to say, we would find another optimal policy if the host country pursued other interests such as technology from MNEs and employment promotion. To discuss the optimal policy as a whole is beyond the scope of this simple framework. Nevertheless, the model clearly provides a rationale for the prevalent policy combination of incentives and regulations. In conclusion, this carrot and stick policy toward MNEs is effective for host countries because there is a trade-off between incentives and regulations.



U_M: the expected utility under M-ownership
$\tilde{U}_M$: the expected utility under S-ownership

Figure 2.1: The MNE's expected utility and joint profits

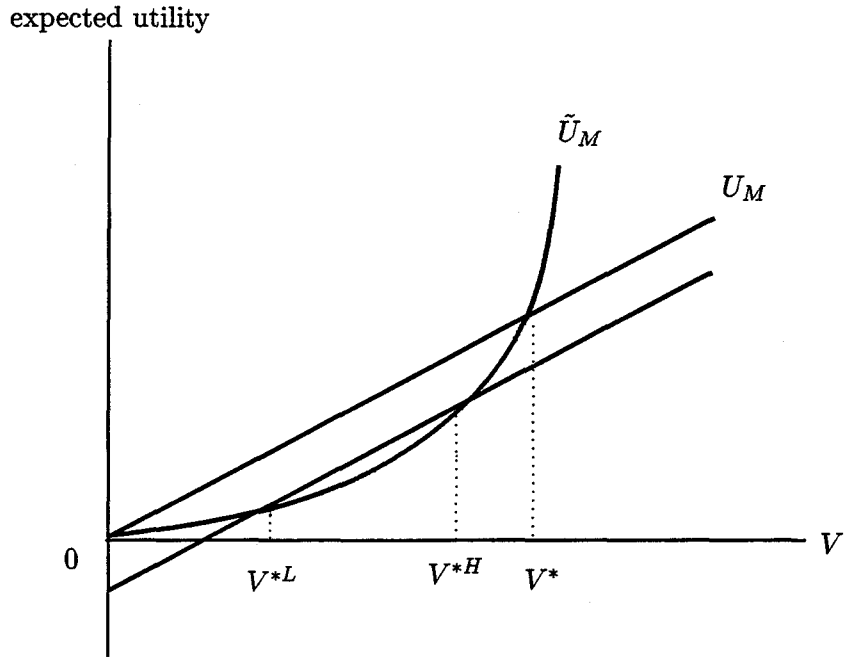


Figure 2.2: The MNE's expected utility and the fixed cost of FDI

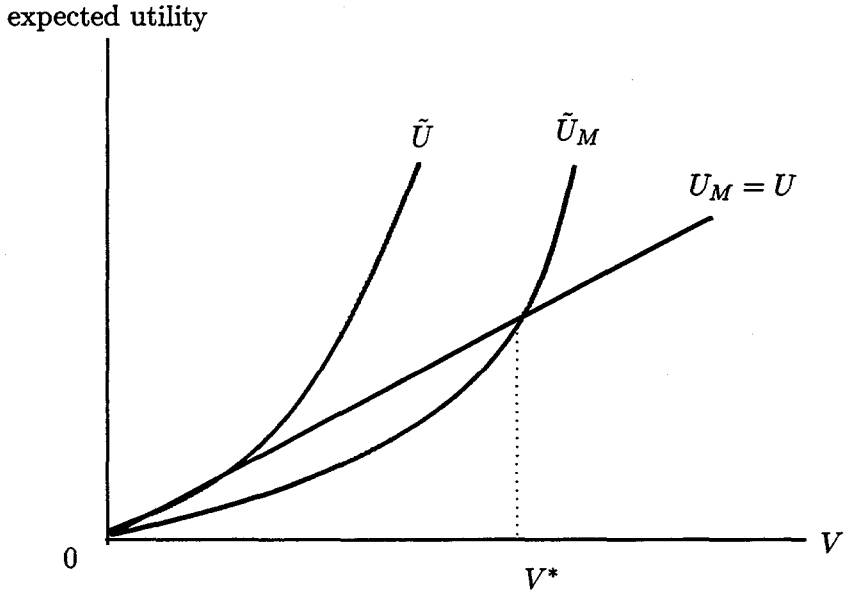
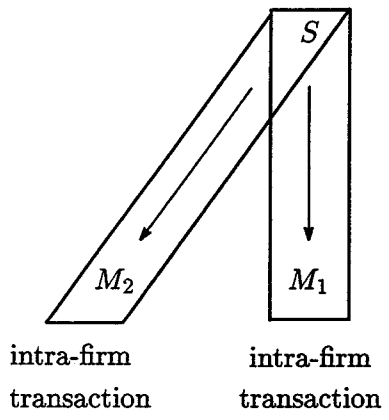
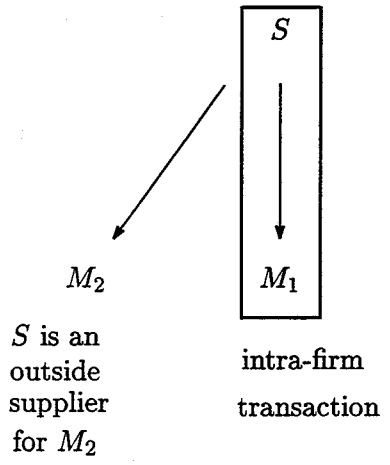


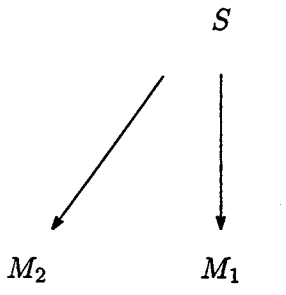
Figure 2.3: The MNE's expected utility and efficiency



(a) Joint ventures



(b) OEM



S is an outside supplier

(c) Subcontracting

Figure 2.4: Joint ventures, OEM and the outside supplier

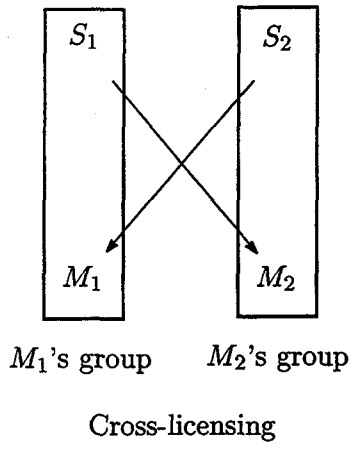


Figure 2.5: Cross-licensing between two MNE groups

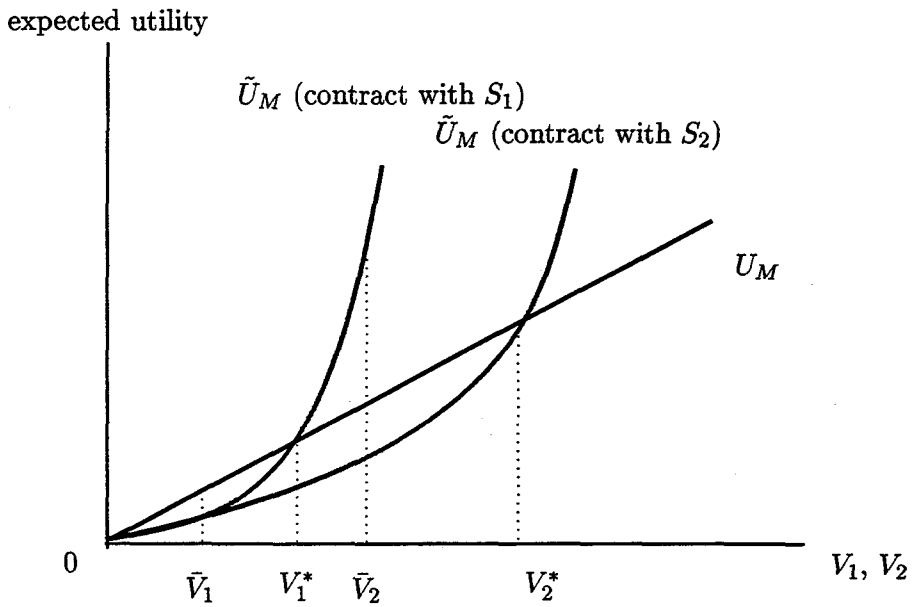


Figure 2.6: The gain from cross-licensing

Chapter 3

Equity Joint Ventures and Technology Transfer

3.1 Introduction[1]

In many developing countries and some industrial countries, multinational enterprises (MNEs) are forced to share equity control with a local firm by the host governments. While these countries try to attract foreign direct investment (FDI) to obtain capital and technology from MNEs, they restrict full ownership by foreign firms to avoid excessive foreign control. This local-ownership policy is a reason why MNEs share equity in a business activity with local partners. Even without policy interventions, however, MNEs prefer equity joint ventures to wholly owned subsidiaries under some circumstances.[2] It is known that Japanese MNEs are more prone to select joint ventures than other MNEs. Buckley (1985) refers to the strong tendency of Japanese MNEs to take minority positions in their affiliates in the 1970's.[3] In reality, while a joint venture is one of the most commonly observed forms of foreign investment by MNEs, their equity shares vary widely.

