Navigating Unpredictable Waters: Negotiating the Joint Venture Waterfall

A More “Scientific” Look at Joint Venture Terms Between Institutional Money Partners and Managing Partners in Real Estate Development

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MIT Center for Real Estate

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Example Project:
Typical mid-scale mixed-use (condo/office/retail) development…

- Total development budget: $104.0 M ($371/NSF)
- Mini-Perm Loan (80% of Hard Cost) @ 6%: $ 62.0 M ($222/NSF)

Revenue projection assumptions:

<table>
<thead>
<tr>
<th>Development Program:</th>
<th>Gross SF</th>
<th>Net SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>115,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Office</td>
<td>172,500</td>
<td>150,000</td>
</tr>
<tr>
<td>Retail</td>
<td>34,500</td>
<td>30,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>322,000</strong></td>
<td><strong>280,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residential Condominium Sales Prices &amp; Sell-out</th>
<th>$525</th>
<th>$550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Sales Prices PSF - Pre-Sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit Sales Prices PSF - Remaining Units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Sale %</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Unit Sale % - Year 1</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Unit Sale % - Year 2</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Unit Sale % - Year 3</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commercial Space Rental Rates &amp; Lease-up</th>
<th>Office Space</th>
<th>$33.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retail Space</td>
<td>$42.00</td>
</tr>
<tr>
<td></td>
<td>Pre-Lease %</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Lease-up % - Year 1</td>
<td>40%</td>
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<td>Lease-up % - Year 3</td>
<td>0%</td>
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| Disposition Assumption (Yr 6): | Capitalization Rate to Estimate Sale Price | 7% |
Project Base Case Cash Flow Projections (JV entity level):

Overall going-in IRRs: 11.2% unlevered, 18.0% as levered by mini-perm loan.
JV Partnership Agreement ("waterfall"): Two partners: “Manager” (developer), & “Money Partner”…

- Capital contributions split 90/10 Money/Dvlpr;
- Pro Rata Pari Passu to 1st hurdle at 10%, then 80/20, except:
- Development cost overruns (& savings) split 50/50 (with catch-up after Money meets 1st hurdle);
- Subsequent hurdles (for Money Partner) at 13% & 15% with cash flow splits thereafter 70/30 & 60/40…
- Condo sales revenue treated as capital proceeds.

<table>
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<th>Return Hurdles &amp; Cash Flow Distributions</th>
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<tbody>
<tr>
<td>1st Hurdle</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Pref. for</td>
</tr>
<tr>
<td>Both to</td>
</tr>
<tr>
<td><strong>10.0%</strong></td>
</tr>
<tr>
<td><strong>Thereafter</strong></td>
</tr>
<tr>
<td><strong>90.0%</strong></td>
</tr>
<tr>
<td><strong>60.0%</strong></td>
</tr>
<tr>
<td><strong>10.0%</strong></td>
</tr>
</tbody>
</table>
**Equity JV Waterfall, Return of & on Capital Contribution 90% Money/10% Dvlpr:**

### Operating Cash Flows: “Return On”

<table>
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<tr>
<th>Return</th>
<th>Money “pari passu”</th>
<th>Dvlpr “pari passu”</th>
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<tr>
<td>15%</td>
<td>60% share</td>
<td>40% share</td>
</tr>
<tr>
<td>13%</td>
<td>70% share</td>
<td>30% share</td>
</tr>
<tr>
<td>10%</td>
<td>80% share</td>
<td>20% share</td>
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- Money “pari passu”
- Dvlpr “pari passu”

### Capital Cash Flows: “Return Of & On”

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- Money “pari passu”
- Dvlpr “pari passu”

**And:** Dvlpr/Money 50/50 on construction cost overrun/savings...
JV Partnership Agreement (“waterfall”): Base Case Cash Flow & Return Projections…

Manager Partner, Money Partner, Base Case Net Cash Flows

Overall going-in IRRs: **28.7% Manager, 16.8% Money Partner.**

*Is this fair?...*
Overall going-in IRRs: 28.7% Manager, 16.8% Money Partner.

