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 $\phi$ 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 ≠ 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)
- capital-market segmentation, differences in cost of capital across partners
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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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Negotiating a Joint Venture: the NPV Perspective

P. Sercu, *International Finance: Theory into Practice*

Outline

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Final Words of Wisdom
A Simple Framework for Profit Sharing

◊ **Key numbers:**

- $NPV_{JV} = \text{value created if A and B cooperate}$
- $NPV_A, \ NPV_B = \text{values created if A and B go it alone}$
- 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 $NPV_{JV} - [NPV_A + NPV_B] \overset{\text{def}}{=} \text{synergy gain} > 0.$

◊ **The equal-gains rule**

  A’s gain $= B’s \ gain > 0,$

  where A’s gain $= [\text{NPV of A’s cash flow from the JV}] - NPV_A,$
  B’s gain $= [\text{NPV of B’s cash flow from the JV}] - NPV_B.$

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

So we give 200+75=275 to A, and 100+75=175 to B.
A Simple Framework for Profit Sharing

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Final Words of Wisdom
Case 1: a proportional-sharing contract

Notation

- $\phi = A$’s share in $I_0$ and the later $CF_t$
- $\tau_X = X$ ( = A or B)’s effective tax rate on branch profits
- $Rev_t = \text{the year}-t \text{ sales revenue of the joint branch, cash basis}$
- $Opex_t = \text{year}-t \text{ operating expenses of the branch, cash basis}$
- $Sales_t = \text{year}-t \text{ sales (the amount invoiced)}$
- $Cost_t = \text{year}-t \text{ costs (the cost of goods sold from P/L)}$
- $I_0 = \text{value of cash and tangible assets invested in the JV}$
- $PV_X(CF) = \sum_{t=0}^{T} \frac{CF_t}{(1+R_X)^t}$
- $R_X = a p.a. \text{ compound discount rate that reflects the riskiness of the cash flow to X}$
- $NPV_{JV,A} = PV_A(Rev - Opex - Taxes) - I_0$
- $NPV_{JV,A} = PV_A(Rev - Opex - (Sales - Cost)\tau_A) - I_0$, an as-if-WOS value using A’s $\tau$ and $R$
- $NPV_{JV,B} = PV_B(Rev - Opex - (Sales - Cost)\tau_B) - I_0$, using B’s $\tau$ 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 $\phi$ 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 $\phi$ and $1 - \phi$ of the accounting profit so
  they pay taxes on that fiscal income
▷ A and B bear/get fractions $\phi$ and $1 - \phi$ of the non-profit cash
  flows

◇ What does A get out of the deal?

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

\[
\begin{align*}
\text{PV A’s share} &= \text{PV} (\phi [Rev - Opex - (Sales - Cost)\tau_A]) - \phi I_0, \\
&= \phi (\text{PV}[Rev - Opex - (Sales - Cost)\tau_A] - I_0), \\
&= \phi \text{NPV}_{JV,A}.
\end{align*}
\]

\[
A’s \text{ gain} = \phi \text{NPV}_{JV,A} - \text{NPV}_A. \quad (1)
\]
Set-up

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  - two players, A and B
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  - NPV and gain:
    \[
    \begin{align*}
    PV \text{ A's share} &= PV (\phi [Rev - Opex - (Sales - Cost)\tau_A]) - \phi I_0, \\
    &= \phi (PV[Rev - Opex - (Sales - Cost)\tau_A] - I_0), \\
    &= \phi NPV_{JV,A}.
    \end{align*}
    \]
    
    A's gain $= \phi NPV_{JV,A} - NPV_A$. \hfill (1)
The gory details:

 fruition


\[ \phi (NPV_{JV,A} + NPV_{JV,B}) = NPV_{JV,B} + NPV_A - NPV_B, \]

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


\[ \phi = \frac{1}{2} + \frac{NPV_A - NPV_B}{2 NPV_{JV}}. \]
The gory details:

◇ **Equal gains:**
  - A’s gain: \( \phi \text{NPV}_{JV,A} - \text{NPV}_A \)
  - B’s gain: \( (1 - \phi) \text{NPV}_{JV,B} - \text{NPV}_B \)
  - Equal gains:

\[
\phi \text{NPV}_{JV,A} - \text{NPV}_A = (1 - \phi) \text{NPV}_{JV,B} - \text{NPV}_B,
\]

\[
\phi \left( \text{NPV}_{JV,A} + \text{NPV}_{JV,B} \right) = \text{NPV}_{JV,B} + \text{NPV}_A - \text{NPV}_B,
\]

\[
\phi = \frac{\text{NPV}_{JV,B}}{\text{NPV}_{JV,A} + \text{NPV}_{JV,B}} + \frac{\text{NPV}_A - \text{NPV}_B}{\text{NPV}_{JV,A} + \text{NPV}_{JV,B}}.
\]