This chapter analyzes the organization forms of foreign investment and explains why an MNE and a local firm tie up to start an equity joint venture in a simple model. In the case of FDI, the MNE becomes the controlling shareholder of a foreign firm; for direct investment, the MNE must acquire the firm's stock. This drives us to the following question: what percentage of ownership is enough for an MNE to become the controlling shareholder? The model developed in this chapter can be applied to examine the relationship

[1]The following analysis is based on Kasuga (1998)

[2]See Gomes-Casseres (1988) for the MNE-host country relationship.

[3]Recently this tendency is not remarkable as before. According to Ministry of International Trade and Industry (1994), the ratios of Japanese manufacturing MNEs that take majority positions are 83.1 percent in developed countries, 59.9 percent in developing countries, and 69.9 percent in the whole area.

between equity shares and control.[4]

The MNE and its organizational form have been explained by internalization theory. The theory states that, because of transaction costs on markets, the firm holding intangible assets chooses to internalize international transactions by setting up a wholly owned subsidiary.[5] As Buckley (1983) and Hennart (1986) point out, the central problem of internalization theory is to clarify the costs and the benefits of each transaction type or organization form. However, the traditional theory totally depends on how to specify the costs and the benefits. For example, Buckley and Casson (1981) assume that FDI involves larger fixed costs and smaller variable costs than other transactions. Although they clarify the case where a firm chooses FDI, it fails to clarify the essential reason in the formal model. Moreover, the conventional theory of MNEs does not focus on equity joint ventures, which are commonly observed in international business, although full ownership has been an object of study for a long time.[6] Hence, little is known about the relationship between control and equity shares in joint ventures.

Without specifying transaction costs, this chapter investigates the choice of the MNE's ownership structure, that is, the choice between FDI and portfolio investment or the choice between equity joint ventures and wholly owned subsidiaries. A model of financial contracts is developed to consider equity shares in joint ventures (or in wholly owned subsidiaries) explicitly.[7] While the traditional theory of FDI focuses on the MNE's choice, this chapter investigates the condition that the local partner accepts because a joint-venture partnership requires the agreement between the MNE and the local firm. Moreover, the relationship between the MNE's equity share and control over of a joint venture is examined. This chapter tries to show the equity share that is enough for an MNE to be the controlling shareholder.

In this chapter, the ownership of a project is introduced into the model of imperfect capital markets by Gertler and Rogoff (1990). Portfolio investment, FDI and equity joint ventures are defined in a formal model using the ownership. In this model of mergers and acquisitions, it is shown that a wealthier firm, which can manage a project more efficiently under asym-

[4]Ono (1985) considers the similar relationship in a two-stage bargaining game model: in the first stage, the two parent firms choose equity shares in the joint venture; in the second stage, they bargain over the joint venture's profit. On the other hand, the model of this chapter considers profit shares and equity shares are the same. The equity share (or the profit share) is here treated as a parameter.

[5]The internalization theory of the MNE was developed by Buckley and Casson (1976) and Rugman (1980). For further details, see Teece (1986), Hennart (1986) and Caves (1996).

[6]Hennart (1991) extends the conventional theory of internalization to explain joint ventures. Dasgupta and Tao (1998) analyze ownership structure of firms and provide a rationale for equity joint ventures in a formal model of incomplete contracts.

[7]See Aliber (1993) and Froot and Stein (1991) for another financial approach to FDI. Their models are based on exchange-rate movements and imperfect capital markets.

metric information, acquires the project.

Internalization theory suggests that MNEs with technological advantages choose FDI (a wholly owned subsidiary or an equity joint venture) as a mode of technology transfer to avoid high transaction costs on markets. In this chapter, the MNE's cost-reducing activities, which are unverifiable, represent technology transfer. As Ramachandran (1993) shows, technology transfer from the MNE decreases as the MNE reduces its equity share in the joint venture. Although joint ownership causes the lower level of technology transfer, the model provides a rationale for equity joint ventures.

The remainder of the chapter is organized as follows. Section 3.2 presents basic assumptions about projects, technology transfer and information structure. A model of portfolio investment, FDI and equity joint ventures is developed in Section 3.3. Section 3.4 investigates the MNE's choice of ownership and the relationship between equity shares and control. The case where local firms have technological advantages is examined in Section 3.5. Section 3.6 summarizes the main results of the paper.

3.2 Basic assumptions

We adopt Gertler and Rogoff's (1990) open-economy model of imperfect capital markets. There are one good and two countries, a source country and a host country. These countries are small in the sense that they cannot affect the world interest rate. There are an MNE in the source country and a local firm in the host country. Both firms are risk neutral and invest their initial endowments for ex post profits. Anyone can lend abroad at the interest rate r. Suppose that there are indivisible projects, which are identical ex ante, in the host country, and that k units of ex ante investment yield a random ex post output Y. The distribution of ex post output is

$$Y = \begin{cases} A - C(e) & \textit{with probability } F(k), \\ -C(e) & \textit{with probability } 1 - F(k), \end{cases} \tag{3.1}$$

where A is gross output in the good state, $C(e)$ is the operating cost of a project and e is the MNE's noncontractible specific resource (unverifiable effort). The operating cost $C(e)$ is convex in e, i.e., $C'(e) < 0$ and $C''(e) > 0$. Thus, if more efforts are expended by the MNE, the operating cost of the project is lowered. Suppose also that the MNE's technology is important enough for the project, i.e., $C(0) > 0$ and $\lim_{e \to 0} C'(e) = -\infty$. The function $F(k)$ denotes the probability of success. The function is increasing, strictly concave, and twice continuously differentiable, with $F(0) = 0$, $F(\infty) = 1$ and $r/A < F'(0) < \infty$. From (3.1), the expected output is

$$Y = AF(k) - C(e). \tag{3.2}$$

The information structure is as follows. When a firm borrows, lenders can observe the firm's endowment and the total amount the firm borrows. However, the lenders cannot verify whether the borrower invests in the project. In particular, the borrower may secretly lend abroad. Thus, investment k as well as e is not verifiable. The other variables, and the functions, $C(\ )$ and $F(\ )$, are common knowledge.

3.3 Foreign investment and ownership

3.3.1 Portfolio investment

In this subsection, suppose that the host country prohibits foreign investors from owning assets. Projects are initially owned by local firms in the host country. Then capital flows, which finance projects, to the host country are caused by portfolio investment.

Definition 3.1 (portfolio investment)
Portfolio investment is the activity of financing a project if a foreign investor has no ownership of the project.

Local firms have w_L initially. If a project owner wants to invest more than w_L in the project, borrowing at the world interest rate r is needed. Then the owner's constraint is

$$w_L + b \geq k, \tag{3.3}$$

where b is the amount the owner borrows. In return for this amount, the borrower issues a state-contingent security. The payment of the security depends on the outcome of the project. A security pays R in the good state and 0 in the bad state.[8] Since the security must offer investors r, the payment R satisfies

$$RF(k) = (1+r)b. \tag{3.4}$$

The expected profit of the project owner (the local firm) is given by

$$\Pi_{PI}^{L}(k) \equiv AF(k) - C(e) - RF(k) + (1+r)(w_L + b - k). \tag{3.5}$$

The first two terms on the right-hand side represent the expected output of the project. The third term is the expected payment to lenders. The last term is the return from risk-free investments. The owner chooses k to maximize (3.5).

[8]None of the results below would change if payments were positive in the bad state. As in Gertler and Rogoff (1990), if the borrower has verifiable incomes after the realization of output, the payment in the bad state can be positive. However, Gertler and Rogoff show that the lifetime wealth is the key to determine k while the instantaneous income does not matter. In this chapter, the initial endowment w_L is the local firm's net worth.

Since the owner in the host country obtains the surplus, the foreign investor (the lender) has no incentive to reduce the operating cost $C(e)$ by expending unverifiable effort e. Thus, no MNEs expend effort in the case of portfolio investment, i.e., e=0 in (3.5).[9]

If there were no information asymmetries, the borrower's problem would be

$$\max_k AF(k) - C(0) - (1+r)(k - w_L).$$

In this case, the borrower does not have to issue a state-contingent security because the payment can be contingent on verifiable k. The first-order condition is

$$AF'(k^*) = 1 + r, \tag{3.6}$$

where k^* denotes the first-best level of investment. This chapter focuses on the case where the first-best level is large enough, i.e., $k^* > w_L$, so that no firms can invest k^* without borrowing.

Under asymmetric information, the borrower maximizes (3.5) for a given R that satisfies the constraint (3.4). Hence, the first-order condition is

$$(A - R)F'(k) = 1 + r. \tag{3.7}$$

A rise in R lowers k. Since $R > 0$, k in (3.7) is smaller than k^*. Since R is an increasing function of b for any given k from (3.4), the borrower chooses the smallest b for the second-best k. Hence, the constraint (3.3) is binding. From (3.3) and (3.4), we obtain the constraint of the borrower's problem,

$$R = \frac{1+r}{F(k)}(k - w_L). \tag{3.8}$$

The solution of this problem, a pair (k, R), is given by the first-order condition (3.7) and the constraint (3.8). In Figure 3.1, (3.7) is drawn as the IC curve, which is downward-sloping and intersects the horizontal axis at k^*. Equation (3.8) is the condition that lenders must receive the market rate of return, and is drawn as the MR_{PI} curve in Figure 3.1. The MR_{PI} curve intersects the horizontal axis at $k = w_L$. The slope of the MR_{PI} curve is given by

$$\frac{1+r}{F(k)}\left\{1 - \frac{F'(k)}{F(k)/k}\left(1 - \frac{w_L}{k}\right)\right\},$$

where $F'(k)/\left(F(k)/k\right)$ is the ratio of the marginal product of k to the average product. Since $0 < F'(k)/\left(F(k)/k\right) < 1$ and since $w_L < k$ along the MR_{PI} curve, the slope must be positive as in Figure 3.1.

