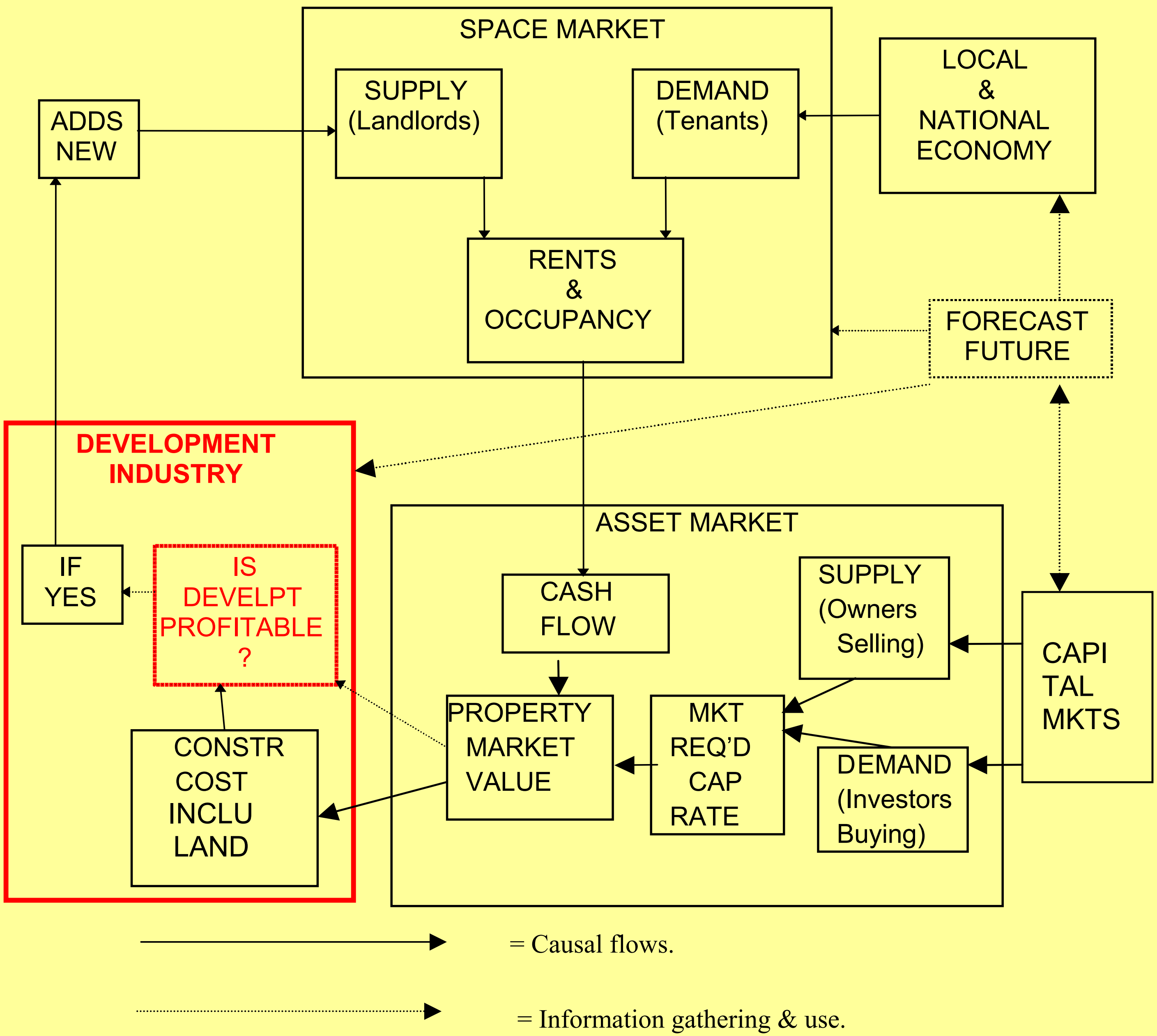
Chapter 29

Financial Analysis of

Real Estate Development Projects

Surely you recall the central role the development industry plays in our overview of *The Real Estate System* (back in Chapter 2)…

Exhibit 2-2: The "Real Estate System": Interaction of the Space Market, Asset Market, & Development Industry



Development is important:

- ***From a finance & investment perspective, but also***
- ***From an urban development (physical, social, environmental) perspective…***

Development is a multi-disciplinary, iterative process . . .

The (famous) *Graaskampian Spiral*.

Graaskamp also coined the concept that most development projects can be characterized as either:

- ***A use looking for a site, or***
- ***A site looking for a use.***

Use Looking for a Site:

- ➔ ***Developer has a particular specialization, or***
- ➔ ***Developer is working for a specific <u>user</u>.***

Site Looking for a Use:

- ➔ ***Developer tries to determine & build the "HBU", or***
- ➔ ***Public entity seeks developer to build a use determined through a political process (presumably also "HBU").***

29.2 Basic Information: Enumerating Project Costs & Benefits

Two types of project budgets are important to be developed:

- ***Construction & Absorption Budget:***
  - ***Covers construction (& lease-up, for "spec" projects);***
  - ***← Relates to the "COST" side of the NPV Equation.***
- ***Operating Budget:***
  - ***Covers "stabilized" period of building operation after lease-up is complete;***
  - ***Typically developed for a single typical projected "stabilized year";***
  - ***← Relates to the "BENEFIT" side of the NPV Equation.***

NPV = Benefits – Costs = Value of Bldg – Cost of Devlpt.

The Operating Budget *(Recall the items from Chapter 11)*:

- **Forecast Potential Gross Income (PGI, based on rent analysis)**
- **Less Vacancy Allowance**
- **= Effective Gross Income (EGI)**
- **Less forecast operating expenses (& capital reserve)**
- **= Net Operating Income (NOI)**

The most important aspect is normally the rent analysis, which is based (more or less formally) on a *market analysis* of the space market which the building will serve. *(See Chapter 6, or Wheaton's 11.433 course.)*

The bottom line:

NOI forecast, combined with *cap rate* analysis (of the asset market):

➔ NOI / cap rate = Projected Completed Building Value = *"Benefit"* of the development project.

