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Optimality of the 51:49 equity structure☆

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HIGHLIGHTS

- We show that the popular 51:49 equity structure can be optimal.
- The 51:49 structure is as efficient as joint control.
- The key condition: highly asymmetric abilities of the two parties.

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ABSTRACT

As an extension of Wang and Zhu (2005), this short paper shows that the popular 51:49 equity structure can be optimal. This equity structure in joint ventures (JVs) has puzzled economists the world over. We find that, when the two parties are highly asymmetric in their abilities to acquire private benefits from their JV, the 51:49 equity structure is optimal and as efficient as joint control.

1. Introduction

We interpret the 51:49 equity structure as a contractual arrangement in which the two partners share revenue equally but only one partner is given control rights. Our goal is to show why this equity structure is optimal.

In practice, most JVs allocate equal or almost equal equity stakes among partners. According to Hauswald and Hege (2009), about two-thirds of two-partner JVs adopt the 50:50 equity split and about 12% adopt the 51:49 (or 50.1% and 49.9%) split. This is intriguing. As Holmström (1999) points out, the observed popularity of partial ownership is at odds with the property rights view of sole ownership in the case of complementary assets. Researchers have explained asymmetric partial ownership by differences in partner characteristics such as resource costs (Belleflamme and Bloch, 2000), private information (Darrough and Stoughton, 1989), and incentives (Bhattacharyya and Lafontaine, 1995; Chemla et al., 2004). Wang and Zhu (2005) show that with incomplete contracting both asymmetric and symmetric ownership can be optimal. Marinucci (2009) finds that the firm whose effort has a higher impact on the JV's profits should be entitled to a larger profit share, while we show that only majority shareholders, including the 50% shareholders, should be given control rights.

We use Wang and Zhu's (2005) two-period model, with incomplete contracting and separate income and control rights. A unique feature of this model is that allocations of both income and control rights are allowed in the initial contract. However, Wang and Zhu (2005) fail to show the optimality of the 51:49 equity structure. We use the Shapley value to decide on the revenue reallocation in ex post renegotiation and show that the 51:49 equity structure is optimal when the two parties' abilities to acquire private benefit are highly asymmetric.

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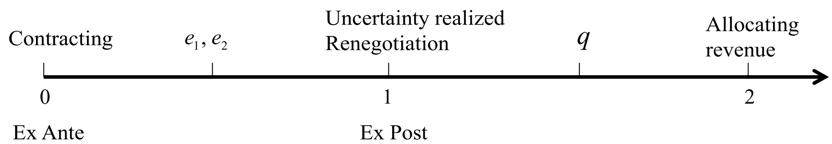

Fig. 1. Timing of events.

2. The model

Project

Following Wang and Zhu (2005), consider two partners, M_1 and M_2 who are engaged in a JV. They are risk neutral in income but have convex costs. There are two periods. In period 1 (ex ante), the two partners invest unverifiable investments (efforts) e_1 and e_2 simultaneously with private costs $c_1(e_1)$ and $c_2(e_2)$ and joint effort h defined by a function $h(e_1, e_2) \geq 0$. In period 2 (ex post), the controlling party takes an action $q \in [0, 1]$. Here, the value of q is uncontractible ex ante, but its control right (the right to decide on the value of q) is contractible ex ante. Further, the value of q is contractible ex post (see Fig. 1).

There is uncertainty in the first period and this uncertainty is realized at $t = 1$. The two parties are allowed to renegotiate their contract at $t = 1$. Revenue is produced at $t = 2$ and it is allocated based on the existing contract.

Private benefits

Let x be the ex post *revenue*. Denote by $\tilde{x}(h)$ the ex ante revenue, which is random ex ante conditional on h. The controlling party can appropriate part of the revenue. Specifically, the controlling party has the right to choose $q \in [0, 1]$ such that

$(1-q)\tilde{x}(h)$	is diverted for private use,
$q\tilde{x}(h)$	is public revenue,
$b_i(1-q)\tilde{x}(h)$	is private benefit for the controlling party,

where $b_i \in [0, 1)$ is M_i's ability to appropriate revenue—a measure of corruptibility. That is, the controlling party reports only a fraction $q\tilde{x}(h)$ of $\tilde{x}(h)$. The announced revenue $q\tilde{x}(h)$ is contractible ex ante.

Contract

Suppose that the two parties negotiate an ex ante contract at $t = 0$ and, if necessary, they renegotiate an ex post contract at $t = 1$. Given that the announced revenue $q\tilde{x}(h)$ and the control rights over q are contractible ex ante, at the beginning of period 1, the two parties sign an ex ante contract for

- allocation of public revenue $q\tilde{x}(h)$ (income rights)
- allocation of control rights over q (control rights).

