Real estate valuation

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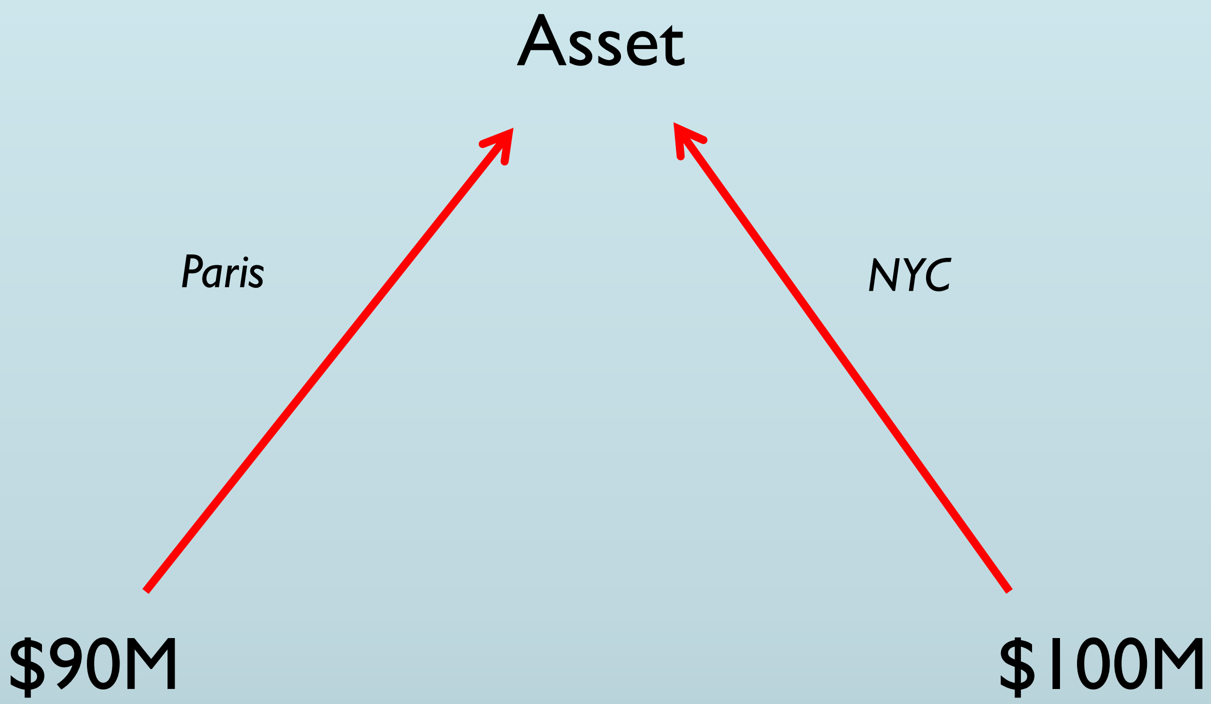
The question

- How should one price real estate assets?
- Two basic tasks:
  1. Describe the distribution of payoffs (i.e. *forecast*)
  2. Price that distribution
- Arbitrage principle: “similar” assets should be priced in such a way that they earn similar returns
- Otherwise…

Arbitrage opportunities



Opportunity cost of capital

- Investing in a given asset is foregoing the opportunity to invest in other assets with similar properties
- Investor should be compensated for foregoing that opportunity
- Asset under consideration, therefore, should yield at least the same return (IRR) as other similar assets

IRRs

- The IRR is the discount rate that makes the present value of expected cash flows equal to the initial investment cost

- There is only one correct way to compute an IRR:
  1. Compute expected cash flows
  2. Find the discount rate that makes the investment's net present value zero

- Reversing these steps is a typical and massive mistake

IRRs: warm-up example

- An asset pays \$500 in year1, and a random cash-flow in year 2
- Year 2 CF is \$500 with probability p, 0 otherwise
- *Expected* second year CF is 500 p + 0 (1-p)= 500p
- Bond's IRR solves $900=500/(1+r) +500p/(1+r)^2$

A deeper example: waterfall structures

- Often, real estate projects include several equity holders
- Some simply fund the project, others have a hand in running it
- Equity can be split simply according to initial stake
- Split can also be conditional on performance to give the right incentives to managing stake-holders

The IRR look-back model

- Initial equity injection: $1M, 10% managing owner, 90% pension fund

- Equity flows are 10% of initial injection in year 1, grow by 10% every year after that. In year five, reversion flow to equity is 10 times year 6 projected cash flow.

- Managing owners gets:
  1. 10% of net equity flows until 10% "hurdle" IRR is reached by the pension fund (Tier 1)
  2. 20% of remaining cash flows until 15% IRR is reached by the pension fund (Tier 2)
  3. 50% thereafter (Tier 3 cash flows a.k.a the gravy train)

- What are cash flows to both equity holders? What is the IRR of both equity holders? Who benefits the most from higher growth rates?

Main asset pricing recipes

1. Discounted cash flow approach
   a. Write asset as a string of expected cash flows
   b. Find the IRR similar assets earn
   c. Discount cash flows using that rate

2. Ratio/Peer Group/Multiple approach
   a. Find a set of similar assets, with known value
   b. Find average value/key statistic ratio
   c. Apply that ratio to asset under consideration

The multiple approach in real estate

- Find a group of comparable properties ('Comps') with known value
- Comparable: similar location, purpose, vintage…
- Compute average ratio of value to gross rental income (**G**ross **R**ent **M**ultiplier approach)
- Compute average ratio of Net Operating Income (NOI) to value, a key ratio known as the **Capitalization Rate**
- Get an estimate of the current Gross Rent and NOI for your target property, and apply ratio

Example

- A target property has a NOI of $400,000
- You have obtained the following two recent sales data:

	NOI	Selling price
Property 1	$424,200	$4,200,000
Property 2	$387,200	$3,400,000

- What is the estimated value of your target using the cap rate approach (assign equal weights to the two sales)?

