Chapter 22

Negotiating a Joint-Venture Contract: The NPV Perspective

Overview

A Simple Framework for Profit Sharing

Case 1: a proportional-sharing contract

Case 2: An equity cum License Contract

- Why a license contract?
- Fair sharing
- Finding ϕ for a given license contract
- Finding an acceptable license deal

Final Words of Wisdom

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Why do JVs deserve a special discussion?

- **Not just another NPV calculation:**
  - Once the contract is known, we can compute an NPV,
  - ... but the contract has to be negotiated keeping in mind the NPV.
  - Avoiding lots of trial-and-error work, we do negotiation and NPV in one shot
- **How we do it**
  - synergy gains = what can be achieved over and above the no-agreement outcome
  - idea: split the synergy gains fairly: e.g. the 50/50 rule (Nash, Selton-Rubinstein, practitioners)
  - solution can always be reduced to simple manipulations of one or two as-if-WOS NPV's plus some simple additional discounting.

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- **Possible ingredients in a JV contract**
  - pure-(cash) equity contract: simple "linear" sharing of *in* & *out*
  - royalty (etc.) going to a partner: non-proportional sharing
  - equity "in kind" at a negotiated value: share of input $\neq$ share of output or residual output
- **Complicating factors:**
  - restrictions on foreign equity ownership in host country, ceilings on admissible royalty percentages, etc.
  - differences in taxes across partners (e.g. home, foreign) or type of income (dividends versus other income)
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The row to hoe

- **simple proportional contract** in a "Step 1" joint-branch framework
  - focus on economics; no tax games
  - two cases:
    - identical tax rates and discount rates for both partners
    - different tax rates and discount rates for both partners
- **Nonproportional contracts** in a "Step-2" framework
  - Why license contracts?
  - How analysed? a double ANPV approach
- **Generalisations**

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A Simple Framework for Profit Sharing

Key numbers:

- NPV_{JV} = value created if A and B cooperate
- NPV_A, NPV_B = values created if A and B go it alone
- Both A and B must get no less than these alternatives

  $\Rightarrow NPV_A$, NPV_B are the threat points

necessary condition for JV: $NPV_{JV} > NPV_A + NPV_B$,

or $NPV_{JV} - [NPV_A + NPV_B] \overset{\text{def}}{=}$ synergy gain > 0.

The equal-gains rule

A's gain $=$ B's gain > 0,

where A's gain $=$ [NPV of A's cash flow from the JV] $- NPV_A$,

B's gain $=$ [NPV of B's cash flow from the JV] $- NPV_B$.

Example: $NPV_A = 200$, $NPV_B = 100$, $NPV_{JV} = 450$.

So we give 200+75=275 to A, and 100+75=175 to B.

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Case 1: a proportional-sharing contract

Notation

ϕ = A's share in I_0 and the later CF_t

τ_X = X (= A or B)'s effective tax rate on branch profits

Rev_t = the year-t sales revenue of the joint branch, cash basis

$Opex_t$ = year-t operating expenses of the branch, cash basis

$Sales_t$ = year-t sales (the amount invoiced)

$Cost_t$ = year-t costs (the cost of goods sold from P/L)

I_0 = value of cash and tangible assets invested in the JV

$\mathrm{PV}_X(CF)$ = $\sum_{t=0}^{T} \frac{CF_t}{(1+R_X)^t}$

R_X = a *p.a.* compound discount rate that reflects the riskiness of the cash flow to X

$NPV_{JV,A}$ = $\mathrm{PV}_A(Rev - Opex - Taxes) - I_0$

= $\mathrm{PV}_A(Rev - Opex - (Sales - Cost)\tau_A) - I_0$, an as-if-WOS value using A's τ and R

$NPV_{JV,B}$ = $\mathrm{PV}_B(Rev - Opex - (Sales - Cost)\tau_B) - I_0$, using B's τ and R

Set-up

The proportional joint-branch contract:

- two players, A and B
- the input I_0 is cash, or assets with a clear market value
- A and B bring in fractions ϕ and $1-\phi$, resp., of I_0
- neither A nor B make any profits on sales, if any, to JV
- A and B get fractions ϕ and $1-\phi$ of the accounting profit so they pay taxes on that fiscal income
- A and B bear/get fractions ϕ and $1-\phi$ of the non-profit cash flows

What does A get out of the deal?