[9]The effect of ownership structure on incentives in this chapter is similar to the implication of incomplete-contract approach. See Hart (1995) for the theoretical foundations of the approach.

Let k_{PI} denote the level of investment that satisfies both (3.7) and (3.8). We obtain k_{PI} from the intersection of the IC curve and the MR_{PI} curve in Figure 3.1. It is clear that k_{PI} is smaller than k^* and depends on w_L. Differentiating (3.7) and (3.8) totally, we obtain

$$\begin{aligned} \frac{dR}{dw_L} &= \frac{1}{D}(A-R)(1+r)F''(k), \\ \frac{dk_{PI}}{dw_L} &= \frac{1}{D}(1+r)F'(k), \end{aligned}$$

where

$$D = (1+r)F'(k)\left\{1 - \frac{F'(k)}{F(k)/k}\left(1 - \frac{w_L}{k}\right)\right\} - (A-R)F(k)F''(k) > 0.$$

Hence, $dR/dw_L < 0$ and $dk_{PI}/dw_L > 0$. Since a rise in w_L shifts the MR_{PI} curve downward and leaves the IC curve unchanged in Figure 3.1, k_{PI} increases as the owner's net worth rises.

In this chapter, the following is assumed.

Assumption 3.1
For any $w_L \geq 0$, $AF(k_{PI}) - C(0) - (1+r)k_{PI} > 0$.

Thus, a project makes a positive (expected) profit without the initial endowment and technology transfer.

3.3.2 Wholly owned subsidiaries

In this subsection, foreign firms (MNEs) are allowed to own projects in the host country. Suppose that an MNE establishes a wholly owned subsidiary for FDI.

Definition 3.2 (wholly owned subsidiaries)
A wholly owned subsidiary is established if an MNE obtains full ownership and the decision-making rights of a project.

In wholly owned subsidiaries, the MNE extends unverifiable effort to reduce the operating cost. Hence, the expected profit of the MNE from a project is

$$\Pi^M_{WOS}(k,e) \equiv AF(k) - C(e) - RF(k) + (1+r)(w_M + b - k - P) - e, \tag{3.9}$$

where w_M is the MNE's endowment and P represents the price of the project. The MNE purchases the project and chooses k and e to maximize (3.9). As in the case of portfolio investment, the borrower (the MNE in this case) must satisfy the constraints (3.4) and

$$w_M + b \geq k + P. \tag{3.10}$$

This inequality implies that the MNE must raise funds to invest k and to purchase a project at the price P. The constraint (3.10) is binding because the MNE chooses b to minimize R for the second-best solution as in the case of portfolio investment.

The price P must satisfy

$$(P + w_L)(1 + r) \geq \Pi^L_{PI}(k_{PI}). \tag{3.11}$$

This inequality is the individual rationality constraint for the project owner in the host country. It implies that the price the MNE offers must be high enough for the local firm to forgo ownership. Suppose that the MNE has the bargaining power.[10] Then P is equal to the reservation value for the local firm; the inequality (3.11) holds with equality.[11] From $\Pi^L_{PI}(k_{PI}) - (1 + r)w_L = AF(k_{PI}) - C(0) - (1 + r)k_{PI} > 0$ (Assumption 3.1), we obtain

$$P = \frac{AF(k_{PI}) - C(0) - (1 + r)k_{PI}}{1 + r} > 0. \tag{3.12}$$

From (3.9), we obtain the first-order conditions for the MNE's problem, $(A - R)F'(k) = 1 + r$ and

$$-C'(e) = 1. \tag{3.13}$$

Let e^* denote the first-best level of unverifiable efforts. MNEs choose e^* that satisfies (3.13) in wholly owned subsidiaries because they obtain the surplus. From (3.4) and (3.10), we obtain the constraint

$$R = \frac{1 + r}{F(k)}(k + P - w_M). \tag{3.14}$$

From the first-order condition with respect to k, as in the case of portfolio investment, the IC curve is drawn in Figure 3.1. The individual rationality constraint (3.14) is drawn as the MR_{WOS} curve. In Figure 3.1, the MR_{WOS} curve intersects the horizontal axis at $k = w_M - P$. Let k_{WOS} denote the investment level that satisfies both (3.7) and (3.14). In Figure 3.1, at intersection of the IC curve and the MR_{WOS} curve, we obtain k_{WOS}. A rise in w_M shifts the MR_{WOS} curve downward. A rise in w_L shifts the MR_{WOS} curve upward because P is an increasing function of w_L.[12] Hence, k_{WOS} is an increasing function of $w_M - P$.

The MNE chooses to purchase a project if

$$\Pi^M_{WOS}(k_{WOS}, e^*) \geq (1 + r)w_M. \tag{3.15}$$

[10]Suppose the case where there are many projects for one MNE to purchase.

[11]If the local firm had some bargaining power, P would become higher. It affects the MNE's willingness to purchase negatively and the owner's willingness to sell positively.

[12]A rise in w_L increases k_{PI}.

From (3.4) and (3.12), the inequality (3.15) can be rewritten as

$$AF(k_{WOS}) - C(e^*) - (1+r)k_{WOS} - e^* \geq AF(k_{PI}) - C(0) - (1+r)k_{PI}. \tag{3.16}$$

The left-hand side is the expected profit from a project. The right-hand side is the price of the project. If (3.16) holds, the MNE prefers establishing a wholly owned subsidiary to portfolio investment. Since $-C(e^*)-e^* > -C(0)$ and since $AF(k)-(1+r)k$ is an increasing function of k for any $k \in (0, k^*)$, (3.16) holds for large w_M/w_L. The result can be stated in the following proposition:

Proposition 3.1
If an MNE is much wealthier than the local firm (if w_M/w_L is large enough), the MNE chooses a wholly owned subsidiary rather than portfolio investment.

3.3.3 Equity joint ventures

The subsection above considers full ownership by the MNE. In practice, however, some countries restrict wholly owned subsidiaries of foreign firms. With the local-ownership policy, MNEs have to find a joint-venture partner to start a new enterprise in the host country. In this subsection, suppose that an MNE makes a joint-venture contract with a partner in the host country.

Definition 3.3 (joint ventures)
A joint venture is a contract that involves sharing ownership of a project.

By this contract, the MNE obtains partial ownership of the project and the local firm obtains the benefit of technology transfer.

Suppose that this joint venture has a fixed $w \equiv w_L + w_M < k^*$, which represents the joint venture's net worth. The MNE's equity share $\alpha \equiv w_M/w$ is treated as a parameter. This joint-venture partnership eases the financial burden of each firm under asymmetric information, i.e., $w > w_L$ and $w > w_M$. In the joint venture model developed in this chapter, equity shares are assumed to be the same as profit shares as in Ramachandran (1993). Hence, the MNE's expected profit from the joint venture is

$$\Pi^M_{JV}(k,e) \equiv \alpha\{AF(k) - C(e) - RF(k) + (1+r)(w+b-k)\} - e. \tag{3.17}$$

Note that the MNE determines e and pays the entire cost of technology transfer because e is unverifiable by assumption. The MNE with an equity share α chooses k and e to maximize (3.17). The MNE must satisfy the constraints (3.4) and

$$w + b \geq k. \tag{3.18}$$

The local firm's expected profit from the joint venture is

$$\Pi_{JV}^{L}(k,e) \equiv (1-\alpha)\left\{AF(k) - C(e) - RF(k) + (1+r)(w+b-k)\right\}. \tag{3.19}$$

The local firm with an equity share $1-\alpha$ chooses k to maximize (3.19). Note that this problem is consistent with the MNE's problem with respect to k.

The constraint (3.18) is binding as (3.3) and (3.10). From (3.17), we obtain the first-order conditions for the MNE's problem, $(A-R)F'(k) = 1+r$ (Equation (3.7)) and

$$-C'(e) = 1/\alpha. \tag{3.20}$$

Let e_{JV} denote the level of effort that satisfies (3.20). A rise in α lowers e_{JV}. Since $0 \leq \alpha \leq 1$, e_{JV} is smaller than the first-best e^*. Thus, as in Ramachandran (1993), technology transfer is promoted as the MNE's equity share increases. From (3.4) and (3.18), we obtain the constraint

$$R = \frac{1+r}{F(k)}(k-w). \tag{3.21}$$

The individual rationality constraint (3.21) is drawn as the MR_{JV} curve in Figure 3.1. The MR_{JV} curve intersects the horizontal axis at $k = w$. Let k_{JV} denote the investment level that satisfies both (3.7) and (3.21). In Figure 3.1, the intersection of the IC curve and the MR_{JV} curve gives k_{JV}. Since $w > w_M - P$ and $w > w_L$, we obtain $k_{JV} > k_{WOS}$ and $k_{JV} > k_{PI}$. Thus, equity joint ventures improve the efficiency of capital investment while technology transfer is inefficient.