Solid comp case in Real Estate

1. Quality of the comparables
2. Consistency of calculations
3. Good treatment of outliers

Sources for real estate comps/multiples

1. Databases of recent transactions: RCA analytics, Costar
2. Survey data
3. “Fundamentals”

NOI vs. EBITDA

- NOI = operating income - operating expenses
- Like EBITDA, a fuzzy notion
- My preference is to figure cash operating expenses only, making my NOI equivalent to "Normalized EBITDA"
- But not everybody agrees…

NOI vs. PBTCF

- NOI = Income net of operating expenses
- BT bottom line = NOI – Capital Expenses
  = **P**roperty **B**efore **T**ax **C**ash **F**low
  = PBTCF
- Before-tax IRR is the discount rate that makes the PV of all future PBTCF equal to the property's price

The holy trinity of real estate

- Consider a property with current PBTCF cap rate $y\%$
- Assume that PBTCF is expected to grow by $g\%$ for ever
- Then the before-tax IRR associated with buying this property is:

$$r = y + g$$

Cap rate "fundamentals"

- NOI yield ≈ required return (r)
  - expected income growth (g)
  + investment rate (CAPEX/V)

- Required return = real risk-free rate
  + expected inflation
  + risk premium
  + liquidity premium

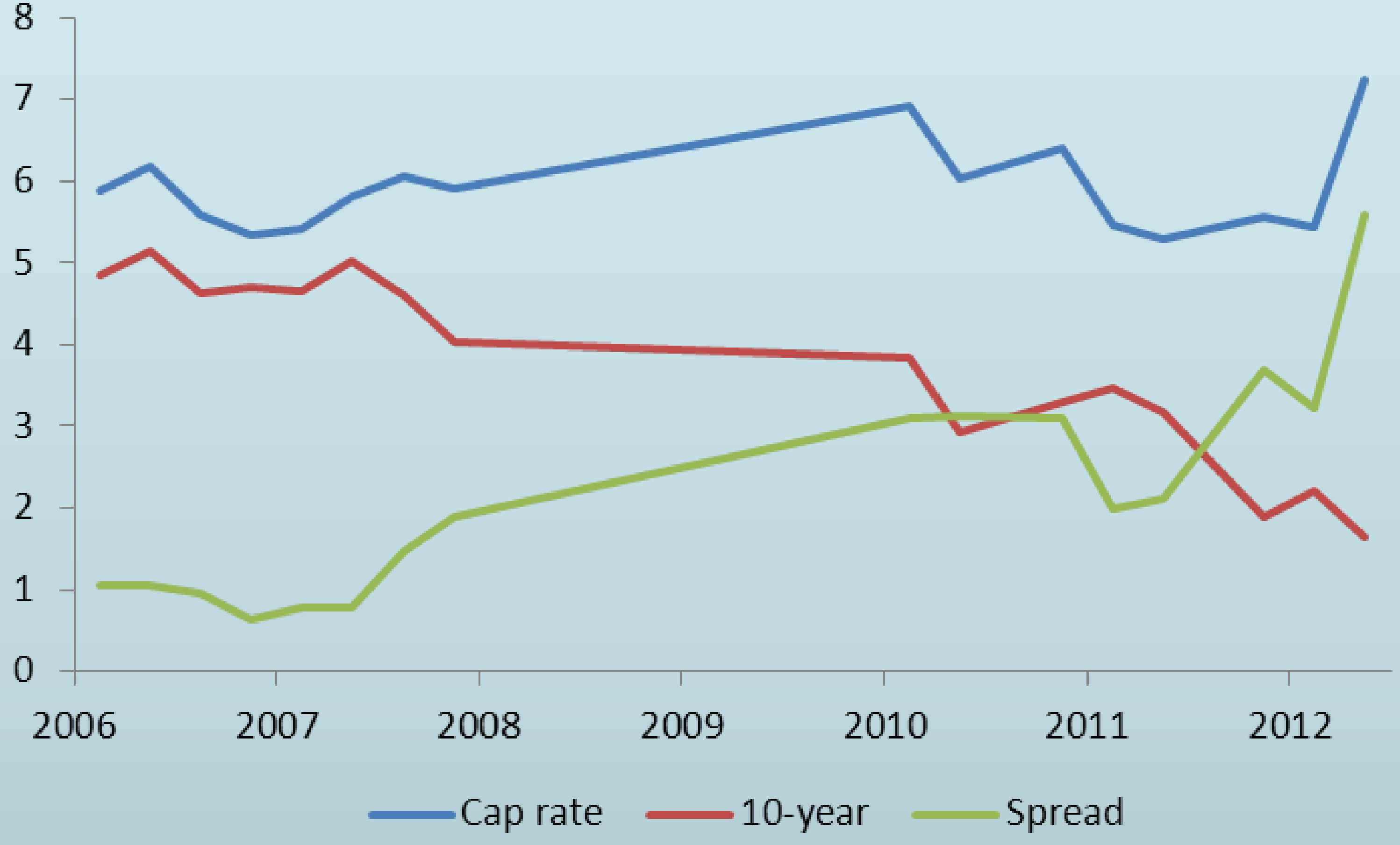
Example: Is Manhattan office overvalued?

