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SHARING THE FRUITS OF KNOWLEDGE TRANSFER :
A General Approach for Negotiating Alliance Contracts
from a Strategy and Finance Perspective

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I. INTRODUCTION

The Carnegie-Bosch Foundation conference on *Knowledge In International Corporations* is the culmination of a two decade long about-face in academic thinking, from the ivory tower view of knowledge as akin to a "public good", and therefore to be ignored as a strategy factor differentiating one firm from another, to the notion of knowledge as the key to the distinctiveness of a firm, and to its competitiveness. The strategy and economics literatures today are far more concerned with the firm as a

knowledge-creating enterprise (Teece,1983; Nonaka and Takeuchi, 1995). Its focus is on building a competitive edge by creating intellectual assets and organizing collective, tacit knowledge routines within the company (Nelson and Winter, 1982). The firm with a superior knowledge base will tend to outperform others.

Knowledge Transfer In Alliances

Since a firm differentiates itself from competitors by its knowledge base, it therefore wants to keep that knowledge proprietary, so as to appropriate the maximum returns from its innovations. In many situations the firm will exploit its advantage by making its own fully-owned investments. However, in a global context, where the end applications of a technology may range beyond the firm's normal product or territorial domains, where the firm cannot efficiently internalize all production activities, and where certain markets are better accessed through local partners, it is sub-optimal for a company to rely on its own operations completely. Increasingly therefore, companies rely on alliances to extend their product and territorial reach, augment the returns from their knowledge creation, and in some cases, to achieve the combinatorial efficiencies that cannot be achieved by operating alone (Contractor and Lorange, 1988).

Intercompany alliances can take various forms -- ranging from contractual cooperation such as licensing, management service agreements, cooperative purchasing agreements involving co-development, to equity-based joint ventures where the partners divide the future profit stream

Under the quaint economic theory that knowledge was akin to a public good, the transfer of knowledge to other allied companies was also regarded as easy, virtually costless, and therefore the compensation paid for knowledge need not be very much. Today, most economists concede that knowledge is proprietary, and is embedded in organizational routines. Corporate knowledge is "sticky" in the firm where it was created, and the transfer of such capabilities to a corporate ally can be costly, protracted and incomplete.

The essence of a successful alliance is the transfer and sharing of knowledge and capability between partners. The value created by knowledge transfer to a corporate ally is no mere abstraction. Empirical studies of abnormal returns in stock markets show that joint ventures and alliances, as knowledge transfer mechanisms, can often be superior to both hierarchy (acquisition) and markets (outright sale) (e.g. Balakrishnan and Koza, 1993).

Is There A "Market" For Knowledge ?

If corporate knowledge is "embedded", idiosyncratic to the firm that created it, and if its costs and value are a function of the country, and the firm which will use it, then there is no "market price" for knowledge as such (except in specific cases such as franchising which involves large numbers of repeated knowledge transfers). In most cases we have only bipartite negotiations between the prospective allies – the knowledge supplier and the knowledge recipient companies -- similar to a bilateral monopoly (Contractor, 1981; Caves, Crookell, and Killing, 1983).

An Outline of the Paper and Its Objectives

The next section details strategic reasons why in a large number of alliances, the knowledge supplying firm is paid with multiple cash flow channels of compensation, such as lumpsum fees, royalties, returns on equity joint venture stakes, as well as interfirm trade in components and finished products between the alliance company and one of its principals. The paper then asks, "If there are several payment channels, what are the tradeoffs between them ?" It maps the profit of each partner over the several compensation variables. The objectives of individual company profit maximization and joint profit maximization are shown to be *not* congruent. Moreover, profit maximization is, itself, not always compatible with other strategic and risk-reduction objectives. The model simulates several tradeoffs between the negotiating parties prior to forming the alliance. Because individual firm profit maximization, joint profit maximization, strategy, and risk objectives are often at odds, the paper concludes that alliances are inherently fragile from the start.

II. DESIGNING THE ALLIANCE AGREEMENT

The transfer of knowledge and corporate capability, from one or both of the principals to the alliance organization, creates incremental value in the alliance. The alliance utilizes this capability (in its product or country market) to generate revenues and earnings, which are then divided and distributed back to the partners by a formula determined by the structure of the alliance. Experienced negotiators such as Lee (1992) or Matsunaga (1983) target a certain net present value (NPV) and then structure the agreement formulae to define how the costs, revenues and profits of the alliance are to be shared by the principals.

Many alliances are not *just* contractual (e.g. arms-length licenses, franchises, management service agreements) or *just* equity-based (i.e a pure equity joint venture company) (Contractor, 1985a*). A great many alliances, these days, exhibit a hybrid structure,* involving

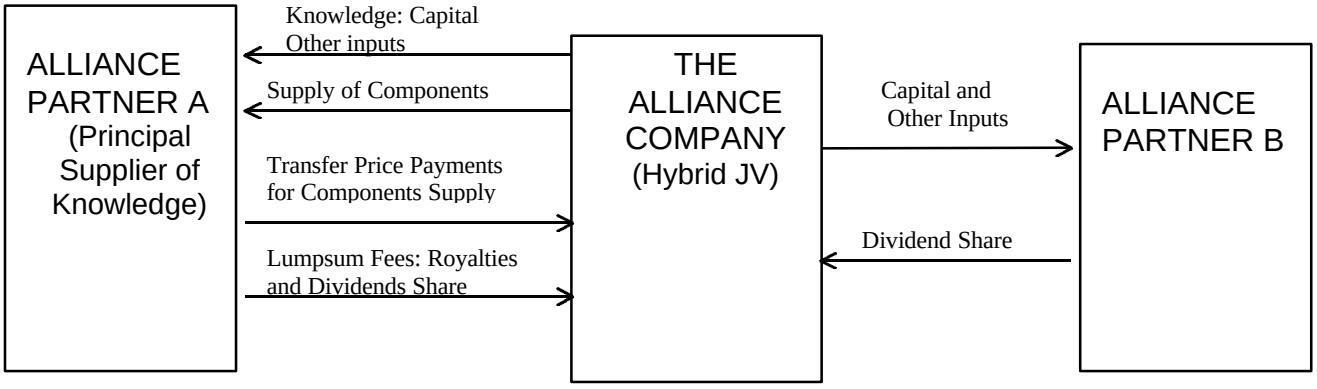
- Some equity participation by both partner firms
- A contractual knowledge transfer from one partner (or both) to the alliance company. The alliance firm signs a licensing agreement with one or both principals, and pays a lumpsum at the inception, and running royalties thereafter.
- Some interfirm trade between the alliance firm and one of the principals.

Such hybrid arrangements are becoming more common (Shane, 1996).

The Advantages of Multiple Cash Flow Channels for Strategy and Risk-Reduction

Consider two companies that have created a third company called the alliance firm. One or both companies supplies knowledge to the alliance, and, in return, receives compensation through multiple types of payments. Creating multiple cash flow channels between the alliance firm and its principals is advantageous, as summarized in Table 1. Payments for knowledge in a *mix* of cash flows, some paid up-front, some linked to sales and others to profits, reduces *overall* volatility, risk and tax, and has important strategic value to one or both partners. Let us first examine the implications of each payment type, separately.

Schema 1: A Common Alliance Agreement



Lumpsum Payments

In return for providing expertise to the alliance, one of the partners may receive lumpsum fees, typically payable at the inception of the agreement, plus running royalties thereafter. Lumpsum payments are often part of the prospective alliance firm's capital structure and may be financed out of long term debt. They provide an immediate, and certain, return to the partner company that provides the alliance with expertise. (However, too large a lumpsum increases the capital cost to the alliance firm, as well as its risks. These risks include paying too much for the expertise, creating too high a fixed cost, and the danger

Table 1: Strategic Advantages of Alternative Cash Flows

Lumpsum Fees and Royalties	Dividends/ Equity Stake	Margins on Components or Products Traded with Affiliate or Licensee
• Lumpsum fee provides immediate cash return	• Direct share in future success and profits of affiliate	• Margins can be very high on proprietary, high technology, or branded items
• Royalties earned even if affiliate/ licensee's profits are zero	• More valuable as years pass than fixed royalties	• Less affected by cyclical fluctuations as dividends are
• Licensing income is a distribution before local tax in home nation	• No expirations	• Profit margin can be earned outside affiliate/licensee country jurisdiction, that is, no convertibility risk; no local taxes
• Possible lower tax in home nation		
• More easily convertible than dividends		
• All royalties kept by licensor (dividends may have to be shared in a joint venture)		

of subsequent shirking on the part of the partner which supplied the expertise. These issues will be discussed in more detail later).