Suppose that full ownership by foreigners is prohibited. The MNE prefers a joint venture if

$$\Pi_{JV}^{M}(k_{JV}, e_{JV}) \geq w_M(1+r) = \alpha w(1+r). \tag{3.22}$$

The left-hand side of the inequality is the MNE's expected profit from the joint venture. The right-hand side is the MNE's profit from portfolio investment or lending abroad at the interest rate r. From (3.4) and (3.17), the inequality (3.22) can be rewritten as

$$AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV} - e_{JV}/\alpha \geq 0. \tag{3.23}$$

Since $AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV} - e_{JV}/\alpha > AF(k_{PI}) - C(0) - (1+r)k_{PI} > 0$ by assumption, (3.22) holds for any α. Thus, the MNE prefers equity joint ventures to portfolio investment in any case.

The local firm prefers a joint venture if

$$\Pi_{JV}^{L}(k_{JV}, e_{JV}) \geq (P + w_L)(1+r). \tag{3.24}$$

The left-hand side of this inequality is the local firm's expected profit from the joint venture, which is a function of α. The right-hand side is the profit from selling the project in (3.11). From (3.4) and (3.19), the inequality (3.24) can be rewritten as

$$(1-\alpha)\{AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV}\} \geq (1+r)P. \tag{3.25}$$

Suppose $\alpha = 0$, i.e., $w_M = 0$ and $w = w_L > 0$. In that case, (3.25) holds with equality. The following calculation shows that the local firm strictly prefers the joint-venture partnership with a small $\alpha > 0$ (to the case of $\alpha = 0$). From (3.19), we have

$$\frac{d\Pi^L_{JV}}{d\alpha} = -\{AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV}\} - (1-\alpha)C'(e_{JV})\frac{\partial e_{JV}}{\partial \alpha}. \tag{3.26}$$

Since $\lim_{e\to 0} C'(e) = -\infty$ and $\partial e_{JV}/\partial\alpha > 0$, it is clear that (3.26) is positive at $\alpha = 0$. Then, since the right-hand side of (3.24) decreases as α increases, (3.24) holds at least for a very small α.[13] Thus, the local firm prefers equity joint ventures in the case where α is small or the impact of technology transfer is large enough.

The result can be summarized as follows.

Proposition 3.2
When full ownership by foreigners is prohibited, there exists an equity share $\alpha \in (0,1)$ such that the MNE and the local firm agree on the joint-venture partnership.

The intuition for the proposition can be easily understood as follows. When full ownership is prohibited, the MNE prefers partial ownership because the partnership promotes technology transfer and capital investment. The local firm becomes the partner if its equity share $(1-\alpha)$ is large enough. A rise in α decreases the local firm's profit share but increases the joint profit because of technology transfer.

Figure 3.2 describes the relationship between the local firm's profit and the MNE's equity share. From (3.26), we obtain $\lim_{\alpha\to 0} d\Pi^L_{JV}(k_{JV}, e_{JV})/d\alpha > 0$ and $\lim_{\alpha\to 1} d\Pi^L_{JV}(k_{JV}, e_{JV})/d\alpha < 0$. We know that the function $\Pi^L_{JV}(\alpha)$ is continuous, upward sloping at $\alpha = 0$ and downward sloping at $\alpha = 1$. If technology transfer from the MNE is sufficiently effective (if α is small), the local firm agrees to the joint-venture partnership. Suppose that the local firm never rejects the partnership if $\alpha \in (0, \bar{\alpha}]$ as in Figure 3.2. It must be noted that, although $\bar{\alpha}$ is the upper bound of the range, the local firm may accept the partnership even if $\alpha \in (\bar{\alpha}, 1)$.

[13] Since w is fixed, k_{JV} does not change.

3.4 Ownership structure and control

In the section above, the MNE chooses equity joint ventures because full ownership is prohibited in the host country. This section shows that MNEs sometimes prefer equity joint ventures to wholly owned subsidiaries without local ownership requirements. We will find some $\alpha \in (0,1)$ such that $\Pi^M_{JV}(k_{JV}, e_{JV}) > \Pi^M_{WOS}(k_{WOS}, e^*) \geq (1+r)w_M \equiv \Pi^M_{PI}$. The first inequality implies that the MNE prefers a joint venture to a wholly owned subsidiary. The second inequality implies that a wholly owned subsidiary makes a larger profit than portfolio investment.

Proposition 3.3
Suppose that a wholly owned subsidiary makes a larger profit than portfolio investment for an MNE. Then, there exists an equity share such that the MNE prefers the joint-venture partnership to full ownership.

Proof. From (3.16), $\Pi^M_{WOS}(k_{WOS}, e^*) \geq \Pi^M_{PI}$ can be rewritten as

$$AF(k_{WOS}) - C(e^*) - (1+r)k_{WOS} - e^* - (1+r)P \geq 0. \tag{3.27}$$

From Proposition 3.1, (3.27) holds for a large w_M or α. Let α' denote the equity share such that (3.27) holds with equality.

From (3.9) and (3.17), the inequality $\Pi^M_{JV}(k_{JV}, e_{JV}) > \Pi^M_{WOS}(k_{WOS}, e^*)$ can be rewritten as

$$\begin{aligned} &\alpha\{AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV}\} - e_{JV} \\ &> AF(k_{WOS}) - C(e^*) - (1+r)k_{WOS} - e^* - (1+r)P. \end{aligned} \tag{3.28}$$

At $\alpha = \alpha'$, the right-hand side of (3.28) is 0. Hence, (3.28) holds $\alpha = \alpha'$. Q.E.D.

The intuition for this result can be easily understood as follows. Inequality (3.27) implies that a wholly owned subsidiary yields a higher return than portfolio investment only if an MNE is wealthy ($\alpha > \alpha'$) as Proposition 3.1 states. Inequality (3.28) implies that a joint-venture partnership is preferred to a wholly owned subsidiary. If $\alpha \leq \alpha'$, this inequality holds because the partnership significantly increases capital investment by lightning a financial burden. Thus, at $\alpha = \alpha'$, the MNE prefers joint ventures to wholly owned subsidiaries, which yield the same returns as portfolio investment. It must be noted that the same argument is applicable to some slightly larger α.

Although the MNE prefers an equity joint venture for some α, local firms do not have to accept the partnership for the same α. Local firms may refuse to be the partner if $\alpha > \bar{\alpha}$. Figure 3.3 illustrates the relationship between α and the mode of foreign investment. If $\alpha < \alpha'$, the MNE cannot choose wholly owned subsidiaries. If $\alpha \leq \bar{\alpha}$, the local firm chooses joint ventures. As illustrated in Figure 3.3, there are two cases, (a) $\alpha' < \bar{\alpha}$ and (b) $\bar{\alpha} \leq \alpha'$. It is important that the impact of cost-reducing technology decreases α'.

As in Figure 3.3, joint ventures in this model can be divided into two groups according to the firm that controls the joint venture substantially. It is useful to define the term "control" as follows.

Definition 3.4 (Control)
Suppose that both the MNE and the local firm accept a joint-venture contract with an equity share. If this partnership were canceled by an outside factor (for instance, the selection of board members in the joint venture), then either firm would be the owner of the project. The owner of the project under this hypothetical situation has control of the joint venture.

This "control" does not affect the decision-making rights in this model.[14] However, this term is helpful to characterize joint ventures.

Suppose that a firm has "control" over a joint venture. Then the firm's threat point, which is the maximum possible gain without the partnership, is the profit from portfolio investment or more. Without "control," the firm's threat point would never be greater than the profit from portfolio investment. This is important especially for MNEs. Only if the MNE has "control" of a joint venture, the threat point of the MNE becomes greater than profits from portfolio investment. Thus, "control" raises the threat point of the MNE. This implies that, with "control," the firms have authority to determine various unwritten terms of the partnership.

In Figure 3.3 (a), the two firms choose a joint venture controlled by the local firm if $\alpha \in (0, \alpha')$. In this case, the MNE's net worth is so small that the MNE cannot afford to own the project. If α is equal to α' or slightly larger than α', then both of them choose a joint venture the MNE controls. If $\alpha \in (\alpha', 1)$, the MNE is wealthy enough to purchase the project for a wholly owned subsidiary. In this case, the MNE chooses either a wholly owned subsidiary (in the case where the local firm rejects the partnership), or an equity joint venture controlled by the MNE (in the case where the local firm does not reject).

In Figure 3.3 (b), the two firms choose a joint venture controlled by the local firm if $\alpha \in (0, \bar{\alpha}]$. If $\alpha \in (\bar{\alpha}, \alpha')$, either portfolio investment (in the case where the local firm rejects the partnership) or a joint venture that the local firm controls (in the case where the local firm accepts the partnership) is chosen because the MNE cannot afford to own the project. If $\alpha \in [\alpha', 1)$, the MNE purchases the project for a wholly owned subsidiary or chooses a joint venture that the MNE controls.

The results can be summarized as follows.

Proposition 3.4
The relationship between equity shares and control is described as follows.

[14]Note that there is no conflict between the two firms when they determine k and e as shown in Section 3.3. Hence, the partnership is never canceled in the model as long as the firms accept on the equity share.