- Cap rates on Manhattan office have fallen back to pre-crisis levels
- Could spell trouble, but…
- …PwC survey (Q2-2012) is consistent with current valuations:

Required return (r)		7.50%
- Cap rate *(PBTCF or NOI?)*	-	5.38%
- Rent growth (g)	-	3.00%
	<	0

- … and spreads over treasuries have actually risen
- … though not as much as in other markets

Cap rates in Manhattan Office



The class of real estate assets

- Bedrock: real estate properties (land + structures affixed to it)
- Residential (deliver housing services) or Commercial (held for a business purpose)
- Real estate properties are strings of cash flows
- Real estate *assets* are all assets whose payoffs derive -- however remotely -- from some underlying property

Some language

- Debt: financial contract that gives specific claims to asset's payoff, but no ownership rights
- Equity: financial contract that gives only a residual (or subordinated) claim to asset's payoff, but carries ownership rights
- Public Markets: Markets with many buyers and sellers, observable transaction prices and sizes, and stringent disclosure rules
- Private Markets: Markets where transactions involve limited numbers of buyers and sellers, and where transaction information and financials need not be disclosed

Real estate assets

	Public Markets	Private Markets
Equity Assets	**REITs** **Mutual funds**	**Real Properties** **Private investment firms**
Debt Assets	**Mortgage-backed securities**	**Whole mortgages** **Venture debt**

REITs *(SIICs)*

- Real Estate Investment Trusts
  1. buy, sell and hold real estate assets on behalf of a diffuse shareholder base
  2. manage these and other assets
  3. **are not taxed at the corporate level**

- Three basic types: equity, mortgage, hybrid

- Can be public or private

- UPREITs (U for "umbrella") hold positions in corporations that invest in real estate, including other REITs

Brief history

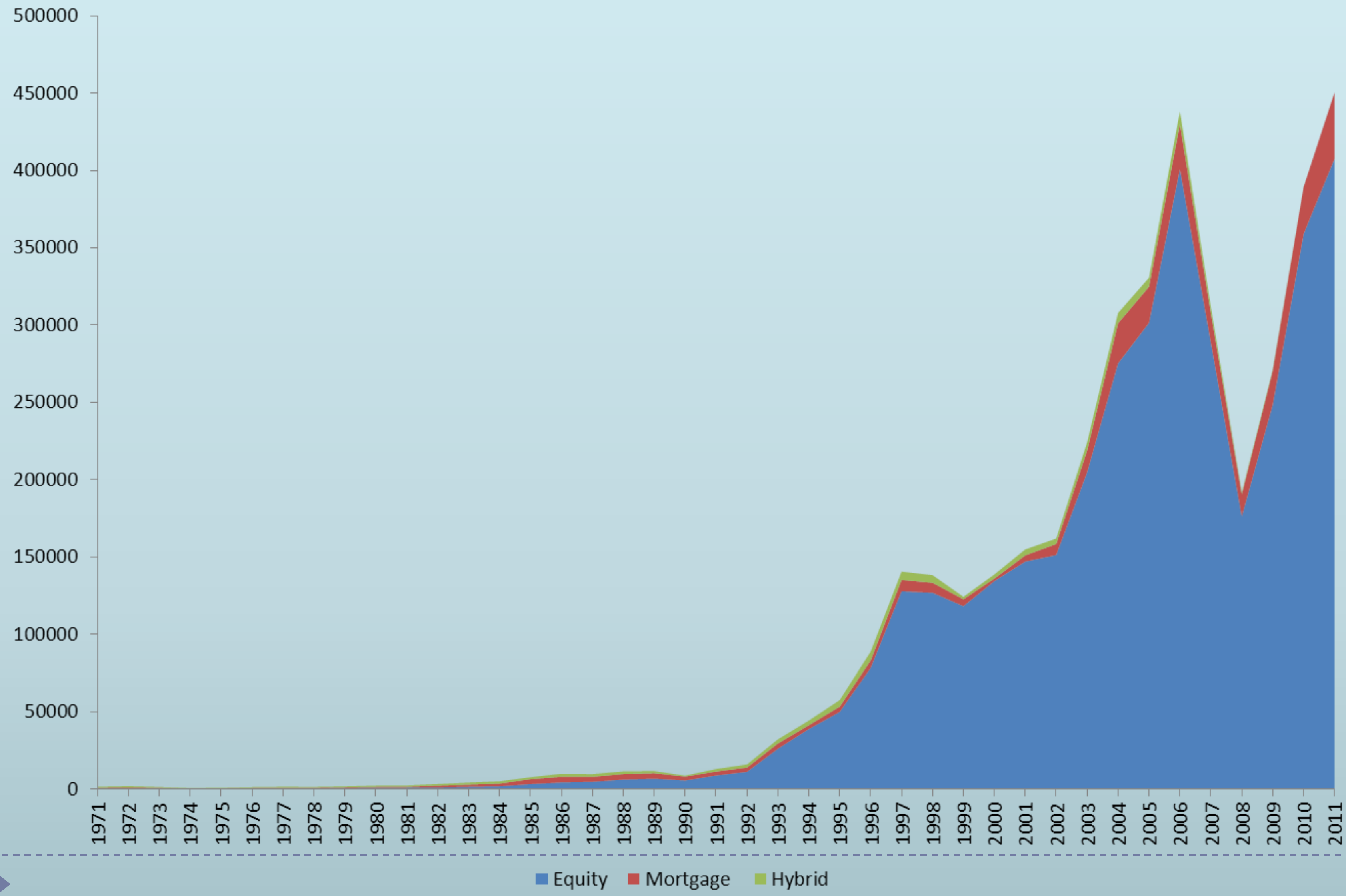
- REIT act, 1960: REITs may be treated as untaxed, pass-through entities provided they satisfy a number of requirements