Royalty Payments

Royalties, being typically stated as a percentage of sales, are *axiomatically* less volatile over the business cycle, as compared to joint venture dividends which are distributed out of more volatile profits. To one of the investors in the alliance, royalties are thus inherently less risky a return than returns in the form of dividends. Moreover, royalties are an excellent risk hedge for the knowledge-supplying company (as licensor) , since they are earned even if the alliance company's profits are zero. The alliance firm that *pays* royalties as a licensee, also would prefer royalties over lumpsums, since they are a variable cost (i.e. contingent on market success) and ensure continued assistance from the partner firm acting as licensor. In virtually every nation, royalties are treatable as a deductible expense to the alliance

firm. This means that the remittance of royalties across borders, legally escapes the corporate income tax of the nation (where dividends, by comparison, have to be paid only after the local tax bite). The receipt of royalties may also attract more favorable tax treatment in the licensor or knowledge supplying firm's *home* country if that nation's tax authorities treat the remittance as a return on past R&D. In the event of currency convertibility problems, royalties are sometimes accorded higher priority over dividend remittances. Finally, we can make a simple but crucial statement: Whereas dividends are shared by the partners in a pure equity joint venture, royalty payments do not have to be shared; *all* of the royalties accrue to the knowledge-supplying alliance partners, acting as licensor.

Equity Joint Venture Stake

On the other hand, as Table 1 shows, there is no getting away from the fact that an equity stake in an alliance is often the most valuable, especially in later years, should the alliance venture succeed. In theory at least, an equity stake has no expiration, unlike a licensing-type agreement with a fixed duration, which may not be renewed on expiry. On termination of a technology transfer agreement, one of the alliance partners may refuse to allow the alliance to renew the agreement, if they do not perceive any continuing knowledge transfer. After all, *ceteris paribus,* continuing royalty payments by the alliance firm reduce the distributable profit for both shareholders. In general, from the point of view of both the alliance firm, as well as the partner company which is a net knowledge recipient, an equity investment by the knowledge-supplying partner is preferable. But the knowledge-supplying partner prefers a hybrid arrangement involving multiple cash flows.

An equity stake also naturally sidesteps several not fully-resolvable problems inherent in merely arms-length contracts, such as (a) Not being able to write a "complete contract" which foresees all contingencies (Caves, Crookell, and Killing, 1983). This is because equity shares are the simplest profit-sharing device, (b) Information asymmetries between prospective allies (Balakrishnan and Koza, 1993). In an equity joint venture both partners know they will be in the same bed together through thick and thin, or (c) Fears resulting from weak intellectual property rights (Anand and Khanna, 1996). This is not to assert that equity joint venture stakes will fully resolve the above problems – only that bounded rationality, information asymmetry, and intellectual property right issues are better handled by an equity-sharing, as opposed to a purely contractual arrangement. Thus the inclusion of equity stakes by both partners acts as a natural risk, cost and profit sharing device, sometimes enables an alliance to form, where otherwise negotiations would be fruitless.

Trade Between the Alliance and One of Its Principals

It is often beneficial to structure a material or finished product trade arrangement between the alliance company and one or both principals. While this creates the potential for transfer-price disagreements, this disadvantage may be offset by several advantages summarized in Table 1. Margins can be large, on proprietary, high-technology, and branded items. Since components and raw materials are more or less linearly linked to output, margins on such supplies are also axiomatically less volatile over the business cycle, compared to dividends. Finally, since such margins can be earned outside the jurisdiction of the country in which the alliance is located, local tax and convertability issues are avoided in the first place.

In brief, more and more alliances are being structured so as to create these multiple cash flow channels. Multiple payment channels can be used to reduce the overall volatility of total cash flow for at least one of the partners, reduce convertibility and other risks, legally reduce taxes (to the extent that royalties and unit transfer prices are reasonable), and being less easily reversible, cement ties between the partners in the alliance. Multiple, or hybrid, arrangements are therefore very desirable.

III. NEGOTIATION COMPLEXITY IN MULTIPLE CASH FLOW ARRANGEMENTS: NON-ZERO-SUM GAMES

However, creating multiple payment provisions in an agreement also greatly increases the level of negotiation complexity in forming the alliance. What, for instance is the tradeoff between “x” percent

royalty and a “y” percent equity stake ? How for instance, might the transfer-price markup, agreed upon between the partners, be weighed against the royalty percentage payable to one of them. A cost to the alliance in which both parties have a stake, such as royalties or purchase of components, will also be a revenue to one of the principals acting as licensor or component supplier, and vice versa.

Negotiation Variables

This paper presents a general framework for alliance negotiations. Where Contractor (1985a) took a one period model involving three variables, the approach here is a multi-period model involving net present value calculations, for both prospective partners, and including important additional variables, such as the duration of the agreement.

Algebraic derivations, as well as the results of a simulation, are presented below. For illustration purposes, a joint venture cum license company is to be formed in Korea, with share a_A held by an American partner, and share a_K held by the Korean partner. $(a_A + a_K) = 1$. In return for American

technology and training, the alliance firm will pay the American partner a lumpsum L and running royalties r, based on yearly sales S of the alliance. The alliance firm in Korea will also depend on import of components from the American partner, whose annual costs for these materials is M, but they will sell the materials to the alliance at (1+m)M, where m is the transfer-price markup earned by the American partner. The initial capital investment amount is V financed by the equity, as shown in Table 2. The alliance company will finance the lumpsum payment by borrowing the amount L, as part of the long term loan, from local banks at interest rate i_K. Other fixed costs amount to E annually. All the financing arrangements, as well as the alliance agreement, are expected to last for "y" years, at the end of which the alliance will be terminated (at zero residual value for simplicity). The corporate tax rate in the US is t_A, and that in Korea t_K. As usual, the cross-border remittance of royalties escapes Korean tax, but all income to the American partner is assumed to be subject to US taxes. The discount rates for the two partners are d_A and d_K respectively.

Projected cash flows and NPV calculations for both partners are indicated in Table 2. Table 3 shows the total variable set, and indicates the theoretical or "inherent" constraint for each, as well as the baseline values used in the simulation.

Table 2: Projected Cash Flows in American-Korean Alliance

	< ***ALLIANCE VENTURE (AV)*** >	
1	SALES	S
2	COSTS	
3	- Royalty	rS
4	- Loan Amortization	$(\frac{1}{y} + i_K)L$
5	- Imported Components	(1+m)M
6	- Other Costs	E
7	TOTAL COSTS (*3+4+5+6*)	$rS + (\frac{1}{y} + i_K)L + (1+m)M + E$
8	Profit Before Tax (*1-7*)	$(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E$
9	Tax ($8 \times t_K$)	$t_K\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}$
10	**AV PROFIT AFTER TAX** (*8-9*)	$(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}$
	< ***KOREAN FIRM IN AV*** >	
11	Dividend from AV ($10 \times a_K$)	$a_K(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}$
12	Initial Investment	$a_K V$ <year 1>
13	NET CASH FLOW (*11-12*)	$a_K(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\} - a_K V$
14	Discount Rate	d_K
15	**KOREAN FIRM NPV** <in year p>	$\frac{1}{(1+d_K)^p}[-a_K V + a_K(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}]$
	<***AMERICAN FIRM IN AV***>	
16	PROFIT	
17	- After Tax Lumpsum Receipt	$(1-t_A)L$ <year 1>
18	- After Tax Royalty	$r(1-t_A)S$
19	- After Tax Component Profit	$m(1-t_A)M$
20	- Dividend from AV ($10 \times a_A$)	$a_A(1-t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}$
21	TOTAL PROFIT (*17+18+19+20*)	$(1-t_A)L + r(1-t_A)S + m(1-t_A)M +$ $a_A(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}$
22	Initial Investment	$a_A V$ <year 1>
23	NET CASH FLOW (*21-22*)	$(1- t_A)L + r(1-t_A)S + m(1-t_A)M +$ $a_A(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\} - a_A V$
24	Discount Rate	d_A
25	**American FIRM NPV** <in year p>	$\frac{1}{(1+d_A)^p}[-a_A V + (1-t_A)L + r(1-t_A)S + m(1-t_A)M +$ $a_A(1- t_K)\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\}]$