*Is this fair?*

Academic Perspective:

*Use basic capital market theory to provide a normative framework & starting point to answer this question...*

The Market Price provides the “opportunity cost” of trading.
Fundamentally, the capital market is a market that trades risk in investment assets.

Thus, the capital market determines the market price of risk in terms of the going-in expected return risk premium (over riskless investment returns) per unit of investment risk (as the capital market perceives and cares about such risk). This provides the “opportunity cost of capital” (OCC) for any investment or claim (what the investor could expect to earn from alternative investments of similar risk).
The capital market determines the “price of risk” as the slope of the “Security Market Line” (SML), the expected return risk premium per unit of risk in any given investment priced at market value (mkt RP/Risk):
Any asset or claim priced at fair market value (providing a “fair” expected return given the amount of investment risk in the asset) must lie on the SML, i.e., must have the same RP/Risk ratio (the mkt price of risk)...

For any two claims \((A, B)\), the ratio of the going-in expected return risk premia \((RP)\) must equal the ratio of the going-in expected risks:

\[
\frac{RP(A)}{RP(B)} = \frac{Risk(A)}{Risk(B)}.
\]
If the devlpt project is priced at fair market value, then it will lie on the SML. If the debt is priced at fair market value, then it too will lie on the SML. If both the above, then the levered equity JV entity will lie on the SML. In that case, both partners’ claims must have the same RP/Risk ratio in order for them both to lie on the SML…
The **RP/Risk ratio** of a claim is labeled its “**Treynor Ratio**.” If the levered JV entity lies on the SML (fair market value), then the Treynor Ratios of each partner’s claim should be equal. Otherwise the one with the lower Treynor Ratio will lie below the SML and not be receiving a “fair” expected return for the amount of investment risk born.
The **RP/Risk ratio** of a claim is labeled its “**Treynor Ratio**.” If the levered JV entity lies on the SML (fair market value), then the Treynor Ratios of each partner’s claim should be equal. Otherwise the one with the lower Treynor Ratio will lie below the SML and not be receiving a “fair” expected return for the amount of investment risk born.

Here, Partner B is not getting a “fair” return (ex ante).
How to measure the “Risk” faced by each partner?...

- We only need to measure the **relative** risk (the **ratio** of the two risks).
- A simple way to do this is by **Scenario Analysis**.
- The simplest form of scenario analysis is **Binomial**:  
  - Construct an upside (“Optimistic”) scenario above the Base Case, and
  - A downside (“Pessimistic”) scenario below the Base Case (The scenarios should have IRRs approximately symmetric around the Base Case IRR, at the underlying unlevered project level. Each scenario should have about a 10% chance of happening – meaning, subjectively, about 1 in 10 chance result could turn out to be that extreme or more so in that direction.)
- Define the “expected” return as the Base Case IRR
- Define the risk (for relative or ratio purposes) as the **range** between the Optimistic minus the Pessimistic IRRs
- Do this for each partner. Then…
- Each partner’s Treynor Ratio is their RP/Risk*:  

  \[
  \frac{(\text{Expected IRR} - \text{Riskfree Rate})}{\text{(Outcome IRR Range)}}
  \]

*Note: In real estate applications “Treynor Ratio” in this context will be same as “Sharpe Ratio,” but in principle it is the Treynor Ratio we’re using because it measures risk as market price of risk.
Let's apply this framework to our Example Project & JV. Recall…

Manager Partner, Money Partner,  
Base Case Net Cash Flows  

Overall going-in IRRs: **28.7% Manager, 16.8% Money Partner.**

*Is this fair?...*
Optimistic Scenario:
Defined as Base Case altered as follows (for example):
• 25% Higher initial revenue projections (sale prices, rents, per SF), and
• 2% per year faster growth trend in those revenues over time.

Pessimistic Scenario:
Defined as Base Case altered as follows (for example):
• 25% Lower initial revenue projections (sale prices, rents, per SF), and
• 2% per year slower growth trend in those revenues over time.
• 5% development cost overrun (50/50 contribution).