- Current requirements include:
  1. 75% of holdings in RE, cash, or US paper
  2. 75% of income must come from rents, dividends, mortgage interest, gains from the sale of qualifying assets or holdings in other REITs
  3. **90% of taxable income must be distributed to shareholders***
  4. At least 100 shareholders
  5. Top 5 holders cannot hold more than 50% of shares

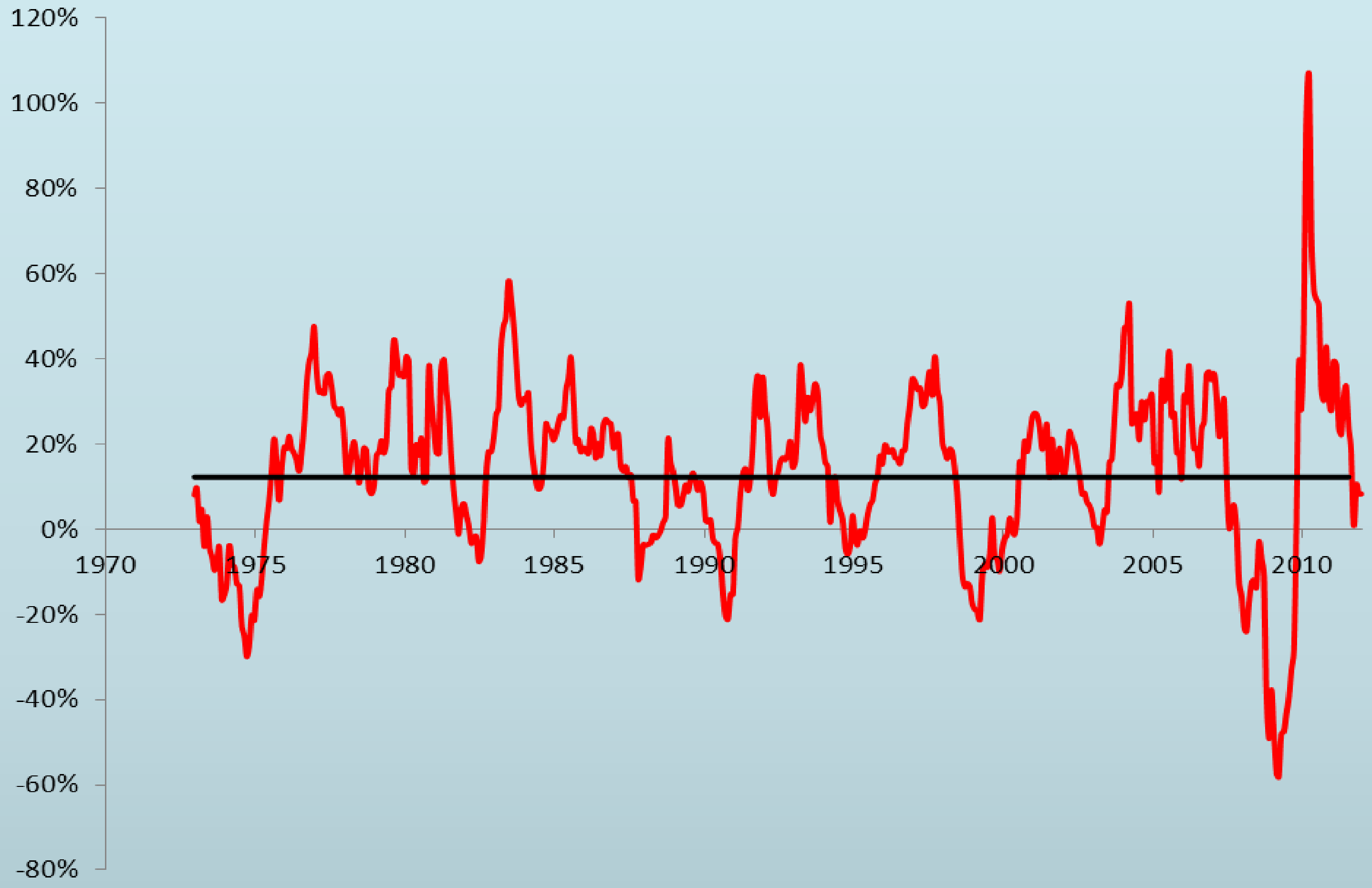
- 1986 tax reform removed two big downsides of REIT structure:
  1. Management activities were severely restricted
  2. Other forms of incorporations (LPs, especially) enjoyed preferential depreciation rules

- 1991 Kimco Realty IPO ushered in a new era for REITs

Market capitalization of Public REITs



Historical 12-month returns (e-REITs)



Mortgage-backed securities

- Basic idea:
  1. Pool a large number of mortgages
  2. Sell the pool as a security, or use the pool as collateral for one or more debt instruments (bonds)
- Purpose:
  1. Allow more investors to invest in real estate debt instruments
  2. Make that investment more liquid
  3. Pool/fine-tune risk

A machine to generate AAA paper

- Why did securitization take off after 2000?
- Among other things because AAA paper became scarce largely due to the global saving glut (US paper hogs)
- AAA paper lubricates many key markets, the repo market in particular
- Where to find it? There is, after all, only so many blue chip issuers
- Answer: CMOs
- Housing boom created endless supply of mortgages, only trick is to somehow issue safe bonds backed by unsafe assets
- Sounds crazy, but it "works": no AAA tranche of any CMO deal has defaulted to date (many have been downgraded, but none have formally defaulted)

The subordination theorem(s)

Theorem I: Risk-free debt can be written against a pool *if and only if* the worst-case scenario CF realization from the pool is strictly positive

Proof: Let A be the lowest possible CF realization associated with the pool. Make the quantity of debt small enough that the promise is A or less.