The Construction & Absorption Budget:

Construction: *"Hard Costs"*

- **Land cost**
- **Site preparation costs (e.g., excavation, utilities installation)**
- **Shell costs of existing structure in rehab projects**
- **Permits**
- **Contractor fees**
- **Construction management and overhead costs**
- **Materials**
- **Labor**
- **Equipment rental**
- **Tenant finish**
- **Developer fees**

The Construction & Absorption Budget *(cont.)*:

Construction: *"Soft Costs"*

- Loan fees
- Construction loan interest
- Legal fees
- Soil testing
- Environmental studies
- Land planner fees
- Architectural fees
- Engineering fees
- Marketing costs including advertisements
- Leasing or sales commissions

Absorption Budget *(if separate)*:

- Marketing costs & advertising
- Leasing expenses (commissions)
- Tenant improvement expenditures *("build-outs")*
- Working capital during lease-up (until break-even)

29.3 Construction Budget Mechanics

Construction *takes time* (typically several months to several years).

During this period, financial capital is being used to pay for the construction.

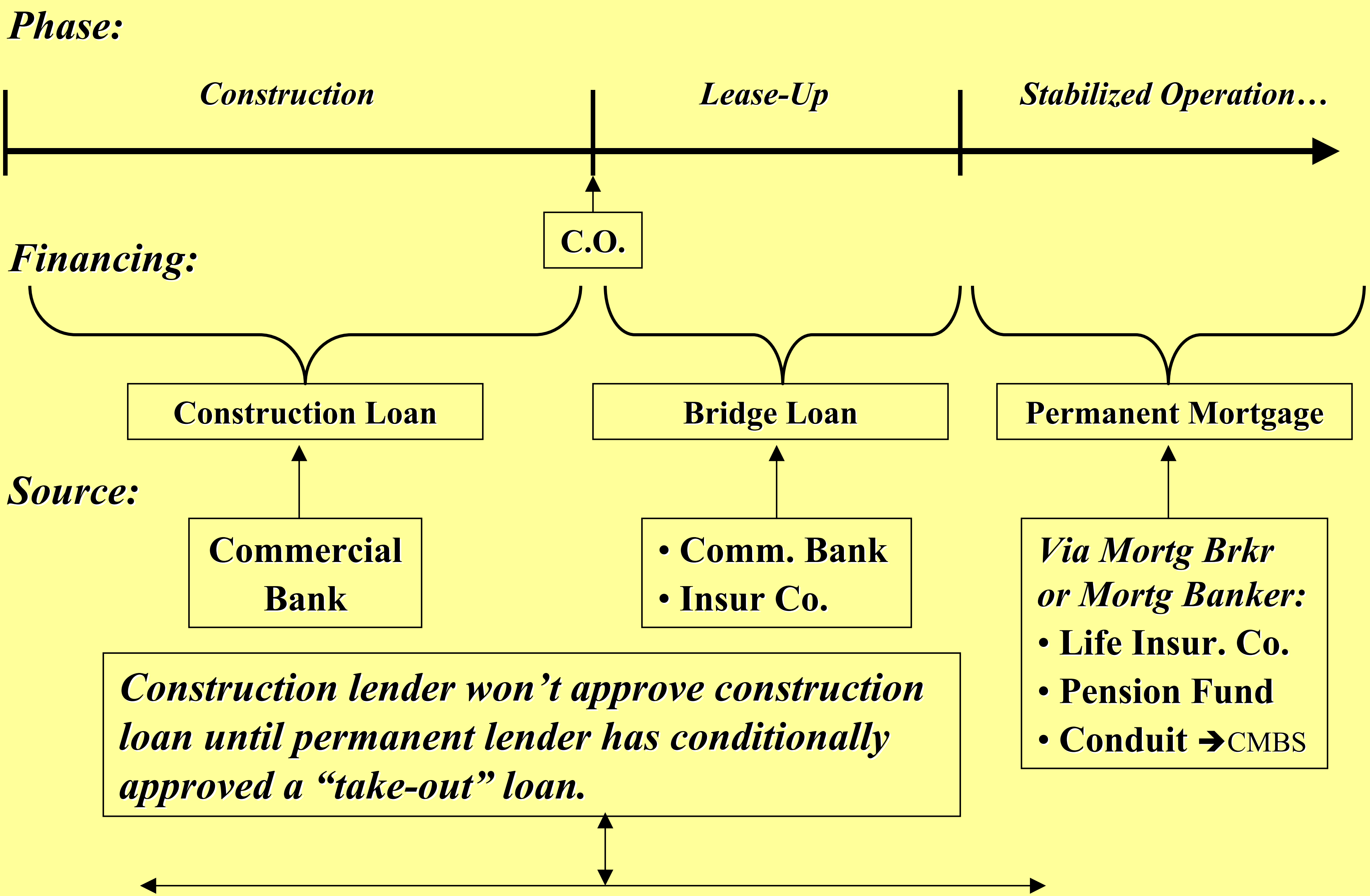
***"Time is money"*: The opportunity cost of this capital is part of the real cost of the construction.**

This is true whether or not a construction loan is used to finance the construction process. But:

Construction loans are <u>almost always</u> used (even by equity investors who have plenty of cash).

Why? . . .

The "classical" construction finance structure:



The construction loan collapses a series of costs (cash outflows) incurred during the construction process into a *single value* as of a single (future) *point in time* (the projected completion date of the construction phase).

Actual construction expenditures (*"draws"* on the construction loan) are added to the accumulating *balance* due on the loan, and interest is charged and compounded (adding to the balance) on all funds drawn out from the loan commitment, from the time each draw is made.

Thus, interest *compounds forward*, and the borrower owes no payments until the loan is due at the end of construction, when all principle and interest is due.

Bottom line: Borrower (developer) faces no cash outflows for construction until the end of the process, when the entire cost is paid (including the "cost of capital").