◇ **Special case: equal tax rates, equal CoCa**

If \( \text{NPV}_{JV,A} = \text{NPV}_{JV,B} = \text{NPV}_{JV} \), then

\[
\phi = \frac{1}{2} + \frac{\text{NPV}_A - \text{NPV}_B}{2 \text{NPV}_{JV}}.
\]
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?**

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

Check:

− A gains $0.611 \times 450 - 200 = 275 - 200 = 75$

− B gains $0.389 \times 450 - 100 = 175 - 100 = 75$
Interpreting $\phi = \frac{\text{NPV}_{JV,B}}{\text{NPV}_{JV,A} + \text{NPV}_{JV,B}} + \frac{\text{NPV}_A - \text{NPV}_B}{\text{NPV}_{JV,A} + \text{NPV}_{JV,B}}$.

- **If A faces a higher tax rate**
  - Effect 1: the first fraction rises above/falls below? 1/2
  - Intuition: if one before-tax rupee is 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

$\text{NPV}_A = 150$ not $200$, $\text{NPV}_B = 100$, $\text{NPV}_{JV,A} = 350$ not $450$, $\text{NPV}_{JV,B} = 450$.

- Old solution:
  \[ \phi = \frac{1}{2} + \frac{\text{NPV}_A - \text{NPV}_B}{2 \times \text{NPV}_{JV}} = 0.5 + \frac{200 - 100}{2 \times 450} = 0.611 \]

  \[ \phi = 0.5 + \frac{0.1111}{2} = 0.625 \]

- New solution:
  \[ \phi = \frac{\text{NPV}_A}{\text{NPV}_{JV,A} + \text{NPV}_{JV,B}} + \frac{\text{NPV}_B}{\text{NPV}_{JV,A} + \text{NPV}_{JV,B}} = \frac{450}{350 + 450} + \frac{150 - 100}{350 + 450} = 0.5625 + \frac{50}{350 + 450} = 0.625 \]

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

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- **Old solution:**
  
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- **New solution:**
  
  $\phi = \frac{450}{350 + 450} + \frac{150 - 100}{350 + 450} = 0.5625 + \frac{50}{350 + 450} = 0.625$

- **Check:**
  
  - A gains ...
  - B gains ...
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Final Words of Wisdom
A wealth of options

- **A now gets some or all of the following**
  - a *royalty* tied to sales \((\text{sales } \times p)\) or sometimes production
  - an *upfront licensing fee* \(L_0\)
  - *periodic fixed fees* \(L_t\)
  - a *share* \(\phi\) 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.
A wealth of options

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

<table>
<thead>
<tr>
<th>Extra Notation</th>
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<tbody>
<tr>
<td>( p ) = the royalty percentage (relative to sales) received by A</td>
</tr>
<tr>
<td>( L_t ) = the lump sum amount received by A in year ( t )</td>
</tr>
<tr>
<td>( LP_t ) = total license payments received by A in year ( t ); ( LP_t = p \times Sales_t + L_t )</td>
</tr>
<tr>
<td>( \tau_{A,D} ) = A’s effective total tax rate on dividends (including taxes on the underlying profits)</td>
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<tr>
<td>( \tau_{A,L} ) = A’s effective total tax rate on licensing income</td>
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<tr>
<td>( \tau_{B,D} ) = B’s effective tax rate on dividends (including taxes on the underlying profits)</td>
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A’s income, PV, and gain

◊ **A’s cash flow from the JV**

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

◊ **A’s ANPV and gain**

\[
\begin{align*}
\text{PV}(CF_A) &= \text{PV}_A(LP)[(1 - \tau_{A,L}) - \phi(1 - \tau_{A,D})] \\
&\quad + \phi\{\text{PV}_A[Rev - Opex - (Sales - Cost)\tau_{A,D}] - I_0}\} \\
&= \phi NPV_{JV,A} + \text{PV}_A(LP)[(1 - \tau_{A,L}) - \phi(1 - \tau_{A,D})], \\
A's \text{ gain} &= \phi NPV_{JV,A} - NPV_A +\text{PV}_A(LP)[(1 - \tau_{A,L}) - \phi(1 - \tau_{A,D})].
\end{align*}
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A’s income, PV, and gain