Theorem II: Debt with less than a probability p of default can be written against a pool *if and only if* the CF realization is strictly positive with probability 1-p

Proof: Let A be such that $P(CF>A) > 1-p$. Make the quantity of debt small enough that the promise is A or less.

How about them CDOs and CDO^{2}s?

- Junior tranches of MBS are often pooled into new deals, often out of necessity (*investors won't pay much for stand-alone B tranches*)

- If combining these tranches raises the lower bounds on overall cash-flows, more AAA paper can be produced with the right level of credit support

- The problem: getting the level of credit support right

- Top tranches of many CDO deals defaulted, which means that people overestimated the ability of pooling to dissipate systematic risk

The game investment banks play

- If you get the following trivial point, you understand securitization better than most people who say they understand securitization

- Given a pool of assets, investment banks choose a feasible security scheme E to write against a given pool of assets to solve:

$$\text{Max } MV(E) - C(E)$$

where MV(E) is the market value of scheme E given investors' willingness to pay for various type of assets while C(E) is the cost of issuing that combination of securities and funding the assets

- After 2000, the scope of securitization widened markedly to include riskier pools of assets because the willingness to pay for top tranches made deals profitable that weren't before

Mortgage securitization: a short history

- The US government wanted liquid secondary markets for mortgages after the great depression: FNMA (1938), GNMA (1968), FHLMC (1970)
- Ginnie issues first pass-through in 1968
- Bank of America issues first private label pass-through in 1977
- Solomon Brothers and First Boston create the CMO concept in 1983

Real estate swap

- Two parties exchange (risky) return from some real estate asset for a fixed return
- At origination, fixed rate is set so that the value of the swap is zero
- As time goes by, swap value rises or falls (symmetrically for the two counterparties)
- Swaps are traded in secondary markets, where investors can buy or sell exposure to real estate payoffs…
- …without the underlying asset being much involved

Real estate swap (continued)

- In practice, RE swaps involve returns on large indices such as NCREIF, for various subtypes of institutional properties
- Institutional Properties: large, safe, premium quality properties in which institutional investors invest
- Say you own lots of properties; to offset the risk associated with your investment, you sell the NCREIF return to Credit Suisse for a safe return
- Hedge vs. systematic real estate risk

Market has yet to take off

- Four possible explanations:
  1. No NCREIF forwards
  2. A redundant asset
  3. "Liquidity begets liquidity"
  4. Tough to price

- More success in Europe with IPD instruments

Credit-default swap (CDS)

- Protection buyer owns asset subject to default (a MBS, say)
- Pays protection seller (AIG, say) fixed premia
- Seller covers default risk
- Perfect way to eliminate diversifiable risk
- Systematic risk remains, however
- Real-estate related CDS played a big role in the recent financial mess

Pricing a revenue-generating property

- Consider a property made of a collection of leasable units
- How much should a given investor pay for such a property?
- Two approaches:
  1. DCF method (forecast expected flows, discount them)
  2. Ratio approach (cap and GRM)
- Both approaches require detailed cash flow data

Three levels of cash-flows

- *Before tax cash flows* accrue to:
  1. Taxes (income and capital gains)
  2. Debt holders
  3. Equity holders

- *After tax cash flows* accrue to:
  1. Debt holders
  2. Equity holders

- *Equity after tax cash flows* accrue to equity holders

Three appropriate discount rates

- *Before tax cash flows* should be discounted at before-tax WACC
- *After tax cash flows* should be discounted at WACC
- *Equity after tax cash flows* should be discounted at required return on equity
- First two calculations give the value of the firm, the last one gives the value of equity

Cash flow pro-forma

- Table of expected cash flows associated with the property over a certain horizon
- Typical horizon: 5 to 10 years, yearly data
- We will first ignore the potential role of debt and taxes, and focus on before tax cash flows

Potential gross income

- *Potential Gross Income* (PGI): revenue when occupancy is full
- PGI = Capacity (in sq. ft) x Expected Rent/Sq. Ft.
- Second element requires market trend analysis
- Best to go unit by unit and lease by lease to forecast expected rent/sq. ft.

How to project rents

- Forecast market rents:
  1. Assume a constant growth rate for market rents (CPI, or average growth rate over recent period)
  2. Use econometric model to forecast rent growth

- Unit-by-unit, use current rent as long as leased, use projected market rent when lease expires, adjusted for unit-specific information

A typical econometric model (GM 6)

- Rents reflect supply and demand
- Supply at date t: $S_t = S_{t-1} + C_t$
- C_t is the number of new units on the market at date t
- $S_t = s(S_{t-1}, R_{t-k})$ where k is construction lag
- $D_t = d(D_{t-1}, R_t, N_t)$ where N_t is a list of demand drivers
- Vacancy rate: 0 if $D_t > S_t$, $(S_t - D_t)/S_t$ otherwise
- $R_{t+1} = r(R_t , (S_t - D_t)/S_t)$
- 1) Estimate/calibrate r, s and d
- 2) Forecast N_t , and you're done

The real estate cycle

1. Market Value exceeds Replacement Cost
2. Investment boom
3. Vacancies rise, rents fall, market value falls below replacement cost
4. Supply only responds with a lag
5. Vacancy and rents bottom out
6. Until market value exceeds replacement cost
7. And on we go

"Fitting is sh%%%ing."