Table 3: Variables and their Ranges

	Variables	Variable Description	Constraint	Baseline Values
1	a_K; a_A	Equity shares in the alliance venture (AV)	$0 \le a_K$; $a_A \le 1$, $a_K + a_A = 1$	0.50; 0.50
2	R	Royalty rate	$0 \le r \le 1$	0.05
3	M	Markup on traded products	$0 \le m \le 1$	0.10
4	i_K	Interest rate in Korea	$0 \le i_K \le 1$	0.15
5	t_K	Tax rate in Korea	$0 \le t_K \le 1$	0.40
6	t_A	Tax rate in America	$0 \le t_A \le 1$	0.30
7	d_K	Discount rate for Korean partner	$0 \le d_K \le 1$	0.12
8	d_A	Discount rate for American partner	$0 \le d_A \le 1$	0.10
9	y	Duration of the AV (years)	$0 < y$	10
10	S	Yearly sales of the AV	$0 \le S$	1,000
11	M	Annual cost of traded components	$0 \le (1+m)M \le S$	100
12	E	Yearly costs incurred by the alliance venture	$0 \le E$	490
13	V	Initial investment	$0 \le V$	500
14	L	Lumpsum payment	$0 \le L$	200

It is worth emphasizing that the assumptions in the simulation represent a very common situation in alliances. The conclusions of the analysis are therefore fairly typical, and have general applicability. Moreover, the fundamental shapes of the curves (and the deductions therefrom) in the figures discussed later, will not change much even if we alter the baseline simulation values. The general approach is a robust one.

IV. TRADEOFFS BETWEEN NEGOTIATION VARIABLES: STRATEGIC, RISK AND BEHAVIORAL IMPLICATIONS

Out of the total set of variables indicated in Table 3, the critical variables, actually subject to negotiation are shown in Table 4.

The rest are assumed to be exogenously defined. What then are the tradeoffs between the above five key variables, for each of the partners ? Are their interests congruent ?

Table 4: Critical Negotiation Variables

	Baseline Simulation Scenario
Equity Shares: a_A / a_K	.50 / .50
Royalty Rate: r	.05
Lumpsum: L	$ 200 (thousand)
Markup on Interfirm Trade: m	.10
Duration of Alliance Agreement: y	10 years

In order to illustrate some of the tradeoffs, a simulation was performed using the baseline values as shown in Tables 3 and 4, and isoprofit (isoNPV) curves generated for each of the negotiating parties. Experienced alliance negotiators (Lee, 1992; Matsunaga, 1983) as well as academics (Contractor, 1985b; Parkhe, 1993) recommend *first* targeting NPV, and *then* assessing tradeoffs among the negotiation variables.

The simulations produce *entire families of isoNPV curves*, with NPV increasing along a certain vector. For the sake of clarity, however, only one curve for each negotiating company, going through the baseline values for the variables, is shown in the following figures, with the direction of NPV increase for each firm indicated by an arrow. Based on the description of variables in the previous section, the NPV for the Korean firm (NPV_K) and NPV for the American firm (NPV_A) can be algebraically expressed as:

$$NPV_K = -\frac{a_K V}{1+d_K} + a_K(1-t_K)\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\}D_{Ky}$$

$$NPV_A = \frac{L(1-t_A)-a_A V}{1+d_A} + [(1-t_A)(rS+mM) + a_A(1-t_K)\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\}]D_{Ay}$$

$$\text{where } D_{Ky} = \sum_{p=1}^{y}\frac{1}{(1+d_K)^p} \text{ and } D_{Ay} = \sum_{p=1}^{y}\frac{1}{(1+d_A)^p} \quad (d_K; d_A \neq 0)$$

We now derive expressions for the first order partial derivatives of these NPV curves which will indicate the general direction of NPV increase for each *family* of curves. At the baseline values, the derivatives have the following signs.

$$\frac{\partial NPV_K}{\partial a_K} = -\frac{V}{1+d_K} + (1-t_K)D_{Ky}\left\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\right\} > 0$$

$$\frac{\partial NPV_K}{\partial r} = -a_K(1-t_K)D_{Ky}S < 0$$

$$\frac{\partial NPV_K}{\partial L} = -a_K(1-t_K)D_{Ky}(\frac{1}{y}+i_K) < 0$$

$$\frac{\partial NPV_K}{\partial y} = a_K(1-t_K)\left[\frac{L}{y^2}D_{Ky} + \left\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\right\}\frac{\ln(1+d_K)}{d_K(1+d_K)^y}\right] > 0$$

$$\frac{\partial NPV_K}{\partial m} = -\,a_K(1-t_K)D_{Ky}\,M < 0$$

$$\frac{\partial NPV_A}{\partial a_K} = \frac{V}{1+d_A} - (1-t_K)D_{Ay}\left\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\right\} < 0$$

$$\frac{\partial NPV_A}{\partial r} = \{(1-t_A)-a_A(1-t_K)\}D_{Ay}\,S > 0$$

$$\frac{\partial NPV_A}{\partial L} = \frac{1-t_A}{1+d_A} - a_A(1-t_K)(\frac{1}{y}+i_K)D_{Ay} > 0$$

$$\frac{\partial NPV_A}{\partial y} = a_A(1-t_K)\,D_{Ay}\frac{L}{y^2} + \left[(1-t_A)(rS+mM)+a_A(1-t_K)\left\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\right\}\right]\left\{\frac{\ln(1+d_A)}{d_A(1+d_A)^y}\right\} > 0$$

$$\frac{\partial NPV_A}{\partial m} = \{(1-t_A)-a_A(1-t_K)\}D_{Ay}\,M > 0$$

Each isoNPV family of curves therefore has a certain direction of NPV increase determined by the above signs of the first order partial derivatives, as we will see in the figures below.

1. <u>Tradeoff Between Equity and Royalty Rate (a_K vs. r)</u>

Figure 1 shows isoNPV curves for the American and Korean side. Recall that for purposes of clarity, to avoid visual clutter, each figure shows only one isoNPV curve for the American side and Korean side respectively. However, each curve represents an entire *family* of isoNPV curves increasing in a certain direction, as shown by the arrows. We find that $\frac{\partial NPV_K}{\partial a_K} > 0$ and $\frac{\partial NPV_K}{\partial r} < 0$; while $\frac{\partial NPV_A}{\partial a_K} < 0$ and $\frac{\partial NPV_A}{\partial r} > 0$ as shown above. Moreover, we can show that for any given a_K (except for the one point of $(a_K, r) = (0.5, 0.05)$), $r|_{NPV_K} \neq r|_{NPV_A}$ and that the slopes of the two curves are not the same, i.e., $\left.\frac{\partial r}{\partial a_K}\right|_{NPV_K} \neq \left.\frac{\partial r}{\partial a_K}\right|_{NPV_A}$ where

$$\left.\frac{\partial r}{\partial a_K}\right|_{NPV_K} = -\frac{\partial NPV_K/\partial a_K}{\partial NPV_K/\partial r} = -\frac{-\frac{V}{1+d_K}+(1-t_K)D_{Ky}\left\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\right\}}{-a_K(1-t_K)D_{Ky}S} > 0$$