(i) *If the MNE's cost-reducing technology is effective* ($\alpha' < \bar{\alpha}$), *there exists an equity share such that the MNE has control over the joint venture* (*at* $\alpha = \alpha'$ *in Figure 3.3* (a)).
(ii) *Only if the MNE's net worth is large enough* ($\alpha \geq \alpha'$), *the MNE has control over a joint venture.*
(iii) *If the MNE's net worth is small enough* ($\alpha < \alpha'$ *in Figure 3.3* (a) *and* $\alpha \leq \bar{\alpha}$ *in Figure 3.3* (b)), *the local firm has control over the joint venture.*

Thus, the MNE chooses an equity joint venture without policy interventions. If the MNE is not wealthy, the partnership is inevitable. However, it depends on technological advantages whether the MNE has control of the joint venture. Strong technological advantages give an MNE control of the joint venture even if the MNE has a small equity share as shown in Figure 3.3 (a).

3.5 Technically advanced local firms

In the conventional theory of MNEs, it has been assumed that advanced technology is transferred from MNEs to local firms. In practice, however, an MNE sometimes takes over a local firm or makes a joint-venture contract to utilize the local firm's advanced technology. This section investigates the case where the local firm has technological advantages and shows how this change affects the results above.

Suppose that the information structure, project and endowments are the same as in the sections above. In this section, however, suppose that the local firm has unverifiable efforts that reduce the operating cost of a project. Then the local firm's expected profit from portfolio investment is

$$\Pi_{PI}^{L} = AF(k_{PI}) - C(e^*) - (1+r)k_{PI} - e^* + (1+r)w_L.$$

In this case, the local firm can choose the first-best level of effort. As in Section 3.3, (3.7) and (3.8) determine k_{PI}.

The MNE's expected profit from a wholly owned subsidiary is

$$\Pi_{WOS}^{M} = AF(k_{WOS}) - C(0) - (1+r)(k_{WOS} + P) + (1+r)w_M,$$

where

$$P = \frac{1}{1+r}\left\{AF(k_{PI}) - C(e^*) - (1+r)k_{PI} - e^*\right\}.$$

This price (the reservation value for the local firm) is higher than the price given in (3.12),because the local firm can utilize the first-best level of e in the case of portfolio investment. The MNE can purchase a project if $\Pi_{WOS}^{M} \geq (1+r)w_M$. This condition can be rewritten as

$$AF(k_{WOS}) - C(0) - (1+r)k_{WOS} \geq (1+r)P.$$

As in (3.27), we have α' such that the inequality holds with equality. In this case, α' must be larger because $e = 0$.

The joint-venture partnership is discussed as follows. The MNE's expected profit from a joint venture is

$$\Pi_{JV}^{M} = \alpha \{AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV}\} + (1+r)w_M.$$

The MNE prefers a joint venture to portfolio investment if $\Pi_{JV}^{M} \geq (1+r)w_M$. It is clear that this condition holds in any case. The local firm prefers a joint venture if $\Pi_{JV}^{L} \geq (1+r)(P+w_L)$, where

$$\Pi_{JV}^{L} = (1-\alpha)\{AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV}\} - e_{JV} + (1+r)w_L.$$

In this case, e_{JV} is the level of effort that satisfies the first-order condition $-(1-\alpha)C'(e) = 1$. Hence, e_{JV} is smaller than the first-best level and a decreasing function of α. For the technically advanced local firm, $d\Pi_{JV}^{L}/d\alpha < 0$ at $\alpha = 0$. In this case, it is not clear that the local firm accepts the partnership for some equity share (Proposition 3.2).

The MNE prefers an equity joint venture to a profitable wholly owned subsidiary if

$$\alpha\{AF(k_{JV}) - C(e_{JV}) - (1+r)k_{JV}\} > AF(k_{WOS}) - C(0) - (1+r)(k_{WOS}+P).$$

As shown in Section 3.4, this inequality holds if $\alpha = \alpha'$. Hence, there exists an equity share such that the MNE prefers a joint venture to full ownership (Proposition 3.3). In this case, however, it is not clear that the local firm accepts that equity share. If the partnership is accepted, the purpose of the local firm must be the MNE's large net worth. When α is small (the MNE is not wealthy), the two firms likely choose portfolio investment rather than a joint venture controlled by local firms because the local firm rejects the partnership.

3.6 Conclusion

This chapter explains why an MNE establishes a wholly owned subsidiary or an equity joint venture with a local firm without the ad hoc specification of transaction costs. The model of ownership structure developed in this chapter is based on a simple financial contract. However, it describes the three modes of foreign investment, portfolio investment, wholly owned subsidiaries and joint ventures. Moreover, the model shows the relationship between equity shares and control of joint ventures.

In conclusion, (1) the MNE's large net worth promotes a wholly owned subsidiary and an equity joint venture controlled by the MNE; (2) the MNE's small net worth promotes portfolio investment and an equity joint venture

controlled by the local firm. These results are based on the assumption about incomplete financial markets. It explains minority positions of some MNEs in their affiliates. However, it is important that minority positions do not imply no control. With strong technological advantages, MNEs have control over joint ventures or take over local firms easily even if their net worth is small.

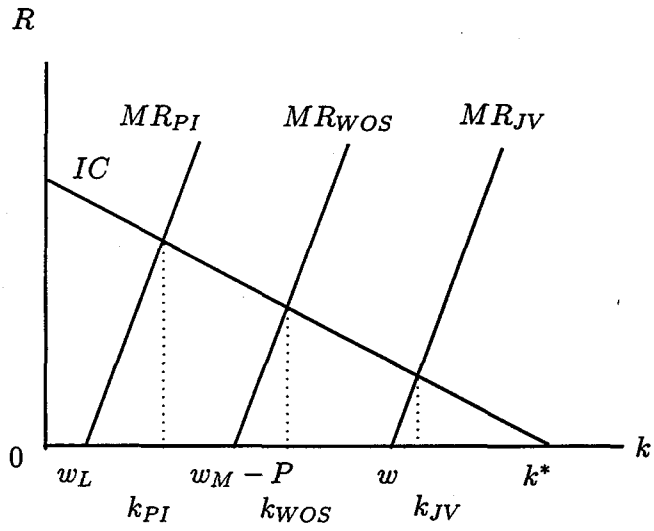


Figure 3.1: Capital investment and net worth

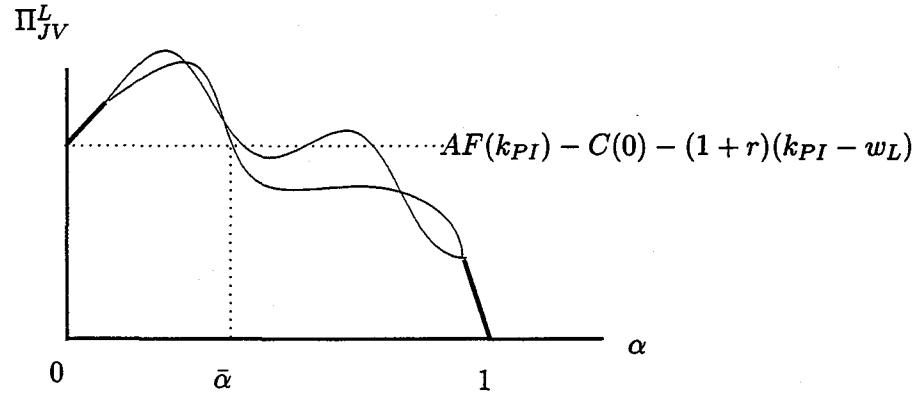
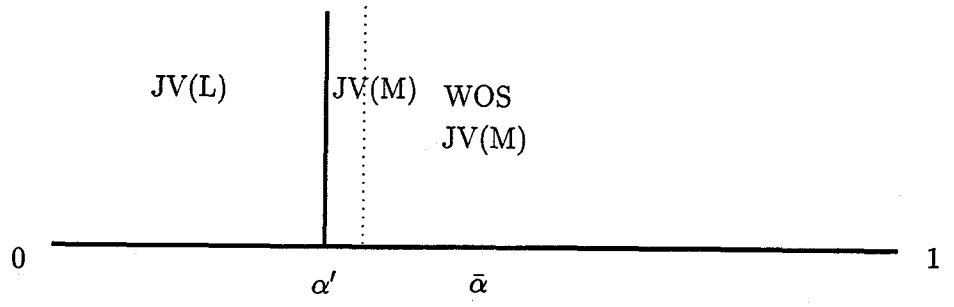
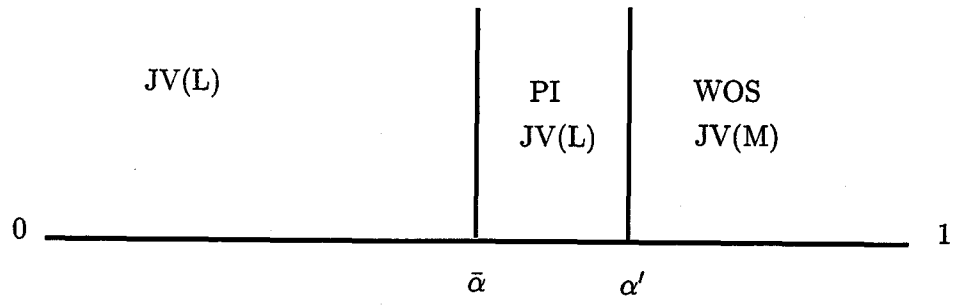