Edward C. Prescott, Nobel Prize Economist

Warning

- Designing a model that fits historical evidence is trivial
- Forecasting is tough
- More complex models fit better, but forecast poorly (Wiki "overfitting")
- Only criterion that matters: out-of-sample forecasting fit
- In other words, how has your forecast performed?
- Truth: beating naïve models is tough, and naïve models are free

Vacancy allowance

- Vacancy allowance = PGI lost to vacancy
- Effective Gross Income (EGI) = PGI –Vacancy allowance
- Sources: past information, and market analysis
- Best to go unit by unit to reflect their specific features, and, obviously, lease length

Operating expenses

- Cost of operating the building: labor, utility bills, property taxes, simple maintenance…
- Can be *fixed* (independent of occupancy) or *variable* (increasing with occupancy)
- Distinguishing features of operating expenses: frequent, mostly predictable and regular
- Building betterment investment are <u>not</u> operating expenses
- Leases specify who bears what cost and, sometimes, *expense stops*

A taxonomy of leases: gross vs. net

- *Gross lease*: owner pays all operating expenses
- *Net lease*: tenant is responsible for at least some operating expenses
- *Triple net (NNN) lease*: all operating expenses are paid by the tenant (EGI+non-rent income≈NOI)
- *Lease with expense stop*: landlord pays operating expenses up to a certain amount, tenant pays the rest

A taxonomy of leases: types of rent

- *Flat rent*: rent is constant until lease ends
- *Graduated rent*: rent increases on a fixed schedule
- *Revaluated rent*: rent reappraised periodically by an independent professional
- *Indexed rent*: rent is indexed to public index such as CPI
- *Percentage lease*: rent is fixed component (base rent) plus fraction of tenant's net income or sales

Net operating income

- NOI= PGI – Vacancy Allowance+ Other Income – Operating Expense
- Other income = net income from non-rent activities (e.g. laundry machines)
- Operating income for the property

Capital expenditures

- Infrequent expenditures, typically though not always meant to better or add to the property (building improvements, leasing commissions…)
- Expenses not associated with basic operation
- They are cash outflows, and matter for the bottom line
- Tax treatment of capital expenditures differs from treatment of operating expenses

Property before tax cash flow

- PBTCF= NOI - Capital expenditures
- Expected inflows minus expected outflows
- Cash flows to be distributed across three types of stake-holders:
  1. Equity holders
  2. Debt holders
  3. The tax man

Reversion cash flows

- Reversion cash flows are the result of selling all or part of the property

- In most cases, one big reversion cash flow in the last year of the analysis, equal to the expected value of the property at that time, net of transaction costs

- Two methods:
  1. Guess a perpetual rate of growth of PBTCF and discount the perpetuity at appropriate rate
  2. Use multiple approach (guess year 11 NOI or EGI, and apply standard multiple)

Typical Pro Forma Items

Operating (all years):

Potential Gross Income = (Rent*SF)	=	PGI
- Vacancy Allowance = -(vac.rate)*(PGI)	=	- V
+ Other Income = (eg, parking, laundry)	=	+OI
- Operating Expenses	=	- OE
______________________		________
Net Operating Income	=	NOI
- Capital Expenditures	=	- CE
______________________		________
Property Before-tax Cash Flow	=	PBTCF

Reversion (last year & yrs of partial sales only):

Property Value at time of sale	=	V
- Selling Expenses = -(eg, broker)	=	- SE
___________________		_______
Property Before-tax Cash Flow	=	PBTCF