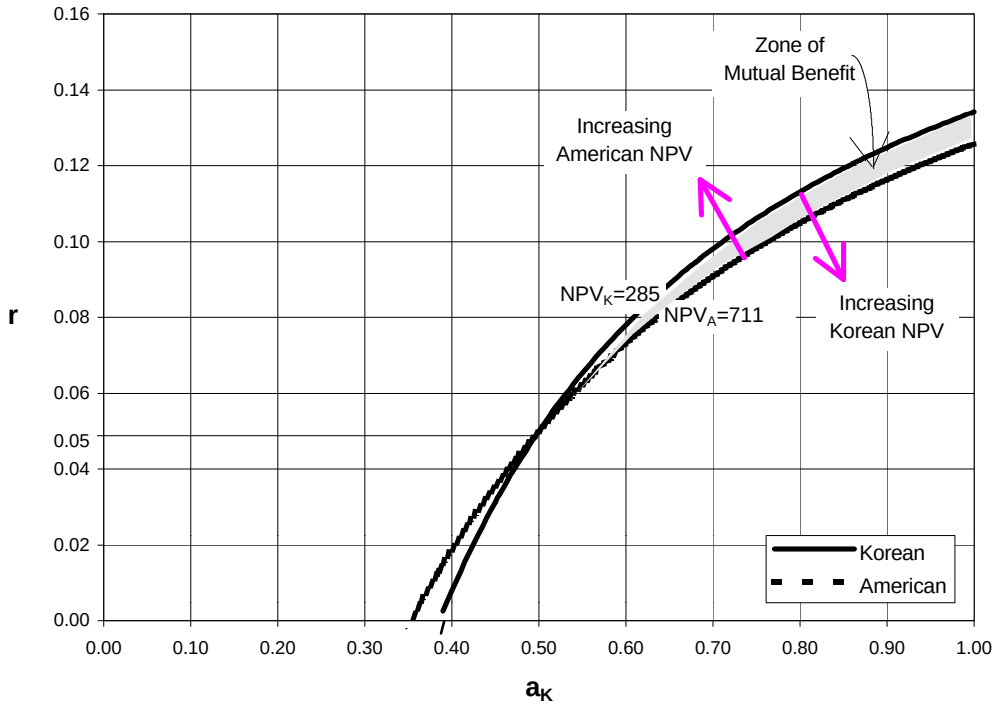
$$\left.\frac{\partial r}{\partial a_K}\right|_{NPV_A} = -\frac{\partial NPV_A/\partial a_K}{\partial NPV_A/\partial r} = -\frac{\frac{V}{(1+d_A)}-(1-t_K)D_{Ay}\left\{(1-r)S-(\frac{1}{y}+i_K)L-(1+m)M-E\right\}}{\{(1+t_K)a_K+t_K-t_A\}D_{Ay}\,S} > 0$$

Therefore the family of isoNPV curves for the two negotiating sides exhibit *opposite* growth vectors, as we see in Figure 1.

Now this presents an interesting negotiation dynamic. For the zone in between the two isoprofit curves in Figure 1 is a "zone of mutual benefit", with NPVs for both parties increasing there. That is to say, it is a *joint-profit-maximizing zone*. Giving the Koreans a higher equity share in the alliance, *and* the Americans (as licensors) a higher royalty, leaves *both* better off, provided this movement is within the zone. However, the zone of mutual benefit in the a_K vs. r map can be very narrow. Second, since $a_K = 1-a_A$, the American partner may not wish to lose control (especially with $a_A < 0.50$), or ultimate veto power

in the board of directors, by having their equity reduced below a certain level. Of course, effective control and equity percentage have only a loose correlation. Hence this strategic concern, or the

Figure 1: Equity vs. Royalty Rate Tradeoff



perceived risk,

of losing majority equity share, may not apply in many cases. (For example, if the Americans supply critical materials on which the alliance depends, for which substitutes cannot be easily obtained, then the American influence is strong despite a minority equity position). Third, increasing the royalty rate, in

what is after all a related party transaction, may attract the adverse attention of the tax authorities in many nations (Gravelle and Taylor, 1992). Fourth, in conditions of lack of trust between alliance partners where the foreign partner assumes the dominant role, and difficulty in verifying royalty calculations, the above tradeoff involving higher royalties for a lower equity share, may not appeal to the American side (Macho-Stadler, Martinez-Giralt and Perez-Castrillo, 1996; Contractor 1985b). On the other hand, in conditions of environmental and political uncertainty, the above tradeoff *would indeed be preferred* by the Americans, since equivalent or higher NPV would be achieved with royalties which carry less risk than returns on equity (Gray and Yan, 1992). (Note that in our simulation we discounted the royalty and dividend stream at equal rates, but some would argue that, royalties being axiomatically less volatile than dividends, the former should be discounted at a lower rate).

Incidentally, since $a_A = 1 - a_K$, the graph of a_A vs. r is simply the mirror image of Figure 1, with identical conclusions for the American and Korean positions, and is therefore not shown.

2. <u>Tradeoff Between Royalty and Lumpsum (r vs. L)</u>

Figure 2 shows the constant NPV lines for the American and Korean partners for the royalty versus lumpsum tradeoff. Once more, each curve (straight lines in this map) represents an *entire family* of isoNPV curves increasing in the direction shown by the arrows. One can again show that $\frac{\partial NPV_K}{\partial r} < 0$; $\frac{\partial NPV_K}{\partial L} < 0$ whereas $\frac{\partial NPV_A}{\partial r} > 0$; $\frac{\partial NPV_A}{\partial L} > 0$. Moreover, the relationship between r and L is linear, and $\left.\frac{\partial L}{\partial r}\right|_{NPV_K} > \left.\frac{\partial L}{\partial r}\right|_{NPV_A}$ where

$$\left.\frac{\partial L}{\partial r}\right|_{NPV_K} = -\frac{\partial NPV_K / \partial r}{\partial NPV_K / \partial L} = -\frac{S}{\frac{1}{y} + i_K} < 0$$

$$\left.\frac{\partial L}{\partial r}\right|_{NPV_A} = -\frac{\partial NPV_A / \partial r}{\partial NPV_A / \partial L} = -\frac{\{(1-t_A) - a_A(1-t_K)\}D_{Ay}S}{\frac{1-t_A}{1+d_A} - a_A(1-t_K)(\frac{1}{y} + i_K)D_{Ay}} < 0$$

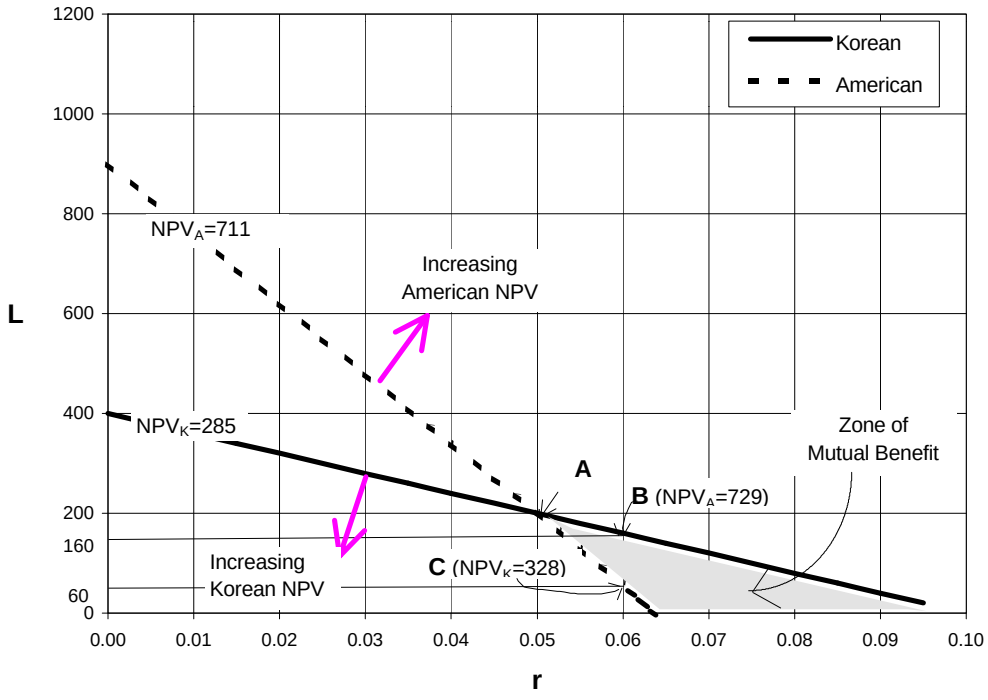
Therefore the isoNPV lines for the two company negotiators move in opposite directions, as shown in Figure 2. But, with different slopes, there is a “zone of mutual benefit”.