Figure 3.2: Equity share and the local firm's profit



(a)



(b)

JV(L): joint ventures controlled by the local firm
JV(M): joint ventures controlled by the MNE
WOS: wholly owned subsidiaries
PI: portfolio investment

Figure 3.3: Equity share and control

Chapter 4

International Capital Movements and Alliances

4.1 Introduction

Recently foreign direct investment (FDI) has grown throughout the world.[1] As Hymer (1960) points out, it is clear that differences in factor endowments or differences in returns to capital are neither necessary nor sufficient conditions for FDI flows between countries. International capital movements take the form of flows of portfolio capital from capital-rich countries to capital-poor countries in general. However, we actually observe a backward FDI flow from a capital-importing country to a capital-exporting country.[2] In addition, two-way FDI is frequently observed among developed countries. These facts suggest that the traditional theory of international trade and investment, which is based on the factor price equalization, is not useful to explain FDI flows. In fact, since 1960s, FDI has been explained by the theory of multinational enterprise (MNE).[3] This theory is based on an organization theory and focuses on organization structure of each international firm. Hence, although a large number of studies made on MNEs, little is known about FDI as an international capital movement.

FDI is distinguished from portfolio investment by the degree of management control that foreign investors exercise in a target company.[4] Hence,

[1]See Graham and Krugman (1993) for an overview and issues about the surge in FDI.

[2]For example, some firms in the United States (a capital-importing country) invest in Japan (a capital-exporting country).

[3]Some models of international trade embed FDI by MNEs. See Helpman (1984) and Markusen (1984) for the model of MNE based on the international trade theory. These studies do not focus on internalization, which is recognized as the central issue by the MNE theorists. However, Ethier (1986) considers internalization in the model of international trade.

[4]In practice, the distinction between the two categories of investment is not clear. An investment is called FDI if an investor purchases enough shares of a foreign firm (10 percent

in this chapter, FDI is explained as the optimal organization structure in a certain environment. Nevertheless, it must be noted that both FDI and portfolio investment are international capital movements. FDI as well as portfolio investment plays a growing role in global economic integration; the impact of FDI flows on capital movements is not negligible.[5]

The purpose of this chapter is to explain two-way FDI and net portfolio flows between pairs of countries with similar technology and factor endowments. The two aspects of FDI, an MNE's optimal organization form and an international capital movement, are emphasized in the model developed here.[6]

This chapter supposes that FDI is a form of alliances among firms with complementary skills in the global economy. In practice, MNEs choose FDI from several alliance forms as the optimal organization structure. However, few studies have a formal model of FDI as an alliance. In this chapter, a model of alliances is developed for analysis of the MNE's alliance mode choice in the theory of international capital movements.

The theory of incomplete contracts developed by Grossman and Hart (1986) is utilized to analyze alliance forms. In this chapter, I adopt an incomplete contract model developed by Yanagawa (1994) to investigate the alliance choice. In accordance with Yanagawa's model, this chapter supposes that an MNE chooses either FDI or licensing. In addition, the allocation of capital used for alliances is examined. Thus, this chapter attempts to integrate a theory of MNEs into the theory of capital movements.

The rest of the paper is organized as follows. Section 4.2 presents a basic alliance model, which explains the boundaries of firms, and defines FDI, licensing and portfolio investment. A two-country model is developed to investigate portfolio investment flows and two-way FDI in Section 4.3. Section 4.4 examines the impact of alliances on international factor movements and explains the mechanism of a backward FDI. The main results of the paper are summarized in Section 4.5.

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in the United States) to be the controlling shareholder. Purchasing shares of foreign firms is called portfolio investment if the investor simply seeks higher interests and dividends without attempting to be the controlling shareholder.

[5]For example, the ratio of FDI inflows to portfolio inflows to the United States is 0.2 and that of FDI outflows to portfolio outflows from the United States is 0.81 in 1996. For the United Kingdom, the former is 0.5 and the latter is 0.49 (Balance of Payments Statistics Yearbook, 1997).

[6]The former has been studied by the conventional theory of MNE, which is known as internalization theory. See Hennart (1991) and Teece (1986) for the development of the theory since Hymer (1960). As stated above, this theory in general does not focus on FDI flows between countries.

4.2 The model of alliances: FDI versus licensing

The incomplete contract model of Yanagawa (1994) is adopted to investigate the choice between licensing and FDI. Suppose a two-period model that contains two countries, two firms and one good. For simplicity, the discount rate is assumed to be zero. In each country, firms are either investors or local partners. Each investor has the endowment $\bar{k}$ in period 1 and access to the identical technology, which yields $f(k)$ from k units of investment. The production function $f(k)$ for this technology is differentiable, with $f' > 0$, $f'' < 0$ and $\lim_{k\to 0} f'(k) = \infty$. In addition, each investor has access to a joint project with a local partner in the other country. This project yields a joint profit Π in period 2 from a unit of investment $(\bar{k}-k)$ determined by the investor in period 1. Suppose that each investor chooses investment $(\bar{k}-k)$ for the joint project first and then invests the rest of the endowment $\bar{k}$ in the other projects.[7] Thus, all the investors can utilize their capital for alliances and the other technology. Using this technology (which is represented by function $f(k)$) implies lending capital to other firms or financial institutions.

Partners are endowed with asset A and unverifiable effort i. The asset A is indivisible and indispensable for an alliance; this chapter distinguishes the asset A from divisible capital goods k. Suppose that both a partner's i and an investor's knowledge are indispensable to the realization of a joint profit. The joint profit $\Pi = \Pi(i)$ is an increasing function of input i in period 1. The effort i incurs a disutility $C(i)$ (in monetary units) for a unit of investment. This effort cost function is assumed to be increasing $(C' > 0)$ and strictly convex $(C'' > 0)$ with $C(0) = 0$ and $\lim_{i\to 0} C'(i) = 0$. To focus on investment flows by investors, this chapter assumes that local partners have no good to invest in period 1.[8]

Suppose that, for each investor, it is easy to find a partner with complementary skills in the foreign country.[9] Then, a firm's collaboration with another firm is defined as follows.

Definition 4.1
An alliance is a foreign investment that requires a local partner's unverifiable input i.

In this chapter, we consider two alliance forms, FDI and licensing.[10]

Definition 4.2
An alliance is called FDI if an investor owns asset A.

[7]Alternatively, it can be assumed that each investor invests k in period 2 and obtains the return $f(k)$ instantaneously.

[8]By this assumption, ex ante transfers, which are studied as ex ante license fee by Yanagawa (1994), are impossible in this chapter.

[9]By assumption, investors find partners only in the foreign country.

[10]Oman (1984) categorizes licensing as a new form of international investment and FDI as an old form.

Definition 4.3
An alliance is called licensing if a local partner owns asset A.

FDI is defined as foreign ownership of local assets. In other words, FDI is to establish a subsidiary in a foreign country. If foreign investors have no local asset (subsidiary), an alliance is called licensing in this chapter. Thus, the allocation of ownership is important to describe organization structure (boundaries of firm) as in other incomplete contract models.

Investors are able to make profits without collaboration with local firms because they have access to the other technology, which is represented by the production function $f(k)$. They can invest k in either country by utilizing this technology. In this chapter, portfolio investment is defined as follows.

Definition 4.4
Portfolio investment is a foreign investment that utilizes the technology, which is represented by the function $f(k)$.

Note that investors can utilize the identical technology also in their home country.

4.2.1 Incomplete contracts

In period 1, an investor must make a contract with a local firm to obtain joint profits from an alliance. Suppose the following environment.

Assumption 4.1 (Incomplete contracts)
In period 1, it is impossible to write contracts about the allocation of joint profits because the second period uncertainty is quite complex.

Thus, the model is based on contractual incompleteness due to a huge number of contingencies. By this assumption, negotiation after the realization of $\Pi(i)$ (in period 2) determines how much two firms obtain from a joint profit. As in Yanagawa (1994) and other models of incomplete contracts, the Nash bargaining solution is utilized as follows. The investor has some bargaining power because of its technical knowledge. The local partner also has some bargaining power from input i. Thus, by assumption, both of them are indispensable for the realization of $\Pi(i)$. Hence, this chapter assumes that the ex post gains from an alliance are divided 50:50.

In this case, the investor obtains, from a unit of investment,

$$\frac{1}{2}\left(\Pi(i) - \pi_I(Q) - \pi_P(Q)\right) + \pi_I(Q),$$

where $\pi_I(Q)$ and $\pi_P(Q)$ are the threat points of the investor and the partner, respectively. These threat points are the gains in the case where negotiation does not reach an agreement. In that case, firms use their own skills alone. Let Q be the alliance form, FDI or licensing. Clearly, the threat points depend on Q. These threat points are specified as follows.