Exhibit 11-2: The Noname Building: Cash Flow Projection											
Item:	Year: 1	2	3	4	5	6	7	8	9	10	11
Market Rent/SF:	$10.00	$10.10	$10.20	$10.30	$10.41	$10.51	$10.62	$10.72	$10.83	$10.94	$11.05
Potential Revenue:											
Gross Rent Space 1 (10000SF)	$105,000	$105,000	$105,000	$103,030	$103,030	$103,030	$103,030	$103,030	$108,286	$108,286	$108,286
Gross Rent Space 2 (10000SF)	$100,000	$100,000	$100,000	$100,000	$100,000	$105,101	$105,101	$105,101	$105,101	$105,101	$110,462
Gross Rent Space 3 (10000SF)	$100,000	$101,000	$101,000	$101,000	$101,000	$101,000	$106,152	$106,152	$106,152	$106,152	$106,152
Total PGI	$305,000	$306,000	$306,000	$304,030	$304,030	$309,131	$314,283	$314,283	$319,539	$319,539	$324,900
Vacancy allowance:											
Space 1	$0	$0	$0	$51,515	$0	$0	$0	$0	$54,143	$0	$0
Space 2	$0	$0	$0	$0	$0	$52,551	$0	$0	$0	$0	$55,231
Space 3	$100,000	$0	$0	$0	$0	$0	$53,076	$0	$0	$0	$0
Total vacancy allowance	$100,000	$0	$0	$51,515	$0	$52,551	$53,076	$0	$54,143	$0	$55,231
Total EGI	$205,000	$306,000	$306,000	$252,515	$304,030	$256,581	$261,207	$314,283	$265,396	$319,539	$269,669
Other Income	$30,000	$30,300	$30,603	$30,909	$31,218	$31,530	$31,846	$32,164	$32,486	$32,811	$33,139
Expense Reimbursements											
Space 1	$0	$1,833	$2,003	$0	$1,651	$964	$1,118	$2,870	$0	$1,823	$329
Space 2	$0	$2,944	$3,114	$1,814	$3,465	$0	$153	$1,905	$469	$2,292	$0
Space 3	$0	$0	$170	$0	$260	$0	$0	$1,752	$316	$2,139	$645
Total Revenue	$235,000	$341,078	$341,891	$285,238	$340,624	$289,075	$294,324	$352,974	$298,667	$358,602	$303,781
Reimbursable Operating Expenses											
Property Taxes	$35,000	$35,000	$35,000	$35,000	$35,000	$36,750	$36,750	$36,750	$36,750	$36,750	$36,750
Insurance	$5,000	$5,000	$5,000	$5,000	$5,000	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250
Utilities	$16,667	$25,500	$26,010	$22,109	$27,061	$23,002	$23,462	$28,717	$24,410	$29,877	$25,396
Total Reimbursable Expenses	$56,667	$65,500	$66,010	$62,109	$67,061	$65,002	$65,462	$70,717	$66,410	$71,877	$67,396
Management Expense	$6,150	$9,180	$9,180	$7,575	$9,121	$7,697	$7,836	$9,428	$7,962	$9,586	$8,090
Total Operating Expenses	$62,817	$74,680	$75,190	$69,684	$76,182	$72,699	$73,298	$80,146	$74,371	$81,463	$75,486
NOI	$172,183	$266,398	$266,701	$215,554	$264,442	$216,376	$221,026	$272,828	$224,295	$277,139	$228,295
Capital Expenditures											
TI		$50,000		$50,000		$55,000	$55,000		$55,000		$55,000
Leasing Commissions		$15,150		$15,455		$15,765	$15,923		$16,243		$16,569
Common physical improvements					$100,000						
Net Cash Flow (operations)	$172,183	$201,248	$266,701	$150,100	$164,442	$145,611	$150,103	$272,828	$153,053	$277,139	
Net Cash Flow (reversion)										$2,282,951	
IRR @ $2,000,000 price: 10.51%											

Going in IRR

- Given a proposed property price, and a full pro-forma, a "total" IRR can be calculated

- It is the discount rate that makes the present value of all expected PBTCF equal to the price

- A sound decision rule: compute typical IRR on similar properties, and take project if property IRR exceeds this typical IRR

Equivalently, use the DCF method

- Estimate required return on similar property (*the opportunity cost of capital*)

- Discount PBTCF at rate

- Another sound decision rule: accept project if resulting value exceeds the price

Typical returns: real estate indices

- *NCREIF property index* (NPI)
- Survey
- Cap rate approach (holy trinity)
- Asset pricing models

Real estate returns: indices

- *NCREIF property index* (NPI): "quarterly … total rate of return measure … of a very large pool of individual commercial real estate properties. …acquired, at least in part, on behalf of tax-exempt institutional investors"

- Return ≈ (NOI + capital gains)/(Initial market value)

- "Class A", premium, institutional quality properties

- Europe and other non-US OECD: IPD

Two big issues with real estate indices

- *Coverage:* institutional properties (owned directly or via JVs by untaxed institutional investors)

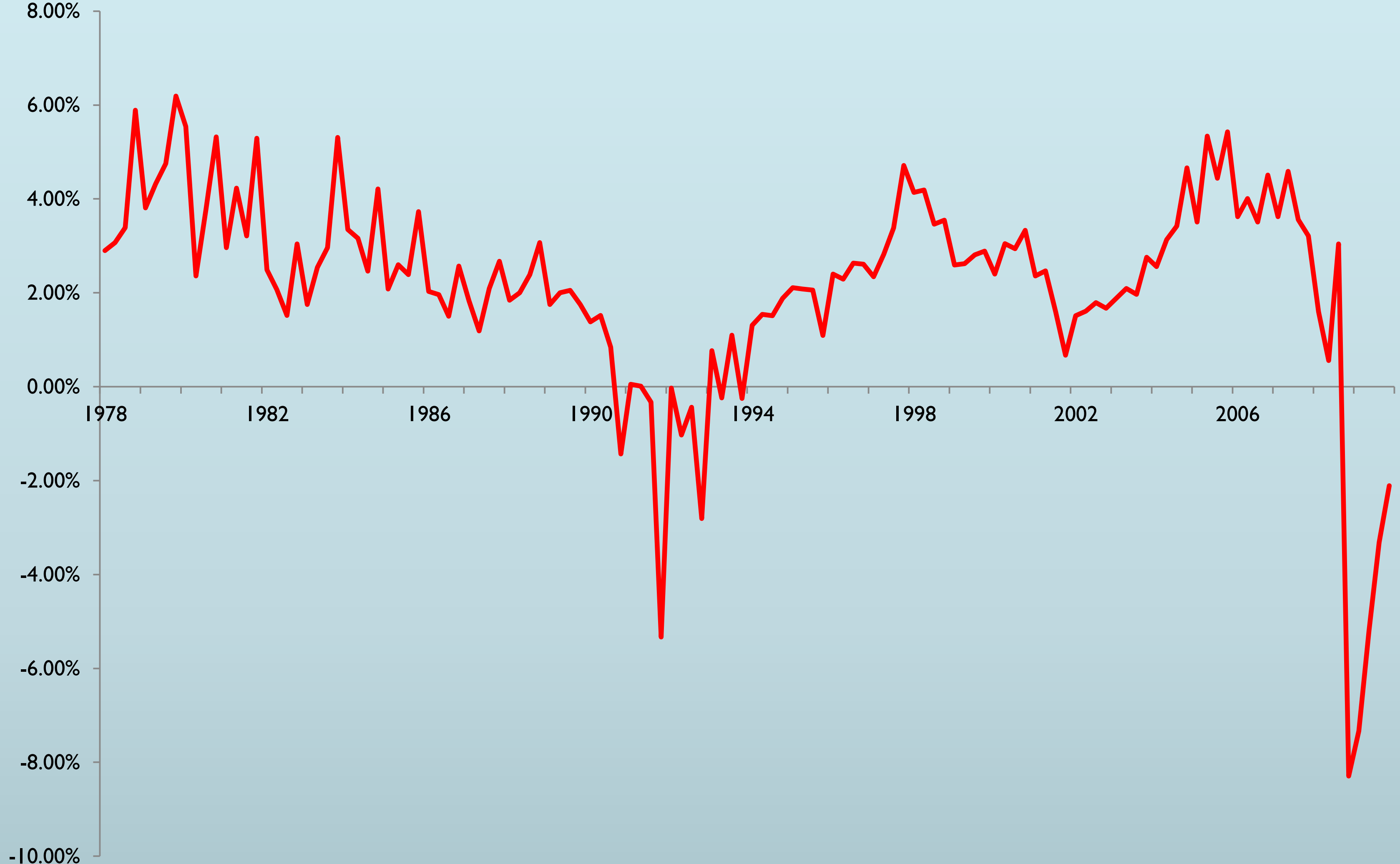
- *Market values*: value is based on transactions when possible, but on appraisals or estimates in most cases