The zone of mutual benefit is in the shaded triangular area, with greater r and lower L. For the Korean side, this is most welcome, since they stand to increase their NPV_K while lowering the breakeven point of the alliance enterprise as a whole. Fixed cost (of long term debt service) is lowered with a lower L. Certainly, royalties as a variable cost increase under this tradeoff. However, these are paid out only in the event of sales success. Overall risk of the alliance is reduced. Lastly, an important

consideration for the Koreans, as recipients of knowledge: A higher royalty rate automatically ensures a higher degree of continued interest from a licensor who now has a vested interest in continued knowledge transfers to the alliance form in Korea which is the licensee.

From the American perspective the tradeoff is equivocal. The slope of the NPV_A function is steeper, i.e. sensitive. Even if they obtained a higher NPV_A in the zone of mutual benefit, would the Americans be willing to give up the *surety* of the lumpsum, paid up front, on signing the agreement, for relatively less certain future royalties ?

Figure 2: Royalty Rate vs. Lumpsum Tradeoff



This is illustrated by comparing the points A, B and C in Figure 2. For the same royalty rate, say r = 0.06, there is a very sharp (sensitive) movement in L, from L = 60 to L = 160. This sets up various games such as,

- *The American Gambit*: (Point A to Point B) Tell the Koreans they want 1 % point more royalty (r = 0.06) , in return for lowering L from 200 to 160. (All incremental gains go to the Americans).
- *The Korean Gambit*: (Point A to Point C) Tell the Americans they are willing to grant 1% point

higher royalty in return for a lumpsum of L = 60. (All incremental gains go to the Koreans). Between points B and C *both* parties show some incremental gain. They should therefore compromise somewhere in between B and C, at (r = 0.06; $60 < L < 160$).

From the point of view of maximizing joint profit in alliances, this simulation illustrates the common sub-optimality of a lumpsum provision, *in general*. Ultimately, for the recipient of the lumpsum, it boils down to a tradeoff between economic efficiency versus slightly higher risk -- the risk of relying on future royalties (as opposed to the surety of the lumpsum).

3 & 4. <u>Tradeoff Between Agreement Life and Royalty Rate or Equity (y vs. r or a_K)</u>

In the y vs. r tradeoff in Figure 3, we can show that $\frac{\partial NPV_K}{\partial y} > 0$ and $\frac{\partial NPV_K}{\partial r} < 0$ while $\frac{\partial NPV_A}{\partial y} > 0$ and $\frac{\partial NPV_A}{\partial r} > 0$ and that $\left.\frac{\partial r}{\partial y}\right|_{NPV_K} > 0$ and $\left.\frac{\partial r}{\partial y}\right|_{NPV_A} < 0$ where

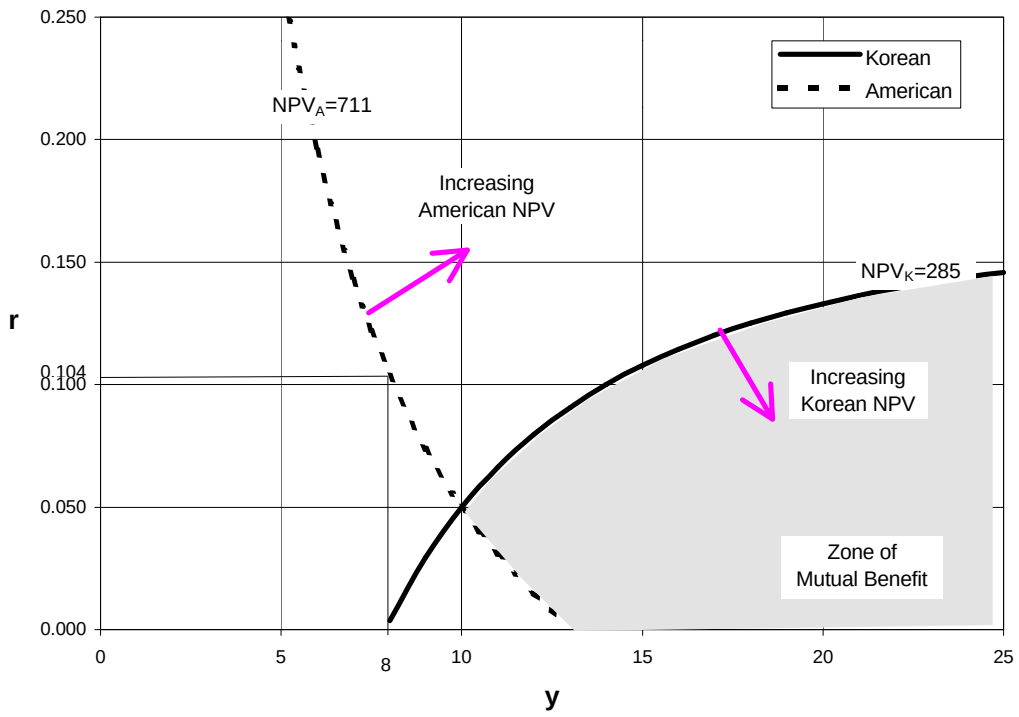
$$\left.\frac{\partial r}{\partial y}\right|_{NPV_K} = -\frac{\partial NPV_K / \partial y}{\partial NPV_K / \partial r} = \frac{1}{D_{Ky} S}\left[\frac{L}{y^2} D_{Ky} + \left\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\right\}\frac{\ln(1+d_K)}{d_K(1+d_K)^y}\right]$$

$$\left.\frac{\partial r}{\partial y}\right|_{NPV_A} = -\frac{\partial NPV_A / \partial y}{\partial NPV_A / \partial r} =$$

–

$$\frac{a_A(1-t_K)D_{Ay}\frac{L}{y^2} + \left[(1-t_A)(rS+mM) + a_A(1-t_K)\left\{(1-r)S - (\frac{1}{y}+i_K)L - (1+m)M - E\right\}\right]\left\{\frac{\ln(1+d_A)}{d_A(1+d_A)^y}\right\}}{\{(1-t_A) - a_A(1-t_K)\}D_{Ay}S}$$

Figure 3: Agreement Life vs. Royalty Rate Tradeoff



Similarly, in the y vs. a_K graph in Figure 4, we can again show that $\frac{\P NPV_K}{\P y} > 0$ and $\frac{\P NPV_K}{\P a_K} > 0$ while $\frac{\P NPV_A}{\P y} > 0$ and $\frac{\P NPV_A}{\P a_K} < 0$ and that $\left.\frac{\P a_K}{\P y}\right|_{NPV_K} < 0$ and $\left.\frac{\P a_K}{\P y}\right|_{NPV_A} > 0$ where

$$\left.\frac{\P a_K}{\P y}\right|_{NPV_K} = -\frac{\P NPV_K / \P y}{\P NPV_K / \P a_K} =$$

$$-\frac{a_K(1-t_K)\left[\frac{L}{y^2}D_{Ky} + \left\{(1-r)S - (\frac{1}{y}+i_K)L - (1+m)M - E\right\}\frac{\ln(1+d_K)}{d_K(1+d_K)^y}\right]}{-\frac{V}{1+d_K} + (1-t_K)D_{Ky}\left\{(1-r)S - (\frac{1}{y}+i_K)L - (1+m)M - E\right\}}$$