- future cash flows: $\phi\left[Rev_t - Opex_t - (Sales_t - Cost_t)\tau_A\right]$
- NPV and gain:

$$\begin{aligned} \text{PV A's share} &= \text{PV}\left(\phi\left[Rev - Opex - (Sales - Cost)\tau_A\right]\right) - \phi I_0, \\ &= \phi\left(\text{PV}[Rev - Opex - (Sales - Cost)\tau_A] - I_0\right), \\ &= \phi NPV_{JV,A}. \\ \text{A's gain} &= \phi NPV_{JV,A} - NPV_A. \end{aligned} \tag{1}$$

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The gory details:

Equal gains:

- A's gain: $\phi\, NPV_{JV,A} - NPV_A$
- B's gain: $(1-\phi)\, NPV_{JV,B} - NPV_B$
- Equal gains:

$$\phi NPV_{JV,A} - NPV_A = (1-\phi) NPV_{JV,B} - NPV_B,$$

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$$\phi = \frac{NPV_{JV,B}}{NPV_{JV,A} + NPV_{JV,B}} + \frac{NPV_A - NPV_B}{NPV_{JV,A} + NPV_{JV,B}}.$$

Special case: equal tax rates, equal CoCa

If $NPV_{JV,A} = NPV_{JV,B} = NPV_{JV}$, then

$$\phi = \frac{1}{2} + \frac{NPV_A - NPV_B}{2\, NPV_{JV}}.$$

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Interpreting the formula (1)

- **Barring tax and CoCa effects ...**
  - deviations from $\phi = 1/2$ should reflect differences in best alternatives ("bargaining strength")

Example: $NPV_A = 200$, $NPV_B = 100$, $NPV_{JV} = 450$.

So we already decided to give 200+75=275 to A, and 100+75=175 to B. HOW?

$$\phi = \frac{1}{2} + \frac{NPV_A - NPV_B}{2\,NPV_{JV}} = 0.5 + \frac{200 - 100}{2 \times 450} = 0.611$$

Check:

- A gains $0.611 \times 450 - 200 = 275 - 200 = 75$
- B gains $0.389 \times 450 - 100 = 175 - 100 = 75$

Interpreting $\phi = \frac{NPV_{JV,B}}{NPV_{JV,A}+NPV_{JV,B}} + \frac{NPV_A - NPV_B}{NPV_{JV,A}+NPV_{JV,B}}$.

- **If A faces a higher tax rate**
  - Effect 1: the first fraction ¿rises above/falls below? 1/2
  - Intuition: if one before-tax rupee us worth less to A than to B, A needs more of the before-tax cake
  - Effect 2—minor: impact of "bargaining position" is affected

Example: A's valuation of both JV and best alternative are down

$NPV_A = 150$ not 200, $NPV_B = 100$, $NPV_{JV,A} = 350$ not 450, $NPV_{JV,B} = 450$.

– Old solution:

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– New solution:

$$\phi = \frac{450}{350+450} + \frac{150-100}{350+450} = 0.5625 + \underbrace{\frac{50}{350+450}}_{0.0625} = 0.625$$

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A wealth of options

- A now gets some or all of the following
  - a royalty tied to sales (sales $\times p$) or sometimes production
  - an upfront licensing fee L_0
  - periodic fixed fees L_t
  - a share ϕ in the remaining profit
- We now have many decision variables and only one constraint, the equal-gains rule.
  - fix some of these parameters on the basis of other considerations (e.g. fiscal)
  - use the remaining parameter to achieve the desired division of the synergy gains.
  - ping-pong until you find a solution that's acceptable

  Thus, non-proportional contracts are used when there are other important considerations beside obtaining a fair sharing of the gains.

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Why a license contract?

- **Risk sharing:** a partner who is closer to financial distress definitely prefers low-risk income.
- **Information asymmetries** (e.g. size of the market; costs)
  - Willingness on behalf of the better-informed partner to accept a big share of the risk acts as a signal for the project's quality
  - The shareholder with the information disadvantage obtains a license income that is less risky and easier to assess.
- **Limited equity:** one partner cannot put up the cash necessary in a pure-equity contract
  - one partner is unwilling to borrow (costs of financial distress) or to issue equity (loss of independence), or
  - there are legal restrictions on foreign equity ownership imposed by the host country
- **PR considerations** (e.g. local image)
- **Political risks** (lower expropriable investment)
- **Tax considerations** — but look at all taxes, i.e. all home and host taxes

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Towards the equal-gains rule

Extra Notation

p = the royalty percentage (relative to sales) received by A

L_t = the lump sum amount received by A in year t

LP_t = total license payments received by A in year t;
$LP_t = p \times Sales_t + L_t$

$\tau_{A,D}$ = A's effective total tax rate on dividends (including taxes on the underlying profits)

$\tau_{A,L}$ = A's effective total tax rate on licensing income

$\tau_{B,D}$ = B's effective total tax rate on dividends (including taxes on the underlying profits)