These scenarios result in projected IRRs near the 10th & 90th percentiles of the IRR outcome probability distribution based on empirically calibrated modeling of typical real estate risk (volatility, trends, cycles, noise), based on analysis of Real Capital Analytics (MIT/CRE Partner Company) data.
Ex post realized levered IRRs: -1.0% Manager, -0.4% Money Partner. Underlying project (unlevered) realized IRR = 2.6% (8.6 pts below Base Case)
Optimistic Scenario:

Ex post realized levered IRRs: **54.8% Manager**, **27.7% Money Partner**.
Underlying project (unlevered) realized IRR = 19.8% (8.6 pts above Base Case)
Manager Partner & Money Partner have pretty similar Treynor Ratios, thus implying “fair” JV claim terms per the capital market Opportunity Cost of Capital (in this example)…
Manager Partner & Money Partner have very similar Treynor Ratios*, thus implying “fair” JV claim terms per the capital market OCC (in this example)…

<table>
<thead>
<tr>
<th>Claim</th>
<th>Base Case IRR</th>
<th>T-bond</th>
<th>IRR Risk Prem</th>
<th>Opt Scen</th>
<th>Pes Scen</th>
<th>Range</th>
<th>Comp</th>
<th>Trey-nor Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mgr</td>
<td>28.7%</td>
<td>1.0%</td>
<td>27.7%</td>
<td>54.8%</td>
<td>-1.0%</td>
<td>55.8%</td>
<td>27.7 / 55.8</td>
<td>0.50</td>
</tr>
<tr>
<td>Money</td>
<td>16.8%</td>
<td>1.0%</td>
<td>15.8%</td>
<td>27.7%</td>
<td>-0.4%</td>
<td>28.1%</td>
<td>15.8 / 28.1</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Manager Partner & Money Partner have very similar Treynor Ratios*, thus implying “fair” JV claim terms per the capital market OCC (in this example)…
Treynor Ratios: Real World Results

Money Partner / Investor Member

Developer / Manager / Sponsor
Treynor Ratios: Real World Results

Hypothetical Mixed-Use

Developer / Manager / Sponsor

Money Partner / Investor Member
Treynor Ratios: Real World Results

Hypothetical Mixed-Use

Condos

Developer / Manager / Sponsor

Money Partner / Investor Member
Treynor Ratios: Real World Results

Hypothetical Mixed-Use
Condos
Apartment
Office

Money Partner / Investor Member
Treynor Ratios: Real World Results

Money Partner / Investor Member

Developer / Manager / Sponsor

Hypothetical Mixed-Use  Condos  Apartment  Office  Industrial
Treynor Ratios: Real World Results

Money Partner / Investor Member

- Hypothetical Mixed-Use
- Condos
- Apartment
- Office
- Industrial
Treynor Ratios: Real World Results

where risk in the denominator = the downside (pessimistic) deviation only
Approximately equal Treynor Ratios…

“Fair” JV cash flow splits arrangement.
More sophisticated and in-depth analysis can be done with **Monte Carlo simulation**, modeling **entire probability distribution** of outcome IRRs…

**Histogram (frequency)**

**Cumulative probability over IRR achieved**

**How can we do this?…**
Empirical data (e.g., RCA) now enables us to rigorously simulate the behavior of real estate asset prices over time.

Replace “unknown unknowns” with “known unknowns”, replace “uncertainty” with “risk”…
Empirical data (e.g., RCA) now enables us to rigorously *simulate* the behavior of real estate asset prices over time.