Example:

Commitment for $2,780,100 of "future advances" in a construction loan to cover $2,750,000 of actual construction costs over a three month period. 8% interest (nom.ann.), compounded monthly, beginning of month draws:

Month	New Draw	Current Interest	New Loan Balance
1	$500,000	$3,333.33	$503,333.33
2	$750,000	$8,355.55	$1,261,688.88
3	$1,500,000	$18,411.26	$2,780,100.14
4	and so on		

Construction schedule must estimate the amount and timing of the draws.

The accumulated interest (8333+8356+18411 = $30,100 in this case) is a *very real part of the total cost of construction*. AKA *"Financing Cost"*.

Typically a "commitment fee" is also required, up front (in cash).

29.4 Simple Financial Feasibility Analysis in Current Practice

The traditional and most widely employed method for the analysis of the financial feasibility of development projects will be referred to here as: *"Simple Financial Feasibility Analysis" (SFFA)*.

SFFA is based on the commercial mortgage market (for *permanent* loans).

It assumes the developer will take out the largest permanent loan possible upon completion of the building.

It assumes that the development *costs* will equal the market *value* of the property on completion.

Obviously, SFFA leaves something to be desired from a normative perspective, but:

- ***It is simple and easy to understand.***
- ***It requires no specialized knowledge of the capital markets other than familiarity with the commercial mortgage market (does not even require familiarity with the relevant property asset market).***

SFFA comes in two modes: *"Front Door"*, & *"Back Door"* . . .

SFFA *"Front Door"* Procedure:

Start with costs & end with rent required for feasibility…

Site Acquisition Costs + Construction Costs
= Total Expected Development Cost
X Loan to Value Ratio
= Permanent Mortgage
X Annualized Mortgage Constant
= Cash Required for Debt Service
X Lender Required Debt Service Coverage Ratio
= Required Net Operating Income or NOI
+ Estimated Operating Expenses (Not passed through to tenants)
= Required Effective Gross Income
÷ Expected Occupancy Rate
= Required Gross Revenue
÷ Leasable Square Feet
= Rent Required Per Square Foot

Question: Is this average required rent per square foot achievable?

Typical approach for *"Site looking for a Use"*.

Example:

- Class B office building rehab project: 30,000 SF (of which 27,200 NRSF).
- Acquisition cost = $660,000;
- Rehab construction budget: $400,000 hard costs + $180,000 soft costs.
- Estimated operating costs (to landlord) = $113,000/yr.
- Projected stabilized occupancy = 95%.
- Permanent loan available on completion @ 11.5% (20-yr amort) with 120% DSCR.
- Estimated feasible rents on completion = $10/SF.

What major issue is left out here?

Site and shell costs:	$ 660,000
+ Rehab costs:	580,000
= Total costs:	$1,240,000
X Lender required LTV	x 80%
= Permanent mortgage amount:	$ 992,000
X Annualized mortgage constant:	x 0.127972
= Cash required for debt svc:	$ 126,948
X Lender required DCR:	x 1.20
= Required NOI:	$ 152,338
+ Estd. Oper. Exp. (Landlord):	113,000
= Required EGI:	$ 265,338
÷ Projected occupancy (1-vac):	÷ 0.95
= Required PGI:	$ 279,303
÷ Rentable area:	÷ 27200 SF
--------------	---------
= Required rent/SF:	$10.27 /SF

Lender will base mortg on Mkt Val, not constr cost.

Use mkt cap rate info to est. bldg val.

SFFA *"Back Door"* Procedure:

Start with rents & building, and end with supportable development costs…

Total Leaseable Square Feet (based on the building efficiency ratio times the gross area)
X Expected Average Rent Per Square Foot
= Projected Potential Gross Income (PGI)
- Vacancy Allowance
= Expected Effective Gross Income
- Projected Operating Expenses
= Expected Net Operating Income
÷ Debt Service Coverage Ratio
÷ Annualized Mortgage Constant
÷ Maximum Loan to Value Ratio
= Maximum Supportable Total Project Costs
(Question: Can it be built for this including all costs?)
- Expected Construction Costs (Other than Site)
= Maximum Supportable Site Acquisition Cost

Question: Can the site be acquired for this or less?

Typical approach for *"Use looking for a Site"*.

Example:

- **Office building 35,000 SF (GLA), 29,750 SF (NRA) *(85% "Efficiency Ratio")*.**
- **$12/SF (/yr) realistic rent (based on market analysis, pre-existing tenant wants space).**
- **Assume 8% vacancy (typical in market, due to extra space not pre-leased).**
- **Preliminary design construction cost budget (hard + soft) = $2,140,000.**
- **Projected operating expenses (not passed through) = $63,000.**
- **Permanent mortgage on completion available at 9% (20-yr amort), 120% DCR.**
- **Site has been found for $500,000: *Is it feasible?***

Potential Gross Revenue = 29,750 x $12 =	**$ 357,000**
Less Vacancy at 8% =	**- 28,560**
= Effective Gross Income	**$ 328,440**
Less Operating Expenses	**- 63,000**
= Net Operating Income	**$ 265,000**
÷ 1.20 = Required Debt Svc:	**$ 221,200**
÷ 12 = Monthly debt svc:	**$ 18,433**
➔ Supportable mortgage amount =	**$ 2,048,735**
÷ 0.75 LTV = Min. Reqd. Value:	**$ 2,731,647**
Less Construction Cost	**- 2,140,000**
------------	**-----------**
➔ Supportable site acquisition cost:	**$ 591,647.**

$$= \frac{18433}{.09/12}\left[1-\left(\frac{1}{1+.09/12}\right)^{240}\right]$$

So, the project seems feasible.

But again, something seems left out… Project may be feasible, *but*…

Problems with the SFFA:

• ***Just because a project is financially <u>feasible</u>, does not necessarily mean that it is <u>desirable</u>.***

• ***Just because a project is <u>not feasible</u> using debt financing, does not necessarily mean that it is <u>undesirable</u>:***

  • ***A project may appear unfeasible with debt financing, yet it might be a desirable project from a total return to investment perspective (and might obtain equity financing).***

Don't confuse an SFFA feasibility analysis with a normatively correct assessment of the *desirability* of a development project from a financial economic investment perspective.