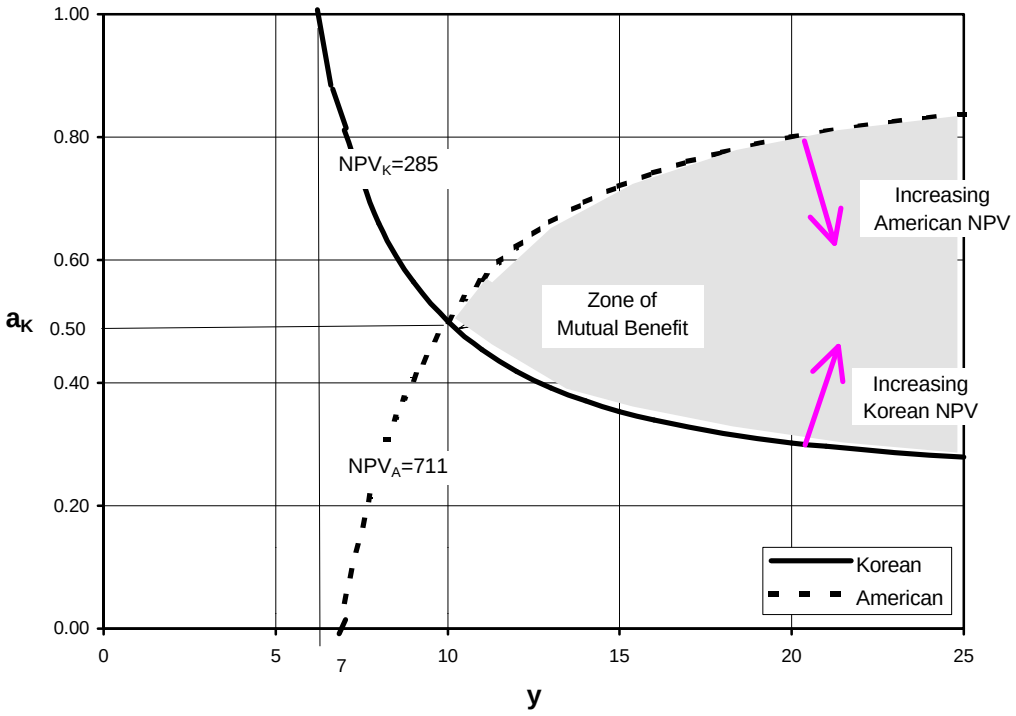
$$\left.\frac{\P a_K}{\P y}\right|_{NPV_A} = -\frac{\P NPV_A / \P y}{\P NPV_A / \P a_K} =$$

$$-\frac{a_A(1-t_K)D_{Ay}\frac{L}{y^2} + \left[(1-t_A)(rS+mM) + a_A(1-t_K)\left\{(1-r)S - (\frac{1}{y}+i_K)L - (1+m)M - E\right\}\right]\left\{\frac{\ln(1+d_A)}{d_A(1+d_A)^y}\right\}}{\frac{V}{1+d_A} - (1-t_K)D_{Ay}\left\{(1-r)S - (\frac{1}{y}+i_K)L - (1+m)M - E\right\}}$$

Every negotiator should plot graphs similar to Figures 3 and 4, for significant strategic deductions about the duration of the agreement. *Ceteris paribus*, a longer agreement benefits both parties by increasing the present value of both; but this is a trivial and foregone conclusion with no negotiation significance. The more important significance of Figures 3 and 4 lies in the asymptotes of each curve. The entire family of Korean curves quickly become flat with increasing y, suggesting an asymptotic limit to the ability of the alliance company to pay higher royalties without detriment to the Korean partner's NPV_K.

Even more significantly, the risks of *curtailment* of the agreement to *less* than its expected life – a not uncommon occurrence in alliances and joint ventures – is of concern. The American curves in both Figures 3 and 4 are steep, for y < 10 years, indicating a significant sensitivity to the curtailment of the

Figure 4: Agreement Life vs. Equity Tradeoff

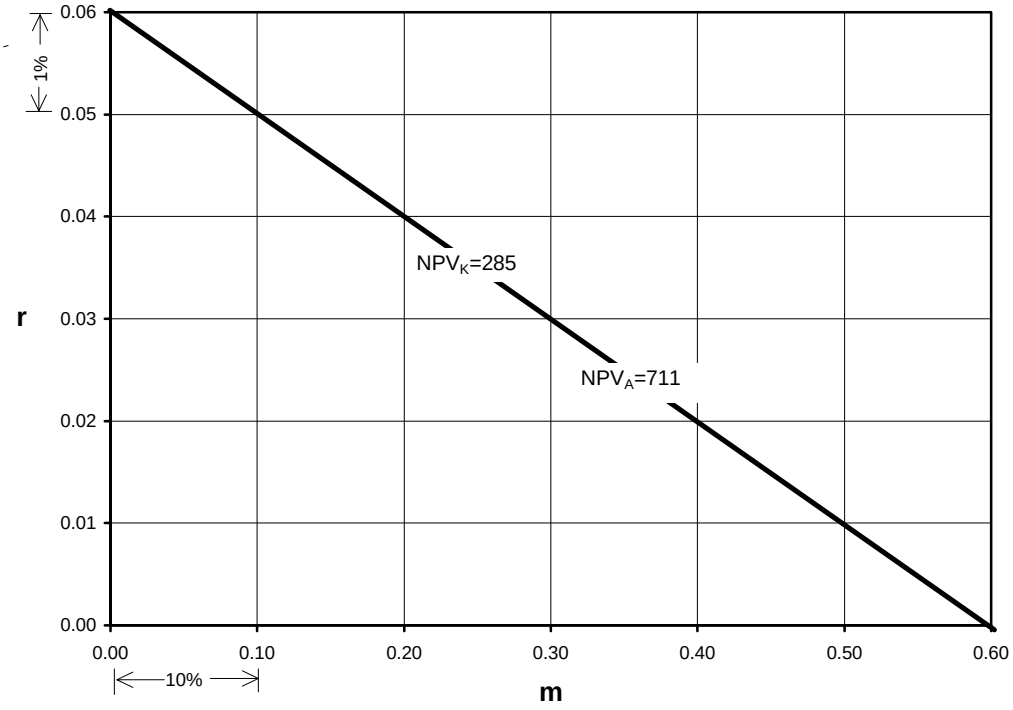


agreement (whether *ex ante*, or especially, *ex post*). For instance, a curtailment of only two years (y = 8 instead of y = 10) would require the royalty rate to more than double, from r = 0.05 to r = 0.104, just for

the Americans to stay even – and this despite the fact that cash flows in years 9 and 10 are heavily discounted. But a doubling of the royalty rate would be totally unacceptable to the Koreans, so that they are not likely to accept such a tradeoff during negotiations. *Ex post* then, the normal arrangement leaves the Americans vulnerable and dependent on an alliance life continuing beyond the tenth year. Curtailment of agreement life is an especially acute issue in the event of idiosyncratic, or unrecoverable alliance-specific investments (Parkhe, 1993)

Figure 4 reveals natural asymptotic limits to both y and a_K (or a_A). No matter how hard the American negotiator tries to push the Korean equity share down, an agreement of less than seven years is dangerous, even infeasable. That conclusion should raise a host of questions in the Americans' minds about the reliability of the Korean partner, long term, and other factors that affect the longevity of the arrangement. For instance, there are still countries such as Korea, whose governments try to limit the life

Figure 5: Markup on Traded Item vs. Royalty Rate Tradeoff



of technology agreements. If the government limit falls below the critical zone, figures such as Figures 3 and 4 can reveal potential problems.

5. Tradeoff Between Intra-firm Trade Markup and Royalty Rate (m vs. r)

The relationship between m and r is linear in Figure 5, since both are linearly related to sales value. The two isoNPV curves have the same slope, i.e., $\left.\frac{\partial r}{\partial m}\right|_{NPV_K} = \left.\frac{\partial r}{\partial m}\right|_{NPV_A} = -\frac{M}{S}$.

Here, a 10 % point change in the markup is equivalent to a 1 % point change in the royalty rate, typifying a fairly common situation. But, while r and (0.1m) are equivalent in numerical impact on NPVs, they differ significantly in strategic implication. Whereas r is part of the agreement, m is not, and more difficult to monitor. The partner supplying the input faces the temptation to cheat. In this case, the Korean partner worries about monitoring the honesty (or opportunism) of the Americans who will supply the raw material, obtained from a separate, far away nation, over ten or more years. The Americans are far less worried, since they can easily monitor royalty calculations from the close vantage point of an equity partner.