A's income, PV, and gain

◇ A's cash flow from the JV

$$\begin{aligned} CF_{A,0} &= -\phi I_0; \\ CF_{A,t>0} &= LP_t(1-\tau_{A,L}) + \phi\,(Rev_t - Opex_t - LP_t) \\ &\quad -\phi\,(Sales_t - Cost_t - LP_t)\tau_{A,D} \\ &= LP_t[(1-\tau_{A,L}) - \phi(1-\tau_{A,D})] \\ &\quad +\phi\,[Rev_t - Opex_t - (Sales_t - Cost_t)\tau_{A,D}]. \end{aligned}$$

◇ A's ANPV and gain

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B's side, and the fair-sharing rule

◇ B's cash flow from the JV

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\begin{aligned}
CF_{B,0} &= -(1-\phi)\, I_0; \\
CF_{B,t>0} &= (1-\phi)\,(Rev_t - Opex_t - LP_t) \\
&\quad -(1-\phi)\,(Sales_t - Cost_t - LP_t)\tau_{B,D} \\
&= -LP_t(1-\phi)(1-\tau_{B,D}) \\
&\quad +(1-\phi)\,[Rev_t - Opex_t - (Sales_t - Cost_t)\tau_{B,D}].
\end{aligned}
$$

◇ B's ANPV and gain

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\begin{aligned}
\mathrm{PV}(CF_B) &= -\mathrm{PV}_B(LP)(1-\phi)(1-\tau_{B,D}) \\
&\quad +(1-\phi)\{\mathrm{PV}_B[Rev - Opex - (Sales - Cost)\tau_{B,D}] - I_0\} \\
&= (1-\phi)\, NPV_{JV,B} - \mathrm{PV}_B(LP)(1-\phi)(1-\tau_{B,D}), \\
\text{B's gain} &= (1-\phi)\, NPV_{JV,B} - NPV_B - \mathrm{PV}_B(LP)(1-\phi)(1-\tau_{B,D}).
\end{aligned}
$$

◇ Fair sharing: find $\{\phi; p; L_t, t = 0, \ldots, N\}$ s.t.

$$
\begin{aligned}
&\phi\, NPV_{JV,A} - NPV_A + \mathrm{PV}_A(LP)[(1-\tau_{A,L}) - \phi\,(1-\tau_{A,D})] \\
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$$\begin{aligned} CF_{B,0} &= -(1-\phi)\, I_0; \\ CF_{B,t>0} &= (1-\phi)\,(Rev_t - Opex_t - LP_t) \\ &\quad -(1-\phi)\,(Sales_t - Cost_t - LP_t)\tau_{B,D} \\ &= -LP_t(1-\phi)(1-\tau_{B,D}) \\ &\quad +(1-\phi)\,[Rev_t - Opex_t - (Sales_t - Cost_t)\tau_{B,D}]. \end{aligned}$$

◇ B's ANPV and gain

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◇ Fair sharing: find $\{\phi; p; L_t, t = 0, \ldots, N\}$ s.t.

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Finding ϕ for a given license contract

- **One story:**
  - Suppose license income is taxed at a lower rate than profits/dividends
  - So we set p, and L_t at the highest values that do not raise fiscal hackles
  - Then find ϕ. If this is infeasible, or otherwise unacceptable, change the license contract etc etc
- **Find ϕ, given a license deal**

$$\phi\, NPV_{JV,A} - NPV_A + \mathrm{PV}_A(LP)\left[(1-\tau_{A,L}) - \phi\,(1-\tau_{A,D})\right]$$
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$$\Rightarrow \quad \phi \overbrace{\left[NPV_{JV,A} - \mathrm{PV}_A(LP)(1-\tau_{A,D})\right]}^{\text{net value, to A, of equity—NVEQ}} - NPV_A + \mathrm{PV}_A(LP)(1-\tau_{A,L})$$
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◇ Find ϕ, given a license deal

$$\phi = \frac{NVEQ_B}{NVEQ_A + NVEQ_B} + \frac{\overbrace{[NPV_A - NPV_B]}^{\text{threat gap}} - \overbrace{\text{PV}_A(LP)(1-\tau_{A,D})}^{\text{partial settlement}}}{NVEQ_A + NVEQ_B} \qquad (2)$$

◇ Comments

- ▷ first ratio is like the fraction of equity values if the license contract had been with an outsider
- ▷ first ratio still simplifies to 1/2 if A and B are homogenous, τ- and R-wise; it is higher is A is disadvantaged
- ▷ the gap between the alternative values ("bargaining strength") can be reduced or even closed by the license income
- ▷ both the threat gap and the side payment get more weight since the numerator is now (twice) the net value of equity not the net value of all cash flows

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Finding an acceptable license deal

- **When used?** sometimes ϕ is dictated by other considerations than pure fair sharing
  - Desire for maximal control within government-set limits on ϕ: set ϕ = max
  - Tax considerations, no desire for control, severe information disadvantage: set ϕ=0.