SFFA does not compute the *value of the completed property*.
Hence, does not compute the NPV of the development investment decision:

NPV = Value – Cost .

SFFA merely computes whether it is possible to take out a permanent loan to finance (most of) the development costs.

The *correct* way to evaluate the financial economic *desirability* of a development project investment:

(Recall Chapter 10.)

"THE NPV INVESTMENT DECISION RULE":

1) **MAXIMIZE THE NPV ACROSS ALL MUTUALLY-EXCLUSIVE ALTERNATIVES; <u>AND</u>**

2) **NEVER CHOOSE AN ALTERNATIVE THAT HAS: NPV < 0.**

For development investments:

NPV = Benefit – Cost = Value of Bldg – Cost of Devlpt.

Three considerations are important and unique about applying the NPV rule to evaluating investment in development projects as compared to investments in stabilized operating properties:

1. ***"Time-to-Build":*** **Investment cash outflow occurs *over time*, not all at once up front, due to the *construction phase*.**

2. ***Construction loans:*** **Debt financing for the construction phase is *almost universal* (even when the project will ultimately be financed entirely by equity).**

3. ***Phased risk regimes:*** **Investment risk is very different (greater) between the construction phase (the *development investment* per se) and the stabilized operational phase. (Sometimes an intermediate phase, *"lease-up"*, is also distinguishable.)**

We need to account for these differences in the methodology of how we *apply* the NPV Rule to development investments. . .

NPV = Benefits – Costs

The benefits and costs must be measured in an *"apples vs apples"* manner. That is, in dollars:

- **As of the *<u>same</u> point in <u>time</u>*.**
- **That have been adjusted to *account for risk*.**

As with all DCF analyses, time and risk can be accounted for by using *risk-adjusted discounting*.

Indeed, using the *opportunity cost of capital* (reflecting the amount of risk in the cash flows being discounted), the discount rate can be applied to either discount cash flows back in time, or to grow (compound) them forward in time (e.g., to the projected time of completion of the construction phase, as in the projected balance due on the construction loan).

Simplify the analysis by working with only two points in time:

- **The present (*time "zero"*), when the development investment decision must be made, and**
- **The projected time of completion of the construction phase (*time "T"*).**

Project cash flows can generally be most accurately and conveniently estimated as of these two points in time:

- **Land cost and other up-front expenditures: as of *time 0*.**
- **Completed building value and construction costs (including financing costs via the construction budget, excluding land costs): as of *time T*.**

The projected values as of *time T* can then be discounted to *time 0* using appropriate risk-adjusted discount rates (OCC).

The crucial NPV calculation is then made as of *time 0*, the time when the investment decision must be made.

Note that in this approach, there is no need to *pre-assume* what type of permanent financing will be used for the completed project.

There is no assumption at all about what will be done with the completed project at *time T*. It may be:

- Financed with a permanent mortgage,
- Financed or sold (wholly or partly) tapping external equity, or
- Held without recourse to external capital.

Project evaluation is independent of project financing, as it should be.*

** Unless subsidized (non-market-rate) financing is available contingent on project acceptance: Recall Chapter 14, the "APV" (Adjusted Present Value) approach to incorporating financing in the investment evaluation.*

Another important reason for this approach:

- ***Risk*** characteristics of **development phase** ***different*** from risk characteristics of **stabilized phase**.
- Thus, ***different OCCs***, therefore:
- Two phases must be analyzed in two ***separate steps***.

"Adjusted Present Value" (APV) Decision Rule (Ch.14)…

Like NPV, only accounts for financing…

APV(equity) = NPV(property) + NPV(financing)

Based on the Value Additivity Principle:

$$Prop.Val = Equity\ Val + Dbt\ Val$$

$$\mathbf{V = E + D}$$

Where: V = Value of the property,
E = Value of the equity,
D = Value of the debt.

Define: P = Price paid for the property,
L = Amount of the loan…

$$
\begin{aligned}
V\text{-}P &= E+D - P \\
&= E+D - ((P\text{-}L)+L) \\
&= E\text{-}(P\text{-}L) + D\text{-}L \\
&= E\text{-}(P\text{-}L) - (L\text{-}D)
\end{aligned}
$$

Thus: $E\text{-}(P\text{-}L) = (V\text{-}P) + (L\text{-}D)$

Or: APV(Equity) = NPV(Prop)+ NPV(Fin)

Note: Arbitrage basis of Value Additivity applies to MV, but the common sense of Value Additivity can be applied to IV as well.

Recall from Chapter 14…

Unless subsidized financing is available,

NPV(financing) = 0 on a MV basis (IV basis too unless investor is "intra-marginal").

Thus,

Normally, APV(equity) = NPV(property), and we can evaluate the development project independent of how (or whether) the completed project will be financed with or without debt:

- **Evaluate investment *"as if all equity"* financing.**
- **If subsidized debt, *add NPV(financing)*.**

Two approaches for applying the *"2-time-point NPV procedure"*:

- **Discount *separately* back to *time 0* the *time T* gross values of the completed building (V_T) and of the construction cost (the construction loan balance due: L_T), employing separate discount rates ($E[r_V]$ and $E[r_D]$, respectively) reflecting the risk in the building value and in the construction cost:** ($E[r_D]$ = OCC for construction CFs. $E[r_V]$ = expected return (going-in IRR) on unlevered investment in stabilized property, or a bit more for *"spec"* projects without pre-leasing. Normally: $E[r_V] > E[r_D]$.)

- **Discount the *time T* <u>net</u> value to *time 0* using a (higher) OCC reflecting the levered nature of that net value (i.e., the development investment OCC, that is, the OCC of the construction phase investment per se: $E[r_C]$).**

In principle, these two approaches are equivalent. They should give the same NPV result as of *time 0*. (This principle can be used to determine the internal consistency of the discount rates employed.)

Let: B_0 = *Time 0* risk-adjusted valuation of project benefits.

C_0 = *Time 0* risk-adjusted valuation of project costs.