4.2.2 Threat points

The threat point of the investor is the maximum possible gain without use of the partner's input i. It depends on the alliance form Q as follows.

$$\pi_I(Q) = \begin{cases} M & \text{if } Q = \text{FDI}, \\ m & \text{if } Q = \text{licensing}, \end{cases} \tag{4.1}$$

where $\Pi(0) > M \geq m > 0$. Thus, the threat point is larger if the investor owns the asset A ($Q = \text{FDI}$). This specification is based on the assumption that the control right of A contributes to the gain if negotiations fail.

The threat point of the partner is the maximum possible gain without use of the investor's knowledge. It also depends on Q as follows.

$$\pi_P(Q) = \begin{cases} 0 & \text{if } Q = \text{FDI}, \\ N(i) & \text{if } Q = \text{licensing}, \end{cases} \tag{4.2}$$

where $\Pi(i) > N(i) > 0$ for any i. Thus, if the local partner has no ownership ($Q = \text{FDI}$), the threat point is 0 because the partner can use neither the investor's knowledge nor the asset A in the case of failed negotiation.[11] If the partner has ownership of A ($Q = \text{licensing}$), the threat point is positive because the partner can use at least the asset A. Yanagawa (1994) assumes that the threat point $N(i)$ is a function of the partner's input i and that the sign of $N'(i)$ depends on the degree of specificity of i. Suppose that i is highly (but not perfectly) specific to the alliance. Then it is reasonable to assume that the threat point decreases as the partner chooses larger i. Yanagawa justifies this assumption as follows. Suppose that the partner has limited resources. Then spending larger i for the failed project decreases input for other activities. Thus, the threat point $N(i)$ is a decreasing function of highly specific i for the failed joint project. However, if i is not very specific to the alliance, the input can contribute to the gain from other activities. This chapter assumes that $N'(i) < 0$ if i is very specific to the joint project and that $N'(i) > 0$ if i is not very specific.

4.2.3 Unverifiable input: the local partner's problem

By assumption, the level of the partner's effort i cannot be written in contracts. From a unit of investment determined by the investor, the partner obtains

$$\frac{1}{2}\left(\Pi(i) - \pi_I(Q) - \pi_P(Q)\right) + \pi_P(Q) - C(i).$$

[11] As in Yanagawa's model, $\pi_P(Q) = 0$ is assumed here if $Q = \text{FDI}$. None of the results would change even if $\pi_P(Q) > 0$.

The partner chooses i to maximize this gain. The first-order conditions are

$$\frac{1}{2}\Pi'(i) = C'(i) \quad \text{for } Q = \text{FDI}, \tag{4.3}$$

$$\frac{1}{2}\left(\Pi'(i) + N'(i)\right) = C'(i) \quad \text{for } Q = \text{licensing}. \tag{4.4}$$

Without losing generality, $\Pi(i)$ is assumed to be linear, so that $\Pi'(i)$ is constant. Let i_F denote the effort level that satisfies (4.3) and i_L the level that satisfies (4.4). From these two first-order conditions, we obtain the following: (1) if the input is highly specific to the alliance ($N'(i) < 0$), $i_F > i_L$ holds; (2) if the input is not very specific ($N'(i) > 0$), $i_F < i_L$ holds.

4.2.4 FDI versus licensing: the investor's problem

The result above shows that the unverifiable input, which is determined by the partner, depends on the alliance form Q. Considering this, the investor chooses the optimal Q and k. From a joint profit, the investor obtains

$$(k - \bar{k})\left\{\frac{1}{2}\left(\Pi(i) - \pi_I(Q) - \pi_P(Q)\right) + \pi_I(Q)\right\}.$$

Accordingly, the problem of the investor is

$$\max_{k,Q} f(k) + (\bar{k} - k)\frac{1}{2}\left(\Pi(i) + \pi_I(Q) - \pi_P(Q)\right).$$

The individual rationality (IR) condition for the partner is as follows.

$$\frac{1}{2}\left(\Pi(i) - \pi_I(Q) + \pi_P(Q)\right) - C(i) \geq 0.$$

This constraint is satisfied when $\Pi(0) - M$ is large because $\Pi(i_F) > \Pi(0) > M \geq m$.[12] In this chapter, $\Pi(0) - M$ is assumed to be large enough, so that the IR condition is satisfied.

The first-order conditions of the investor's problem with respect to k are

$$f'(k) = \frac{1}{2}\left(\Pi(i_F) + M\right) \equiv \text{MPk}_\text{F} \quad \text{for } Q = \text{FDI}, \tag{4.5}$$

$$f'(k) = \frac{1}{2}\left(\Pi(i_L) + m - N(i_L)\right) \equiv \text{MPk}_\text{L} \quad \text{for } Q = \text{licensing}. \tag{4.6}$$

Let k_F denote the investment level k that satisfies (4.5) and k_L the investment level that satisfies (4.6). Thus, if FDI is chosen, $\bar{k} - k_F$ is invested in the joint project. If licensing is chosen, $\bar{k} - k_L$ is invested in the joint

[12] Since i_F and i_L are smaller than the first-best level (the complete contract case) that satisfies $\Pi'(i) = C'(i)$, we obtain $\Pi(i)/2 - C(i) > 0$ for any i_F and i_L. Hence, for large $\Pi(0)$ and for small $\pi_I(Q)$, the IR condition is satisfied. Note that $\Pi(i_L) > \Pi(i_F)$ if licensing is chosen as will be proven later.

project. Note that only k_L and $\mathrm{MPk_L}$ depend on the function $N(i)$. From (4.5) and (4.6), the investor chooses an alliance form as follows.

$$Q = \begin{cases} \text{FDI} & \text{if } \mathrm{MPk_F} > \mathrm{MPk_L}, \\ \text{licensing} & \text{if } \mathrm{MPk_F} < \mathrm{MPk_L}. \end{cases} \tag{4.7}$$

Since $M > m - N(i_L)$, we obtain $\mathrm{MPk_F} < \mathrm{MPk_L}$ only if $\Pi(i_L) > \Pi(i_F)$ (or $i_L > i_F$). Hence, licensing is chosen only if the partner's input is not very specific to the alliance ($N'(i) > 0$). For a large M, we obtain $\mathrm{MPk_F} > \mathrm{MPk_L}$ even if $N'(i) > 0$. Thus, the investor chooses FDI if ownership of the asset A in the foreign country has a large positive impact on the threat point.

4.3 The model of international capital flows

This section presents a model of capital movements to investigate the relationship between alliances and aggregate capital flows. Suppose that there are many firms (investors and partners) in Country 1 and Country 2. All the firms have the same functions $f(k)$, $\Pi(i)$, $C(i)$, and the same endowment $\bar{k}$. However, every partner has a different function $N(i)$, which represents the threat point in the case of licensing. Suppose $N'(i) > 0$ for all the partners, so that licensing is possible in both countries.

From the first-order conditions (4.3) and (4.5), we obtain the unique k_F and $\mathrm{MPk_F}$ for all the investors in both countries. On the other hand, from (4.4), i_L is not identical because every partner has a different $N'(i) > 0$. Hence, from (4.6), $\mathrm{MPk_L}$ varies between investors. Note that $\mathrm{MPk_L}$ depends both on $N(i)$ and on $N'(i)$. Let $\overline{\mathrm{MPk}}_{\mathrm{Lj}}$ be the maximum $\mathrm{MPk_L}$ and $\underline{\mathrm{MPk}}_{\mathrm{Lj}}$ the minimum $\mathrm{MPk_L}$ in Country j, $j = 1, 2$.

Figure 4.1 illustrates the rates of returns, $f'(k)$, $\mathrm{MPk_F}$, $\overline{\mathrm{MPk}}_{\mathrm{Lj}}$ and $\underline{\mathrm{MPk}}_{\mathrm{Lj}}$, for investors in Country j. Suppose $\underline{\mathrm{MPk}}_{\mathrm{Lj}} < \mathrm{MPk_F} < \overline{\mathrm{MPk}}_{\mathrm{Lj}}$ as in Figure 4.1. Then, investors with $\mathrm{MPk_L} \in [\underline{\mathrm{MPk}}_{\mathrm{Lj}}, \mathrm{MPk_F})$ never choose licensing. A unit of investment yields $f'(k) \in [\mathrm{MPk_F}, \overline{\mathrm{MPk}}_{\mathrm{Lj}}]$ because the investors obtain at least $\mathrm{MPk_F}$ through FDI. Hence, if $\mathrm{MPk_F}$ is larger than $f'(\bar{k})$ and $\underline{\mathrm{MPk}}_{\mathrm{Lj}}$, some firms in Country j choose FDI. In addition, if both Country 1 and Country 2 have large $\mathrm{MPk_F}$ (if M is large), two-way FDI occurs. The results can be summarized as follows.

Proposition 4.1
Outward FDI occurs in a country with a large endowment ($\bar{k}$) if the return from FDI is higher than the minimum return from licensing.

This proposition implies that two-way FDI occurs even if the two countries have similar technology ($f(k)$) and endowments when the threat point M is large in both countries.

Let $\mathrm{MPk_j}$ be the average rate of return on investment for investors in Country j. It is clear that $\mathrm{MPk_j} \in (\mathrm{MPk_F}, \overline{\mathrm{MPk}}_{\mathrm{Lj}})$ because all the investors

obtain at least MPk_F. Because of the variation of MPk_L, the average rates of returns in the two countries do not have to be the same even if these countries utilize the identical technology ($f(k)$ and $\Pi(i)$). Note that all the investors in Country j can obtain the average rate of return MPk_j. The following is an explanation of this argument. Suppose that an investor obtains a rate of return higher than MPk_F and lower than MPk_j. Then the investor can obtain a higher return by lending k to other investors with higher returns. All the investors lend their capital to others as long as their returns are lower than the average. As a result, all the investors in Country j can obtain the average rate of return MPk_j.