Random simulation of 10 properties around market:

- Annual Frequency; Mkt=Moody's/REAL CPPI = 1.0 at 4Q00.
- Property Buy(4Q00) & Sell(2Q10) with Random Price Dispersion Normal Distn Actual Resids Price Intercept StdDev; Property Idiosyncratic Drift Random Walk

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Replace “unknown unknowns” with “known unknowns”, replace “uncertainty” with “risk”...
Using this new quantitative knowledge about real estate price dynamics, we **simulate** the **entire probability distribution** of outcome IRRs for our development project JV…

For example, this is the type of outcome probability distribution we get for the **Mgr & Money** partners’ IRRs under the given JV arrangement terms. You can graphically see the **tails** and **shapes** and the probabilities of various outcomes.
Based on the Monte Carlo simulation (entire probability distribution), the developer’s Treynor Ratio appears a bit better than the Money partner’s. The Money partner also faces a more negative skew and larger kurtosis (relatively fatter tails): Mgr not sharing enough upside with Money partner, or Money exposed to too much downside.
Exploring effect of changes in the JV terms…

Here we’ve substantially changed the hurdle & splits structure in favor of the Money Partner. (“Tight money” environment.) This results in nearly equal Treynor Ratios for the two partners (Money still has a little worse downside) …

Here only one hurdle, at 18%, then 80/20.
(Base Case was three hurdles at 10%, 13%, 15% and splits of 80/20, 70/30 & 60/40.)

<table>
<thead>
<tr>
<th>Treynor Ratios:</th>
<th>/StdDev</th>
<th>/Downside</th>
</tr>
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<tbody>
<tr>
<td>Development Partner</td>
<td>0.82</td>
<td>1.10</td>
</tr>
<tr>
<td>Money Partner</td>
<td>0.82</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Cumulative Distn Fcn: ex post IRRs (across simulation runs)
Thus, the Monte Carlo analysis suggests (unlike the simple scenario analysis) that the originally proposed JV terms may not be giving a “fair” deal to the Money partner relative to the Developer, based on the capital market risk/return criterion. However, there could be several reasons justifying this:

1. Development fees don’t fully cover developer’s project mgt & overhead costs?
2. Project control & operational incentives considerations.
3. Developer sourced the project and may be allowing Money partner to come in at historical cost of land rather than higher current opportunity cost of land (what it would sell for as assembled & permitted).

Point (3) would allow Money partner to face a fair market risk/return prospect even though a lower Treynor than Mgr…
Based on historical land cost...

Here, Money partner receives “fair” expected return (\(\geq SML\)) even though lower Treynor than Developer...

Treynor Ratios are slopes of dashed lines
Scatterplot 2000 Trials: MgrIRR-MoneyIRR by Levered Entity IRR

Treynor Ratios:

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<tr>
<td>Development Partner</td>
<td>0.96</td>
<td>1.34</td>
</tr>
<tr>
<td>Money Partner</td>
<td>0.86</td>
<td>1.03</td>
</tr>
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Base Case terms: 10%, 13%, 15%; 90/10, 80/20, 70/30, 60/40; 50/50 cost overrun/savings:
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Treynor Ratios: /StdDev /Downside
Development Partner 0.94 1.27
Money Partner 0.96 1.17

50/50 cost overrun/savings with one hurdle: pro rata to 18%, then 80/20:

Scatterplot 2000 Trials: MgrIRR-MoneyIRR by Levered Entity IRR

- Project success possibly including cost savings
- Project failure despite cost savings
- Project failure with cost overrun
- Project success despite big cost overrun
50/50 cost overrun/savings with one hurdle: pro rata to 18%, then 80/20:

Scatterplot 2000 Trials: MgrIRR-MoneyIRR by Levered Entity IRR

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Pro Rata on Costs: 10%, 13%, 15%; 90/10, 80/20, 70/30, 60/40; 90/10 cost overrun/savings:

Scatterplot 2000 Trials: MgrIRR-MoneyIRR by Levered Entity IRR

Treynor Ratios: /StdDev /Downside

| Development Partner | 0.99 | 1.34 |
| Money Partner       | 0.84 | 1.01 |
Scatterplot 2000 Trials: MgrIRR-MoneyIRR by Levered Entity IRR

Project success possibly including cost savings (or overruns)

Money never beats Manager

Project failure possibly including cost overruns (or perhaps savings)

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