V_T = Projected *time T* valuation of the completed building.

L_T = Projected *time T* value of construction cost (brought forward to *T* using $E[r_D]$).

$NPV(cons)_T$ = Projected *time T* net difference between completed bldg value and construction cost.

LAND = Market value (*MV*) of land (or investment value if $IV > MV$) as of *time 0* (e.g., as discussed in Ch.28).

FEES = Other up-front expenditures (besides land) required to begin project as of *time 0*.

V = *Time 0* present value of projected *time T* value of completed building (same as V in Chapter 28).

K = *Time 0* present value of development costs exclusive of land (same as K in Chapter 28).

Then:

$$NPV = B_0 - C_0 = \frac{NPV(cons)_T}{\left(1+E[r_C]\right)^T} - C_0 = \frac{V_T - L_T}{\left(1+E[r_C]\right)^T} - \left(LAND + FEES\right)$$

$$= \frac{V_T}{\left(1+E[r_V]\right)^T} - \frac{L_T}{\left(1+E[r_D]\right)^T} - \left(LAND + FEES\right)$$

$$= \frac{V_T}{\left(1+E[r_V]\right)^T} - \left(\frac{L_T}{\left(1+E[r_D]\right)^T} + FEES\right) - LAND = \frac{V_T}{\left(1+E[r_V]\right)^T} - K - LAND$$

$$= V - K - LAND = V - \left(K + LAND\right) = B_0 - C_0 = NPV$$

Where $E[r_V]$, $E[r_D]$, and $E[r_C]$ are appropriate discount rates (*OCC*) for V_T, L_T, and $(V_T - L_T)$, respectively. *(In general: $E[r_D] < E[r_V] < E[r_C]$.)*

The second method **(discounting the net *time T* value, *NPV(cons)*$_T$ = $V_T - L_T$, using a single levered discount rate)** is most common in practice,

Perhaps because investors in development projects like to think in terms of the return on their equity capital invested during the development phase. (Development investment has different levels of risk and expected return than other types of investment, and investors in development typically are seeking precisely that level of risk and return.)

How may we estimate reasonable levels of expected return (OCC), $E[r_C]$*, for development investments? . . .*

Two methods, closely related, should give similar results:

1. *Equilibrium relation between* $PV(V_T)$*,* $PV(L_T)$*, &* $PV(V_T\text{-}L_T)$*;*
2. *"WACC Formula" based on leverage in the devlpt project.*

Method 1 for determining $E[r_C]$:

Using Equilibrium Across the Markets for Stabilized Property, Construction Debt, and Land…

The basic idea is that equilibrium requires: $$\frac{V_T - L_T}{(1+E[r_C])^T} = \frac{V_T}{(1+E[r_V])^T} - \frac{L_T}{(1+E[r_D])^T}$$

Otherwise, superior risk-adjusted returns (ex ante) could be made by investing in some combination of stabilized property (V_T), construction debt (L_T), or developable land (V_T-L_T). Presumably, equilibrium across markets drives market prices in these asset classes to be such that superior returns are not possible, and the above relationship tends to hold.

Thus, if you have knowledge of:

- ***V_T = Expected value of completed stabilized property at time T;***
- ***L_T = Expected balance due on construction loan at time T (all construction costs including financing costs);***
- ***$E[r_V]$ = Market expected total rate of return (going-in IRR) on investments in completed properties of the type to be built;***
- ***$E[r_D]$ = Market expected return on construction loans (< loan interest rate).***

Then you can solve the above equation for $E[r_C]$ to obtain:

$$E[r_C] = \left[\frac{(V_T - L_T)(1+E[r_V])^T(1+E[r_D])^T}{(1+E[r_D])^T V_T - (1+E[r_V])^T L_T}\right]^{(1/T)} - 1$$

Method 1 for determining $E[r_C]$…

Example: Project to build an apartment building…

- Construction will take 1 year (**T=1**).
- Similar stabilized properties are currently worth $10,000,000. Expected appreciation in this type of property over the next year = 0%. Hence, **V_T=$10,000,000**.
- Construction cost is $7,680,000 (fixed-price contract to be paid on completion, including construction interest). Hence, **L_T=$7,680,000**.
- Going-in IRRs for stabilized properties of the type to be built are around 8%. Hence, **$E[r_V]$=8%**.
- Expected return on construction loan is 5.8%. Hence, **$E[r_D]$=5.8%**.

Thus:

$$E[r_C] = \frac{(10 - 7.68)(1.08)(1.058)}{(1.058)10 - (1.08)7.68} - 1 = 16\%$$

The development investment should provide an expected return of 16%.

Method 2 for determining $E[r_C]$:

Using the WACC & Knowledge of Land Value…

The *WACC* Formula is a useful approximation to see how big the development phase *equity* return should be relative to:

- **The stabilized property (i.e., *underlying asset, e.g.*, *NCREIF*) return,**
- **The construction cost (i.e., *debt*) return.**

Recall (from Ch.13): $$r_C = r_D + \left(r_V - r_D\right)LR$$

Where:

r_C ***=Return on devlpt project up-front investment (construction phase).***

LR=Effective leverage in the devlpt project (V_T/E) ***= Completed stabilized property value divided by up-front land cost (& fees).***

r_V ***= Total return on stabilized property during development phase (as if it existed completed already).***

r_D ***= Total return on construction debt.***

Method 2 for determining $E[r_C]$…

Apply the WACC to the *ex ante* risk premium:

$$E[RP_C] = E[RP_D] + (E[RP_V] - E[RP_D])LR$$

Example. *If:*

$E[RP_V]$ = 300 bp
(Typical for $E[RP_{NCREIF}]$, more for spec)
$E[RP_D]$ = 100 bp
(Remember: E[r], not "stated interest", See Ch.18)
LR = 5

Then: $$E[RP_C] = 100bp + (300bp - 100bp)*5 = 1100bp$$

e.g., If T-Bills are yielding 5%, then the expected return on the construction project is 16%: $$E[r_C] = 5\% + 11\% = 16\%$$

Note: If $E[r_C]$ is to be a <u>market</u> opportunity cost of capital (OCC), as it should be, then LR must be based on current <u>market value</u> of the land: $LR=V_T / E$, where E = LAND+FEES time 0 market val.