In this model, the difference between the two average rates of returns causes portfolio investment as follows. Suppose $MPk_1 > MPk_2$. By the integration of capital markets, some investors in Country 2 lend their capital to firms in Country 1. Since this international lending involves no asset ownership, it is called portfolio investment (Definition 4.4). The result above can be summarized as follows.

Proposition 4.2
When threat points ($N(i)$) differs among countries and firms, the integration of capital markets causes portfolio investment to the country with the higher average rate of return even if the countries have identical technology ($f(k)$) and endowments ($\bar{k}$).

Note that the threat points, M, m, and $N(i)$ (the maximum possible gains firms obtain in case the negotiation does not reach an agreement), are never realized because firms are always better off reaching an agreement. Hence, the most likely interpretation of the threat points is as follows. A threat point indicates the assessed value of the local partner's asset A. Even if the technologies actually utilized ($f(k)$ and $\Pi(i)$) are identical, the threat points can vary widely. For example, suppose that a firm has special skills to utilize the asset A in case of failed negotiations. Then, this firm appreciates the asset A even if it is useless for others. In this case, the threat points are not the same. Thus, even if the two countries utilize the identical technology, the average rates of returns can vary between the countries as long as every firm assesses the asset differently. In this model, the variation of function $N(i)$ causes the different average rates of returns, so that portfolio investment occurs. Thus, portfolio flows and two-way FDI are caused by each firm's appraisal of asset A even if the two countries have the same aggregate production functions ($f(k)$ and $\Pi(i)$) and factor endowments ($\bar{k}$).

4.4 The impact of FDI on capital flows

In the section above, all the variables and functions except $N(i)$ are assumed to be identical in both countries. In practice, technology and returns vary

widely between countries and between firms. This section examines how the return of alliances affects aggregate factor movements.

Suppose that MPk_F rises in Country j.[13] From Figure 4.1, if the investors in Country j obtain higher returns from outward FDI, the average rate of return in Country j (the home country of FDI) rises. Hence, portfolio flows to Country j increase. Thus, the returns from outward FDI affect the domestic average rate of return. The result can be summarized as follows.

Proposition 4.3
If the returns from outward FDI rise in Country j, portfolio inflows to Country j increase.

This proposition implies that promoting outward FDI causes inward portfolio investment. Similarly, attracting inward FDI raises the average rate of return in the foreign country and hence promotes outward portfolio investment.

These implications are consistent with the behavior of MNEs described in Hymer's thesis (1960): when portfolio capital flows into the United States, many U.S. multinationals invest abroad. This observation of backward FDI flows is inconsistent with the neoclassical explanation, which focuses on the marginal productivity. Hence, Hymer and many other researchers dismiss the neoclassical theory of capital movements and adopt the internalization theory of MNE. This chapter presents an explanation of a backward FDI flow based on the neoclassical factor movement theory with the incomplete contract model of MNEs.

4.5 Conclusions

Two-way FDI and other alliances are growing recently. The conventional theory of MNE and international trade does not have a common framework to explain these phenomena and international capital movements. This chapter explains two-way FDI in a simple model of international capital movements using the incomplete contract theory of MNEs. The model shows the relationship between each MNE's alliance mode choice and aggregate capital flows. We must consider the variation of firms in one way or another to analyze two-way FDI and aggregate capital movements in an integrated model. In this chapter, the variation of firms is represented by different threat points (different assessed values of assets).

Hymer (1960) developed the theory of MNEs by pointing out that the neoclassical explanation of (portfolio) capital movements was inconsistent with backward FDI flows. Thus, backward FDI flows cannot be explained in a simple neoclassical model; because of this inconsistency, many scholars

[13] As shown in Section 4.3, the appreciation of the asset increases the threat point M and MPk_F.

actually dismiss the neoclassical explanation of FDI. However, the main result of the present paper is as follows: the appreciation of assets in one country causes FDI flows to that country and portfolio flows from that country. This result is consistent with the observation of a backward FDI flow.

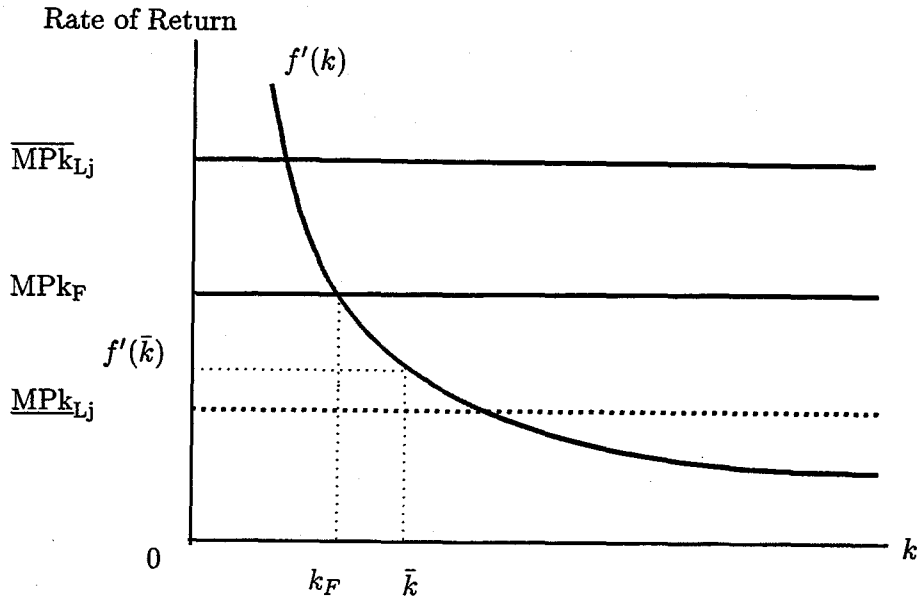

Figure 4.1: Returns of investment

Chapter 5

Summary and Conclusions

The theory of MNEs must explain various multinational activities. For example, the traditional theory of MNEs (the transaction cost theory) explains why an MNE establishes a wholly owned subsidiary. However, the conventional explanation of MNEs relies on the ad hoc assumption that inter-firm transactions are imperfect. In this thesis, three rigorous models are developed to explain the institutional modes chosen by MNEs without the ad hoc assumption of transaction costs. These models show what transaction costs are, and how each organization form of MNEs affects transaction costs.

In Chapter 2, the model of vertical integration is developed. This model, which is based on the theory of incomplete contracts, considers the choice between intra-firm transactions (internalization) and inter-firm transactions. The inter-firm transaction causes a high price and high incentives for subcontractors to make an effort while the intra-firm transaction causes a low price and low incentives. It is clear that internalization is not always efficient in this model because of organizational failures. Hence, inter-firm transactions can be chosen in spite of the transaction cost (a higher price). Thus, the incomplete contract model implies that alliances between independent firms can be more efficient than internalization. This model suggests that collaborative arrangements such as OEM are chosen by MNEs if unverifiable efforts of subcontractors are important.

In contrast, Chapter 3 focuses on unverifiable input of MNEs to investigate technology transfer from MNEs to joint ventures. Considering financial contracts explicitly, the model shows the relationship between equity shares and control in joint ventures. Although joint ownership reduces technology transfer, MNEs choose joint ventures because the partnership lightens the burden of external funds in imperfect financial markets. The model suggests that even a small MNE can be the controlling shareholder in joint ventures if its technology is very useful for the business partner.

Chapter 4 also considers collaborative arrangements between firms in international business. As in the other models, FDI or another alliance

is chosen by an MNE as the optimal organization form in a certain environment. However, this alliance model is utilized to investigate how each MNE's alliance choice relates to aggregate capital movements between countries. This analysis is an attempt to integrate a theory of MNEs into the theory of capital movements. To consider two-way FDI in a model of capital movements, the variation of firms must be modeled in one way or another. In the model of Chapter 4, the variation of firms is represented by different threat points. This analysis shows the mechanism of a backward FDI as follows: the appreciation of assets in one country causes inward FDI flows to that country and outward portfolio flows because this appreciation increases the average rate of return in foreign countries.

The role of unverifiable input is essential in all of the three models of multinationals; in these models, the MNEs choose the optimal organization structure considering the partner's incentives. This approach is completely consistent with the transaction cost theory of MNEs. However, in the transaction cost theory, the lack of rigorous models causes some theoretical limitations. This thesis is an attempt to overcome these weaknesses by using the theory of contracts, which has not been fully utilized in the analysis of MNEs. In addition, although the traditional MNE theory focuses on FDI, this thesis based on the new approach shows that the theory of MNEs should encompass much broader ranges of multinational activities.

The analyses in this thesis show that this new approach is useful to explain various alliance forms observed in international business. Nevertheless, there are many other alliances that have not been discussed here. For example, the strategic behavior of MNEs has not been studied in this thesis. The future direction of this study will be one that encompasses a game theoretic approach to strategic alliances.

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