  Then solve for an acceptable license contract that achieves fair sharing
- **How to use**
  - analytically? cumbersome when you cycle through many parm's—and then you still have to implement it in a spreadsheet
  - numerically: chose tentative values for all parm's. Compute each player's gain given this set (always copying the parm values from your initialisation cell). Then use SOLVER to equalize the gains.

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Finding an acceptable license deal

Example

- Let $NPV_{JV,A} = NPV_{JV,B} = 493$
  $\tau_{A,D} = \tau_{A,L} = \tau_{B,D} = .35$
  $NPV_A = 152$
  $NPV_B = 0$
- Company A prefers maximum control subject to the legal limit $\phi \leq 0.49$, so ϕ is set at 0.49.
- Tentatively, we set $L_t = 0$. Then $\text{PV}(LP) = p\,\text{PV}(Sales)$, where $\text{PV}(Sales) = 2962$.
- With these inputs, the royalty percentage should be $p = 8.24\%$.
- If that looks too high, set p at an acceptable level (5%?) and solve for e.g. L_0 (upfront license fee) or a series of L_t with the same PV, etc etc

Outline

Qualitative summary

- **It's really quite simple:**
  - First do NPV's as if the whole project were a wholly owned subsidiary:
  - partner A analyses the problem using her own tax rate and discount rate on the entire cashflow ($NPV_{JV,A}$)
  - B does the same using his tax rate and his cost of capital ($NPV_{JV,B}$)
  - If one of these NPV's is negative, STOP.
  - If each of these NPV's is positive, and their sum larger then the summed threat points, we can probably find a fair sharing rule.

    The only extra info you may need, for non-equity contracts, is $\mathrm{PV}(sales)$ (or another similar variable)

Generalisations (1)

- **Handling asymmetric information?**
  - Each negotiating team can still use its own estimates of the relevant data and compute the implications for JV proposals as a starting point in the bargaining
  - Or use backwards: given your own alternative and a proposed contract, back out the NPV_B that woudl make the contract fair, and then judge its reasonability
- **Handling three or more partners?**
  - Each should get one-Nth of the synergy gains.
- **Equal bargaining strengths and the 50/50 rule?**
  - Easy to adjust for any other division of the synergy gains.
  - OR: use a specific proposal to back out the implied sharing proportions.

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Generalisations (2)

- **Profits on owner's sales to JV?**
  - Why make profits on intra-group sales rather than obtain dividends or royalties etc.?
    - tax authorities won't accept zero-profit sales to a related company
    - transfer pricing may be used to shift profits from high- to low-tax locations
    - transfer pricing may be used to obtain a fair sharing of the synergy despite host-country regulations on equity ownership, dividend payments, license fees, etc.
  - How to handle these profits?
    - Like royalties. these profits are deductible expenses for the JV, taxable income for the supplier/parent.
    - Thus, transfer-pricing profits can be added to the formulas in essentially the same way as royalties.

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Generalisations (3)

- **Equity in kind, at negotiated valuation**
  - Apart from taxation, this is very similar to finding a fair upfront license income L_0, paid by JV to A, and then ploughed back as equity.

Example

Example: A wants 50% of the later inflows, but paying only 30% of I_0. Two solutions:

- A pays up 30% of I_0 in cash, then sells a "know-how" to JV for 20% of I_0 and puts up that money as additional equity- OR
- A pays up 30% of I_0 , and brings in the know-how for 20% of I_0.

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Summing up

- A JV can work only if there are synergy gains. The negotiations are not directly about how to share the JV's NPV but how to share the synergy gains.
- We use the popular 50/50 rule, but any other one can be adopted.
- A major insight is that a fair JV agreement should take into account all forms of income:
  - the fraction of profits (ϕ),
  - any royalty (p) on sales,
  - other types of periodic fees (L_t) in excess of costs, if any, associated with the service
  - any upfront payment L_0 for know-how etc
  - profits on owners' sales to the JV, or
  - non-cash equity inputs at a negotiated value.
- Be careful about the other determinants of value (taxes, discount rates)
- Once we have thought through the contract, the analysis needs only simple as-if-WOS NPV's, and PV's of simple things like sales or promised fees.
- Often, more complicated-looking devices are needed to avoid restrictions on the use of simple devices.

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