6. <u>Tradeoff Between Agreement Life and Lumpsum (y vs. L)</u>

Figure 6 shows isoNPV curves for the American and Korean side. We can show that $\frac{\partial NPV_K}{\partial y} > 0$ and $\frac{\partial NPV_K}{\partial L} < 0$ whereas $\frac{\partial NPV_A}{\partial y} > 0$ and $\frac{\partial NPV_A}{\partial L} > 0$, and that $\left.\frac{\partial L}{\partial y}\right|_{NPV_K} > 0$ and $\left.\frac{\partial L}{\partial y}\right|_{NPV_A} < 0$ where

$$\left.\frac{\partial L}{\partial y}\right|_{NPV_K} = -\frac{\partial NPV_K / \partial y}{\partial NPV_K / \partial L} = \frac{\frac{L}{y^2} D_{Ky} + \left\{(1-r)S - (\frac{1}{y} + i_K)L - (1+m)M - E\right\}\frac{\ln(1+d_K)}{d_K(1+d_K)^y}}{(\frac{1}{y} + i_K)D_{Ky}}$$

$$\left.\frac{\partial L}{\partial y}\right|_{NPV_A} = -\frac{\partial NPV_A / \partial y}{\partial NPV_A / \partial L} =$$

$$-\frac{a_A(1-t_K)D_{Ay}\frac{L}{y^2} + \left[(1-t_A)(rS+mM) + a_A(1-t_K)\left\{(1-r)S - (\frac{1}{y}+i_K)L - (1+m)M - E\right\}\right]\left\{\frac{\ln(1+d_A)}{d_A(1+d_A)^y}\right\}}{\frac{1-t_A}{1+d_A} - a_A(1-t_K)(\frac{1}{y}+i_K)D_{Ay}}$$

Figure 6: Agreement Life vs. Lumpsum Tradeoff

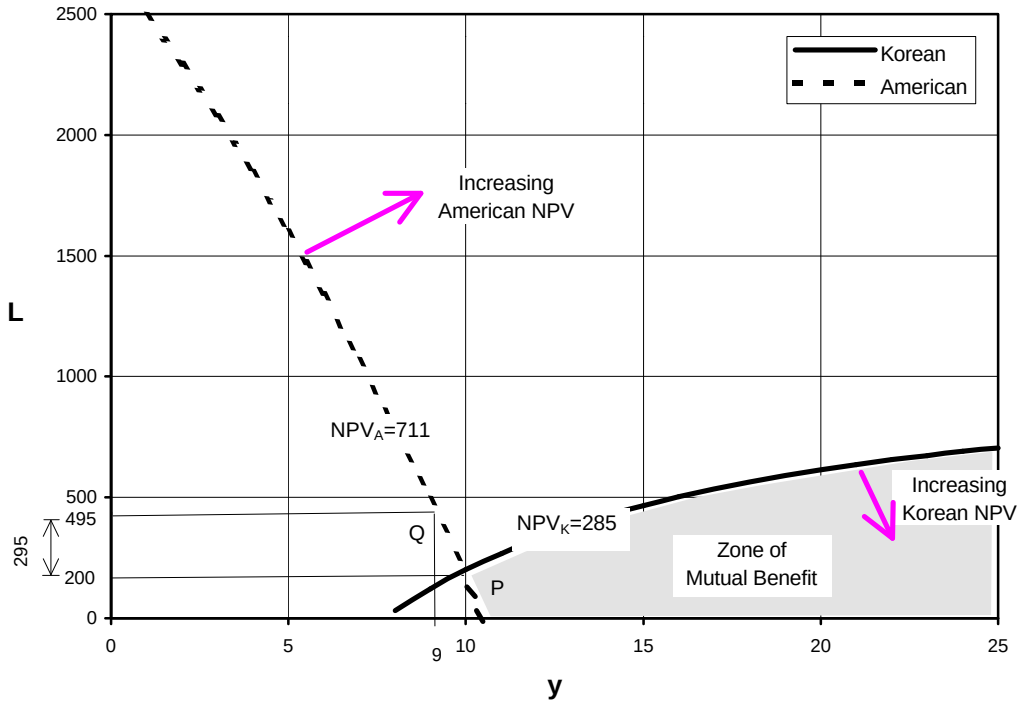


Figure 6 reiterates the futility of large lumpsums and the sensitivity of the agreement life. NPV_A is a steep function, so that a huge increase of L, from 200 to 495 (see points P and Q) is equivalent to reduction of agreement life by only the terminal year.

In general, lumpsums are problematic and costly. Since they are often financed by a joint venture out of debt, a higher L lowers profits (by increasing the debt service burden) for *both* partners. Overall, it is not a satisfactory tradeoff.

7. <u>Lowering the Lumpsum</u>

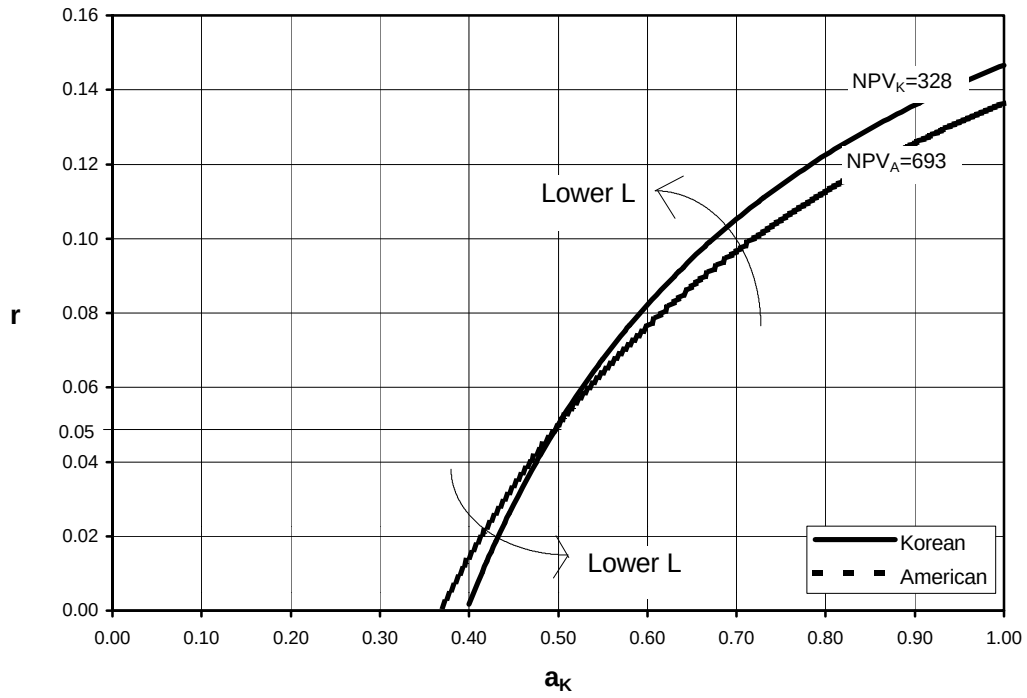
The advantages of reducing lumpsums is further illustrated by Figure 7, which is a redrawing of Figure 1 (a_K vs. r) but this time with a lumpsum of L =100 only, which is half its former (baseline) value. With all other variables held constant, a lower

(i) Rotates the curves for both NPV_A and NPV_K counterclockwise with respect to the baseline pivot

(ii) The Koreans gain substantially, since NPV_K is now 328 (instead of 285)

(iii) However, NPV_A, at 693, is only *slightly* lower than the Figure 1 value of 711. That is to say, a 50

Figure 7: Equity vs. Royalty Rate Tradeoff
(With Lower Lumpsum)



percent reduction in lumpsum reduces the American NPV by a mere 2.5 percent (which can be made up by other small concessions) while increasing the Korean partner's NPV by 15 percent. This shows that *both* parties can gain, and increase their *joint* profit, by reducing the lumpsum payment. However, the Americans, as knowledge providers to the alliance may be reluctant to do so, for reasons of caution, certainty, and immediacy. A lumpsum is contractually specified, and payable at the inception of a project. Royalties, linked to sales are less secure, and are out in the future. Profit return on equity investment occurs even later, and is the least certain of all.

V. CONCLUSIONS FOR STRATEGY AND NEGOTIATION BEHAVIOR

This paper has presented a general approach to conducting alliance negotiations, from a finance and strategy perspective. The essence of an alliance is a transfer of knowledge and organizational capability from one, or both principals to the alliance company. This transfer creates value in the alliance firm. This paper is concerned about how to structure the alliance agreement to compensate the partners, with especial attention given to the compensation received by the knowledge-supplying

partner. Alliances are increasingly being structured with multiple cash flows between the alliance firm and its principals. These are typically a combination of an equity joint venture, which then also signs an additional license agreement with one of its investors who is the principal knowledge supplier to the alliance company. In addition, there frequently is trade between the alliance firm and one of its principals. There are several strategic advantages to multiple cash flow channels.