Recall:

The Fundamental Nature of Real Estate Development Investment:

- ***A <u>forward</u> purchase commitment in a stabilized fully operational (leased up) property:***
  - **Buy (incur opportunity cost of) land *now*,**
  - **Get stabilized property *later*.**

- ***A <u>levered</u> investment in the stabilized (core) property:***
  - **Up front the only cost is the purchase of (or incurring the opportunity cost of) the *land*.**
  - **This can be viewed as the *equity* investment to obtain (*a long position in*) the future stabilized property (*a volatile asset*),**
  - ***Subject to the payment of construct costs* (*a relatively fixed outlay that will occur in the future, i.e., subsequent to the time when the land cost is incurred*).**
  - **The development investment is thus equivalent to having a *long* position in the stabilized property combined with a *short* position in the construction costs.**

The Fundamental Nature of Real Estate Development Investment…

Let: *"E"* = Up front investment in devlpt project *(E= LAND+FEES);*
"V"* = *Time 0* PV of *time T* completed property value *(V=PV(V_T)=V(0));
"D"* = *Time 0* PV of construction cost exclusive of land *(D=K-FEES).
Then:

$$E = V\text{-}D$$

$$\Rightarrow \frac{\Delta E}{E} = \frac{\Delta V}{E} - \frac{\Delta D}{E} = \frac{\Delta V}{E}\frac{V}{V} - \frac{\Delta D}{E}\frac{D}{D} = \frac{V}{E}\frac{\Delta V}{V} - \frac{D}{E}\frac{\Delta D}{D}$$

$$\Rightarrow \frac{\Delta E}{E} = \frac{V}{E}\frac{\Delta V}{V} - \frac{(V-E)}{E}\frac{\Delta D}{D} = \frac{V}{E}\frac{\Delta V}{V} - \left(\frac{V}{E} - 1\right)\frac{\Delta D}{D} = \frac{\Delta D}{D} + \frac{V}{E}\left(\frac{\Delta V}{V} - \frac{\Delta D}{D}\right)$$

$$\Rightarrow WACC:$$

$$g_E = (LR)g_V + (1 - LR)g_D = g_D + (g_V - g_D)LR$$

The Fundamental Nature of Real Estate Development Investment…

$$\Rightarrow WACC:$$
$$r_E = g_E = (LR)g_V + (1 - LR)g_D = g_D + \left(g_V - g_D\right)LR$$

r_E =Return on devlpt project up-front investment (purely appreciation, g_E, no income).

LR=Effective leverage in the devlpt project (V_T /E) (= Completed stabilized property value divided by up-front land cost).

g_V = Appreciation return on stabilized property during development phase (as if it existed completed already).

g_D = Percentage change in total (final) construction cost (exclusive of land) during development phase (e.g. zero for guaranteed fixed-price contract).

Numerical Example…

- Project to build an apartment building.
- Similar (stabilized) properties are currently worth **$10,000,000**.
- Construction will take **1 year**.
- Construction cost is **$7,680,000** (fixed-price contract to be paid on completion).
- Land (opportunity value, i.e., what land could be sold for) & up-front fees (e.g., architect) cost **$2,000,000**.
- Assuming expected appreciation in this property type is zero over the next year, expected return on the development investment is **16%**:

$$16\% = \frac{E[EndVal] - BegVal}{BegVal} = \frac{(\$10{,}000{,}000 - \$7{,}680{,}000) - \$2{,}000{,}000}{\$2{,}000{,}000}$$

Numerical Example (cont.)…

- Now suppose between now and next year apartment property values take an unexpected plunge of **10%**, to **$9,000,000**.

- For an unlevered investor in pre-existing stabilized property the return hit is just this 10% loss.

- But to our development investment our ***loss is magnified*** to **50%** below the previous +16% expectation (as –34% is 50 points below +16%):

$$-34\% = \frac{(\$9,000,000 - \$7,680,000) - \$2,000,000}{\$2,000,000} = \frac{-\$680,000}{\$2,000,000}$$

- The reason for the magnification of the impact on the return is that the construction cost ($7,680,000) did not change with the change in stabilized property value (from $10,000,000 to $9,000,000).

- The reason the magnification was **5**-times (-50%/-10%) is because the effective ***Leverage Ratio*** in the development is **5** (in this case):

$$LR = V_T / E = \$10,000,000 / \$2,000,000 = 5.$$

The effective operational leverage will not be so great if some of the construction cost is paid by the equity investor up front or during the construction phase (e.g., no construction loan, contractor requires payments as costs are incurred).

e.g., in the previous example, suppose half the fixed-price construction cost had to be paid up-front (but it was still the same $7,680,000 amount)…

Then the original expected return would have been 5.5%:

$$5.5\% = \frac{E[EndVal] - BegVal}{BegVal} = \frac{(\$10{,}000{,}000 - \$3{,}840{,}000) - (\$2{,}000{,}000 + \$3{,}840{,}000)}{\$2{,}000{,}000 + \$3{,}840{,}000}$$

And the loss to the development investor caused by the 10% drop in apartment values would have been only 17.1%, reflecting the effective leverage ratio 1.71 (= $10,000,000 / $5,840,000), as -11.6% is 17.1% below the previous expectation of 5.5%:

$$-11.6\% = \frac{E[EndVal] - BegVal}{BegVal} = \frac{(\$9{,}000{,}000 - \$3{,}840{,}000) - (\$2{,}000{,}000 + \$3{,}840{,}000)}{\$2{,}000{,}000 + \$3{,}840{,}000}$$

But note there is still leverage even here. And of course in the real world, most development is financed by construction loans covering 100% of construction costs (for a variety of reasons), loans that are paid off by the developer (the equity development investor) only upon completion of construction, thereby maximizing leverage.