That is, *an ex ante contract* has the following form:

$$\text{ex ante contract} = \{\text{revenue sharing scheme on } qx, \text{ control rights over } q\}.$$

This contract can be renegotiated ex post after the investments are sunk but before the action q is taken. Following the literature, renegotiation ensures ex post efficiency. Since ex post social welfare is $[q + b_i(1-q)]\tilde{x}(h)$ if M_i has the control rights, ex post efficiency means $q = 1$. This means that an ex post contract has the following form:

$$\text{ex post contract} = \{\text{revenue sharing scheme on } x, q = 1\}.$$

We want to identify the optimal ex ante contract. Let $\mathcal{S}$ be the set of admissible revenue-sharing schemes defined by

$$\mathcal{S} \equiv \{s_i : \mathbb{R}_+ \to \mathbb{R}_+ | s_i \text{ is Lebesgue integrable}, \ i = 1, 2\}.$$

A revenue-sharing scheme s allocates $s_1(qx)$ to M_1 and $s_2(qx)$ to M_2, where $s_1(qx) + s_2(qx) = qx$. There are three possible allocations of control: M_1 has sole control, M_2 has sole control, and M_1 and M_2 have joint control. For joint control, each party is entitled to half of the announced revenue qx and has the veto rights over q. If the two parties cannot reach an agreement on q, no revenue is generated For single-party control, the controlling party can unilaterally choose q to maximize its ex post payoff.

We impose the following three assumptions on the functions as in Wang and Zhu (2005).

Assumption 1. $h(e_1, e_2)$ is strictly increasing in e_1 and e_2.

Assumption 2. $c_i(e_i)$ is convex and strictly increasing in e_i, for $i = 1, 2$.

Assumption 3. $R(e_1, e_2) \equiv E[\tilde{x}(h(e_1, e_2))]$ is concave and strictly increasing in e_1 and e_2.

3. The solution

If q is ex ante contractible, the solution is called the second-best (SB) solution. If q is not ex ante contractible, the solution is called the third-best (TB) solution. We solve for the TB solution only. The TB solution is generally less efficient than the SB solution. When the TB solution is as efficient as the SB solution, we say that the TB solution is SB. When the TB solution is strictly less efficient than the SB solution, we say that the solution is TB.

The general solution

If M_1 has sole control over q, in the second period, M_1 can choose to renegotiate with M_2, which implies $q^* = 1$. The ex post social welfare $\tilde{x}(h)$ is then divided based on the Shapley value, implying $\tilde{x}(h)/2$ for each party. Alternatively, M_1 can choose not to renegotiate, but to choose q unilaterally based on the ex ante revenue-sharing scheme. According to Wang and Zhu (2005), since both parties are risk neutral in income, an optimal revenue-sharing scheme involves a pair (α_1, α_2) of revenue shares, with $\alpha_i \geq 0$ and $\alpha_1 + \alpha_2 = 1$. Hence, in the latter case, M_1 receives payoff

$$\pi_1 \equiv \max_q \ \alpha_1 q\tilde{x}(h) + b_1(1-q)\tilde{x}(h),$$

while M_2 receives $\alpha_2 q\tilde{x}(h)$. This implies $\pi_1 = \alpha_1\tilde{x}(h)$ if $\alpha_1 \geq b_1$, and $\pi_1 = b_1\tilde{x}(h)$ if $\alpha_1 < b_1$. M_1 decides whether or not to renegotiate by comparing π_1 with $\tilde{x}(h)/2$. This implies Lemma 1.

Lemma 1. *Suppose that M_i is given sole control and revenue share α_i. Then, if $\alpha_i \geq \max\{1/2, b_i\}$, M_i's ex post payoff is $\alpha_i\tilde{x}(h)$; if $\alpha_i < \max\{1/2, b_i\}$, M_i's ex post payoff is $\max\{1/2, b_i\}\tilde{x}(h)$.*

Since the contract is renegotiable, two aspects must be considered when trying to determine the optimal revenue-sharing scheme. The controlling party may try to maximize her private benefits by asking for at least revenue share b_i ex post, or it may demand renegotiation and ask for revenue share 1/2 ex post according to the Shapley value. This means that a renegotiation-proof revenue share α_i for the controlling party must satisfy $\alpha_i \geq \max\{1/2, b_i\}$. This explains Lemma 1.

Denote by (α_1^*, α_2^*) the SB revenue shares. Wang and Zhu (2005) offer (α_1^*, α_2^*) and Lemma 2.