From the point of view of the partner that has supplied knowledge or expertise, or territorial rights to the alliance firm, lumpsum payments provide the surety of an immediate return. A royalty stream, being usually linked to sales, is less volatile than dividends. Royalties are earned even when profits of an equity joint venture have dried up in a cyclical down turn, and royalties have tax advantages over dividend remittances in both the nation of the alliance firm (being considered a deductible expense there) as well as in some royalty recipient's countries. An equity stake is, however, unquestionably superior in the event of commercial success in later years, and is more valuable than royalties constrained by the agreement formula to a fixed percentage. An equity stake is not subject to cancellation, whereas one of the alliance partners may not wish to renew a license on its expiry. Trade in raw materials or finished product, between the alliance firm and one of its partners, sets up a cash flow useful to the recipient in similar ways to the royalty stream in terms of lower volatility, transfer price markups earned, and the legal avoidance of alliance nation tax and currency convertibility problems.

Thus the strategic recommendation to negotiators is to set up multiple cash flow channels, in order to reduce cyclical volatility, reduce several types of risk, and taxes, and to cement ties between the corporate allies. Such hybrid arrangements also increase the commitment of the partners and are more difficult to dissolve.

However multiple cash flow channels also multiply the number of variables to negotiate over. Each partner targets a net present value NPV, and then seeks a combination of [**1.** Equity share "**a**" **2.** Lumpsum "**L**" **3.** Royalty Rate "**r**" **4.** Agreement life "**y**" **5.** Intrafirm trade markup "**m**"] which will give it the target NPV. However, the tradeoffs, between the five variables involve non-zero-sum games between the parties. By presenting algebraic expressions, as well as showing a simulation of a common alliance case, the paper mapped these tradeoffs between the five crucial negotiation variables: Each map showed a representative of a family of isoNPV curves for each side, and the vector of its increase. Each map identified "Zones of Mutual Benefit," where *joint* profits of *both* partners may increase.

Movement to those zones can benefits both parties. However, that does not necessarily mean that they will always wish do so – for the incremental strategic risks may outweigh the financial benefit. In

many cases, financial profit maximization is tempered by strategic cautions and aversions. These strategic concerns are summarized in Table 5. The receiver of expertise (the Koreans in our example) wish to ensure the continuing help of the Americans in later years, and fear that they may shirk from their implied duty to help the alliance. This is especially true when a expertise supplier's returns are front-end loaded, for example with a high lumpsum. This strategic caveat should lead the Koreans to offer a lower initial lumpsum, in return for higher royalties and/or equity stake. This also has the virtue of reducing fixed costs of the alliance. The increased variable cost of a higher royalty rate is paid only out of commercial success.

In the above situation, joint profit maximization and strategic caveat may be congruent. However, the two are not congruent with regard to the American side's fear of a curtailed agreement life. Simulation results in Figures 3 and 4 illustrated the sensitivity of the American NPV to a shorter agreement. This concern would have them demanding a higher lumpsum, which is sub-optimal. Alternatively, curtailment penalties may be demanded as an agreement provision, but the Koreans would likely balk at that demand. The Koreans, on their part, are concerned about opportunism from the American side in overpricing the raw material or components supplied to the alliance. For the Koreans to offer the Americans a higher equity stake, in the hopes that they will be moderate on the transfer price, is often a misguided idea. This is because any increment to the unit transfer price Dm, is far higher than the gain in the Americans' profit share. Besides, it is earned in the US, where it is also not subject to Korean taxes. $DmM >> a_A (1-t_K)DmM$. The Koreans can only hope for self-restraint and moderation from their American partners. Of course, keeping the option of an alternative supply source always helps.

While developing trust, both sides will however wish to monitor each other. The Americans, as licensors, are concerned about the accounting accuracy of royalty basis calculations. For example, even the definition of "Sales" on which royalty is paid, is far from simple (Contractor, 1985b). Is sales value computed ex-factory, FOB warehouse, or wholesale ? Does it include or exclude excise and value-added taxes ? Does it exclude returns, rejects and remanufactured items ? In a multi-product operation, what products or models fall within or without the definition of the licensed technology ? A more tightly drafted alliance agreement, including external audit provisions is one response. But daily managerial participation in the alliance, by means of a significant equity stake, is better.

Table 5: Strategic Caveats Which May Lead To Profit *Non*-Maximizing Solutions

Strategy Concept	Caveat or Concern	Negotiating Response

SHIRKING	Receiver of Expertise wishes to ensure continuing flows of knowledge and assistance in the future (Korean concern)	Reduce L; Offer higher r and higher a_A instead. (Pay supplier of expertise out of business success; convert fixed cost to variable cost)
OPPORTUNISM	Curtailment of Agreement Life (American concern)	Ask for $a_A > 0.50$; write curtailment penalties in agreement; increase L
	Unilateral increase in margin on trade (Korean concern)	Keep option for alternative supply source
MONITORING	Understatement of Royalty Basis (American concern)	Managerial presence in alliance; provision for external audit
	Overvaluation of traded good (Korean concern)	External audit; commercial intelligence
OTHER RISKS	Volatility of political and commercial environment (American concern)	Higher r; lower a_A
	Cyclical industry (American concern)	L better than r; r better than a_A
	Poor performance of enterprise saddled with high L and high r (Korean worry)	Offer higher a_A in return for lower L and lower r
	Losing control over management and quality (American concern)	$a_A > 0.50$; write veto clauses into agreement; keep alliance dependent on supply of materials/components
	Creating a future competitor (American concern)	Withholding or reducing flow of knowledge; Try to write non-compete clauses in agreement

In volatile economic and political environments the tradeoff between royalty rate and equity share may not be viewed as a neutral movement along an isoprofit curve, and can be biased by risk-averse parties in favor of royalties which are less subject to volatility in the alliance sales. In general, the greater the perception of environmental risk and volatility by the knowledge-supplying partner about the host nation of the alliance, the more they will be biased towards lumpsums and royalties compared to an equity stake. But this can be sub-optimal for the joint profits of the alliance, and for the other partner.

In general, an international knowledge-supplying firm is properly concerned about losing control over quality, and about the threat that their transfer of expertise will create a future competitor. Demanding a majority equity share may not always do the trick or be satisfactory, since the other partner may balk, and since tradeoffs may involve giving up too much of the relatively secure royalties and lumpsums. Moreover, there is only a loose correlation between equity ownership and control. The knowledge-supplying firm may try to augment their leverage through other means, such as creating a dependency on a critical input that they supply, writing non-compete clauses in the agreement (these may be of dubious enforceability) or withholding and reducing the flow of knowledge to the alliance. But such means are sometimes illegal, increase the potential for discord, and may be detrimental to the performance of the alliance from which the knowledge provider seeks to draw their future profits.
It is important to reiterate that *neither the financial calculations, nor indeed the individual strategic considerations, point in a congruent direction for each negotiating side*. Table 5 reveals contradictory recommendations with respect to L, r and a_A, and these, in turn may lead away from the "Zones of Mutual Benefit" in the financial calculation. For instance, on shirking, opportunism, and monitoring considerations, a higher a_A or American equity was recommended. However, in a volatile political and commercial environment the Americans may judge the risk as too high for substantial equity investment, despite other advantages. The most risk averse position for the expertise supplier (Americans) to take would be to demand a very high lumpsum. But this is extremely inefficient financially, and strategically. More pertinently, weighting cash flows too much towards the front end has often resulted in the project becoming saddled with excessive fixed costs, or even unfeasible.

Such internal contradictions between the strategic considerations themselves, and between the strategic and financial considerations, show why alliances are such fragile creations. And yet, the economic value that such company combinations create, and the knowledge they transfer across national borders, more than justify their often ephemeral nature. The approach outlined in this paper, the simulation method presented, the strategic caveats, and the negotiation responses to each, will however help companies to craft better and longer-lasting alliances.

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