The Fundamental Nature of Real Estate Development Investment…

Implications of development's operational leverage:

Realized development project investment returns are:

- ***Highly correlated*** **with stabilized property appreciation returns.**
- ***More volatile*** **than stabilized property appreciation returns.**

Therefore, development investment is *more risky* than investment in stabilized pre-existing property *(no surprise)*.

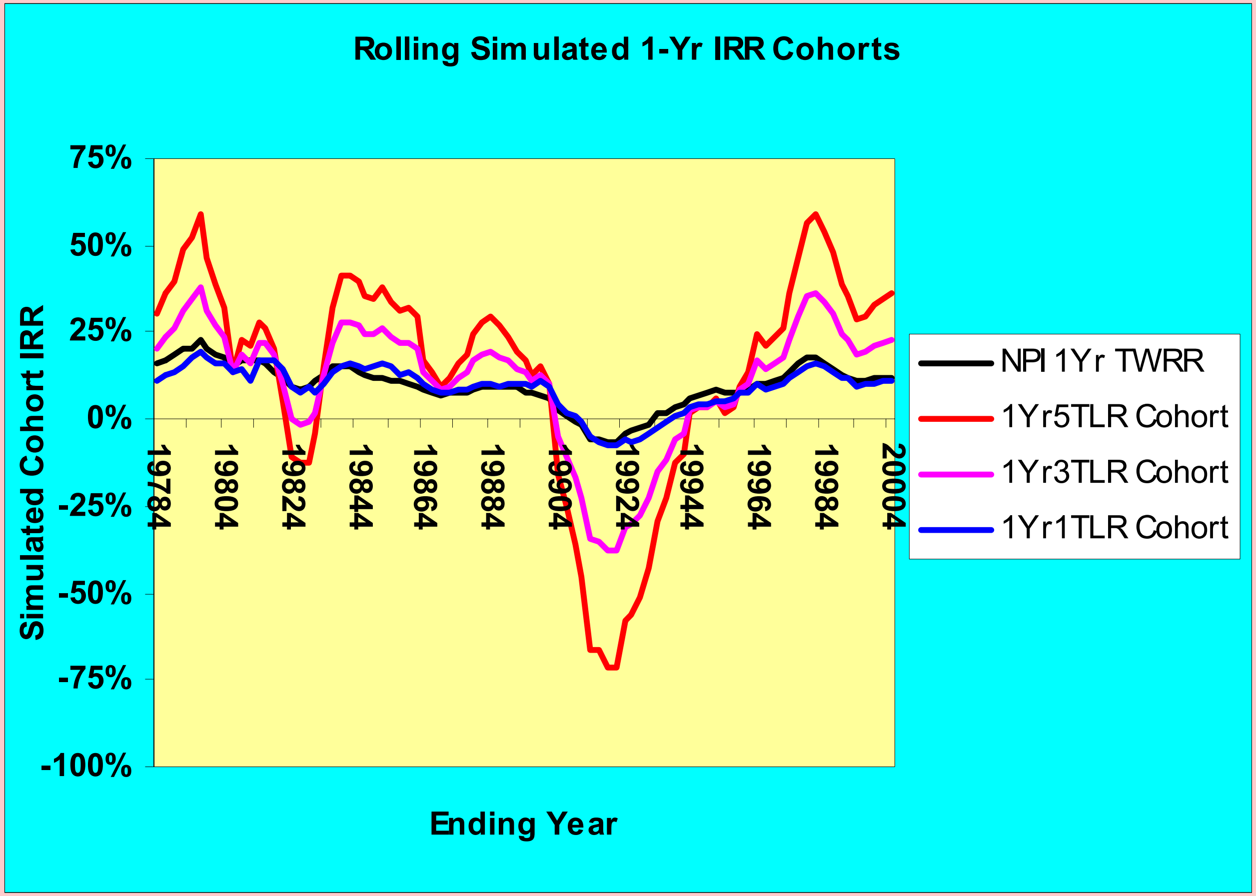
But note that:

Risk is *added by leverage*, and thus:

- **Would exist even for pre-leased projects *(i.e., development risk is not caused only by speculation)*, and would exist even in the absence of a wide-amplitude development demand cycle.**
- **Added risk implies development should have a higher *risk premium* than stabilized investment, in the *ex ante ("going-in") IRR* (and on average over the long run, *ex post* as well).**
- **WACC formula can be useful in estimating appropriate risk premium for development investment, relating development phase RP to typical stabilized property-level RP.**

The Fundamental Nature of Real Estate Development Investment…

The framework described here can be used, in conjunction with an index of periodic appreciation returns to stabilized property (such as the NCREIF Index), to simulate what the ex post IRRs to typical development investments would have been, during specific historical periods of time…



Comparing *Method 1* and *Method 2* for estimating development phase OCC:

- **Method 1 is theoretically at least as sound as Method 2.**
- **Method 1 does not require knowledge of the current market value of the land (which may often be difficult to accurately estimate).**
- **Method 1 does not depend on the simple return (1-period, not compounded) WACC formula approximation of the construction phase IRR (a multi-period, compounded rate of return), an approximation that breaks down for long duration construction projects (e.g., multi-year projects).**

Due to all of these advantages, *Method 1* is probably generally preferable to *Method 2*: Estimate development phase OCC based on internal consistency between $E[r_V]$, $E[r_D]$, and $E[r_C]$.

What about the *lease-up* phase? . . .

- **Not relevant for pre-leased or owner-occupied developments.**
- **In spec projects, if lease-up is projected to be of significant duration, then it is most correct to treat it as a separate phase, with its own separate OCC:**
  - ***Three points in time: Time 0 (present), CO Time (T), Stabilization Time (S).***
  - ***Three phases each with separate OCC (discount rate) because of different risk: Construction Phase (most risky), Lease-up Phase (intermediate risk), Stabilized Operation Phase (least risk).***
- **OCC in lease-up phase typically 50-200 bp > Stabilized property OCC.**

In principle, the lease-up phase OCC is similar to the *"inter-lease* discount rate" introduced in Chapter 10.