◇ A’s cash flow from the JV

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

◇ A’s ANPV and gain

\[
\begin{align*}
PV(CF_A) & = PV_A(LP)[(1 - \tau_{A,L}) - \phi (1 - \tau_{A,D})] \\
& \quad + \phi \{PV_A[Rev - Opex - (Sales - Cost) \tau_{A,D}] - I_0\} \\
& = \phi NPV_{JV,A} + PV_A(LP)[(1 - \tau_{A,L}) - \phi (1 - \tau_{A,D})], \\
A's \text{ gain} & = \phi NPV_{JV,A} - NPV_A + PV_A(LP)[(1 - \tau_{A,L}) - \phi (1 - \tau_{A,D})].
\end{align*}
\]
B’s side, and the fair-sharing rule

B’s cash flow from the JV

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

B’s ANPV and gain

\[
\begin{align*}
PV(CF_B) &= -PV_B(LP)(1 - \phi) (1 - \tau_{B,D}) \\
&\quad + (1 - \phi) \{ PV_B[Rev - Opex - (Sales - Cost) \tau_{B,D}] - I_0 \} \\
&= (1 - \phi) NPV_{JV,B} - PV_B(LP)(1 - \phi) (1 - \tau_{B,D}), \\
B's\ gain &= (1 - \phi) NPV_{JV,B} - NPV_B - PV_B(LP)(1 - \phi)(1 - \tau_{B,D}).
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Fair sharing: find \( \{\phi; p; L_t, t = 0, \ldots, N\} \) s.t.

\[
\phi NPV_{JV,A} - NPV_A + PV_A(LP) [(1 - \tau_{A,L}) - \phi (1 - \tau_{A,D})] \\
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Finding $\phi$ 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 $\phi$. If this is infeasible, or otherwise unacceptable, change the license contract etc etc

**Find $\phi$, given a license deal**

\[
\phi \text{ NPV}_{JV,A} - \text{ NPV}_A + \text{ PV}_A(LP)[(1 - \tau_{A,L}) - \phi (1 - \tau_{A,D})] = (1 - \phi) \text{ NPV}_{JV,B} - \text{ NPV}_B - \text{ PV}_B(LP)(1 - \phi)(1 - \tau_{B,D}).
\]

<table>
<thead>
<tr>
<th>net value, to A, of equity—NVEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\phi \left[ \text{ NPV}_{JV,A} - \text{ PV}<em>A(LP)(1 - \tau</em>{A,D}) \right] - \text{ NPV}_A + \text{ PV}<em>A(LP)(1 - \tau</em>{A,L})$</td>
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**Find $\phi$, given a license deal**

$$
\phi \left( NPV_{JV,A} - NPV_A + PV_A(LP) \left[ (1 - \tau_{A,L}) - \phi \left(1 - \tau_{A,D}\right) \right] - NPV_A + PV_A(LP) \left(1 - \phi\right)(1 - \tau_{B,D}) \right)
$$

Rightarrow

$$
\phi \left[ NPV_{JV,A} - PV_A(LP)(1 - \tau_{A,D}) \right] - NPV_A + PV_A(LP)(1 - \tau_{A,L})
$$

$$
= (1 - \phi) \left[ NPV_{JV,B} - PV_B(LP)(1 - \tau_{B,D}) \right] - NPV_B.
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Net value, to A, of equity—NVEQ

Net value, to B, of equity—NVEQ
Finding $\phi$ for a given license contract

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\phi = \frac{NVEQ_B}{NVEQ_A + NVEQ_B} + \frac{[NPV_A - NPV_B]}{NVEQ_A + NVEQ_B} - \frac{PV_A(LP)(1 - \tau_{A,D})}{NVEQ_A + NVEQ_B}
$$

diamond **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, $\tau$- and $R$-wise; it is higher if 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
Finding $\phi$ for a given license contract

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(2)

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Finding an acceptable license deal

✧ **When used?** sometimes $\phi$ is dictated by other considerations than pure fair sharing
  - Desire for maximal control within government-set limits on $\phi$: set $\phi = \text{max}$
  - Tax considerations, no desire for control, severe information disadvantage: set $\phi=0$.
  
  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 \( \text{NPV}_{JV,A} = \text{NPV}_{JV,B} = 493 \)
  \( \tau_{A,D} = \tau_{A,L} = \tau_{B,D} = .35 \)
  \( \text{NPV}_A = 152 \)
  \( \text{NPV}_B = 0 \)

- Company A prefers maximum control subject to the legal limit \( \phi \leq 0.49 \), so \( \phi \) 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 \( \text{PV} \), etc etc
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 $\phi$ for a given license contract
   Finding an acceptable license deal

Final Words of Wisdom
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 $PV(sales)$ (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 would 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.

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◊ **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.
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◊ **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
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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 ($\phi$),
  - 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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