The procedure presented in Study Question 10.23 (p.857) can be used to estimate lease-up OCC (r) based on knowledge of:

- **Typical lease term length in new leases in the relevant space market (T);**
- **Typical tenant borrowing rate (*intra-lease* discount rate) (r_L);**
- **Prevailing cap rate (current cash yield) in the relevant property asset market (k);**
- **Realistic expected long-term average growth rate in rents chargeable by a given building (g).**

The formula presented there for a single-tenant space with the lease just signed and for lease payments in arrears is:

$$r = (1+g) \Big/ \left\{ 1 - \frac{k}{1+r_L} \left[\frac{1 - \left((1+g)/(1+r_L)\right)^T}{1-(1+g)/(1+r_L)} \right] \right\}^{(1/T)} - 1$$

The formula if the lease has not yet been signed and 1st payment in 1 yr is a polynomial that can easily be solved numerically in Excel by iteration:

$$1 + r - (1+g)^T (1+r)^{1-T} = k \left[1 - \left(\frac{1+g}{1+r_L} \right)^T \right] \Big/ \left(1 - \frac{1+g}{1+r_L} \right)$$

The typical property market can be assumed to be bracketed by these two extreme cases (lease just signed, lease just expired), so the average between these two estimates of r could be used.

Numerical example (from book):

- Market value of land is $2,000,000 (*LAND* = $2 million).
- Fees that must also be paid up front (*time 0*) are $200,000.
- Total construction cost is projected to be $4,500,000 (not including financing cost), and construction is expected to take 3 years ($T = 3$), with payments for work done owed to the contractor projected to occur in 3 equal installments of $1,500,000 each at the ends of years 1, 2, and 3.
- A construction loan covering all the above-noted construction costs can (and will) be used, at 7.5% interest, requiring a $20,000 up-front origination fee in cash. Loan will be due upon completion of construction at the end of Year 3.
- The opportunity cost of capital (OCC) for investments in development projects of this nature is assumed to be 20% per annum ($E[r_C]=20\%$).
- Construction completion is expected to be followed by 2 years of absorption (lease-up), including two projected net cash flows of: -$100,000 at end of Yr.4 (when building will still be mostly empty), and +$400,000 at end of Yr.5 (more tenants, less leasing expenses). OCC for lease-up phase assumed to be 300bp greater than OCC for stabilized investment.
- Stabilized operation (beginning Yr.6) projected NOI = $800,000/yr with projected growth of 1% per year thereafter based on rental market projections. OCC (going-in IRR) for investments in stabilized property projected to be 9% per annum.

Step 1: **Estimate Stabilized Property Value at Project Completion…**

$$V_5 = \$10{,}000{,}000 = \frac{\$800{,}000}{1.09} + \frac{(1.01)\$800{,}000}{1.09^2} + \frac{(1.01)^2\$800{,}000}{1.09^2} + \ldots$$
$$= \frac{\$800{,}000}{0.09 - 0.01}$$
$$= \frac{\$800{,}000}{0.08}$$

Step 2: **Estimate Physically Complete Building Value at End of Construction Phase…**

Note: OCC = 9% + 300bp = 12%.

$$V_3 = \$8{,}201{,}531 = \frac{-\$100{,}000}{1.12} + \frac{\$400{,}000 + \$10{,}000{,}000}{1.12^2}$$

Step 3: **Estimate Construction Cost As of Time of Construction Completion…**

$$L_T = \$4{,}845{,}938 = \$1{,}500{,}000(1.075)^2 + \$1{,}500{,}000(1.075) + 1{,}500{,}000$$

***Step 4:* Calculate Projected Construction Phase Net…**

$$\boxed{NPV(cons)_T = V_T - L_T = \$8{,}201{,}531 - \$4{,}845{,}938 = \$3{,}355{,}593}$$

***Step 5:* Estimate *Time 0* PV of the Construction Net…**

$$\boxed{B_0 = \$1{,}941{,}894 = \frac{\$3{,}355{,}593}{1.20^3}}$$

This is the benefit of the development project, measured in *time 0*, risk-adjusted dollars.

***Step 6:* Subtract *Time 0* Cost to Determine NPV Measured in *Time 0* Risk-adjusted Dollars…**

$$\boxed{NPV_0 = B_0 - C_0 = \$1{,}941{,}894 - \$2{,}220{,}000 = -\$278{,}106}$$

As the NPV is negative, this development project is obviously *not* a good investment at this time.

What is an obvious problem with this project?

29.5.4 Summarizing the advantages of the recommended procedure:

Consistent with underlying theory. (i.e., consistent with NPV Rule, based on Wealth Maximization Principle.)

Simplicity. Avoids need to make assumptions about permanent loan or form of permanent financing (equity vs debt).

Explicit identification of the relevant OCC. Identifies explicit expected return (OCC) to each phase (each risk regime) of the investment: Development, Lease-up, Stabilized operation.

Explicit identification of land value. Procedure requires explicit identification of current opportunity value of the land.

"Front-door" or "Back-door" flexibility possible. Procedure amenable to "backing into" any one unknown variable. E.g., if you know the land value and the likely rents, you can back into the required construction cost. If you know (or posit) all of the costs and values, then you can back into the expected return on the developer's equity contribution for the development phase.

Do developers really use the "NPV Rule"? . . .

- **Most don't use NPV *explicitly*.**
- **But remember: NPV ←→ *Wealth Maximization*.**
- **By definition, *successful* developers maximize their wealth.**
- **Thus, *implicitly* (if not explicitly), *successful* developers must (somehow) be employing the NPV Rule:**
  - **e.g., in deciding *which projects* to pursue,**
  - **An intuitive sense of correctly rank-ordering mutually-exclusive projects by NPV, and picking those with the highest NPV (they may think of it as "best profit potential"), must be employed (by the most successful developers).**
- **Suggestion in Ch.29 is that by making this process more explicit, it may be executed better, or by more developers (i.e., making more developers "successful"),**
- **The NPV approach also should improve the ability of the development industry to "communicate" project evaluation in the *"language of Wall Street"* (e.g., "NPV", "OCC").**