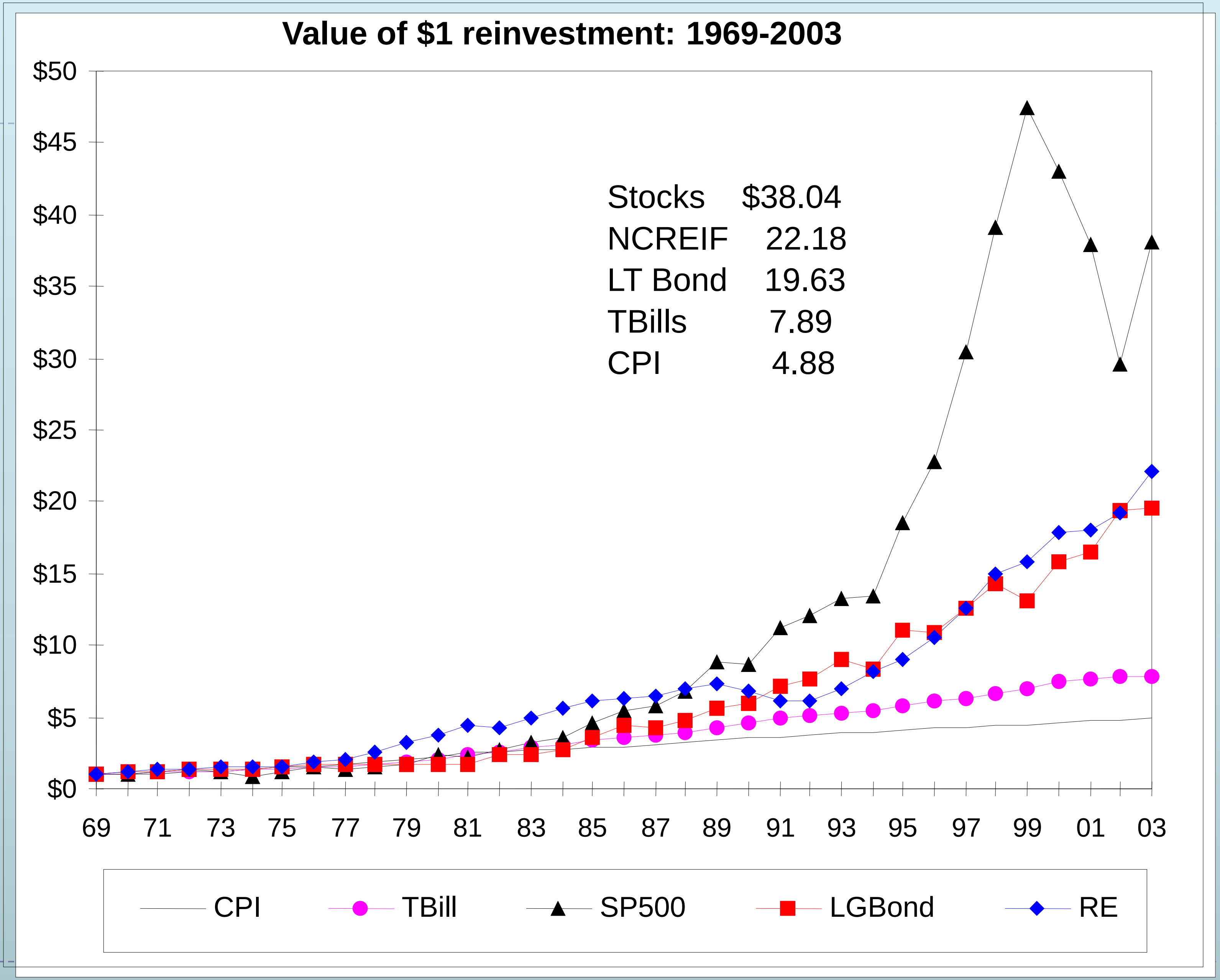
Historical evidence, 1970-2003

	Total Return	Volatility	Risk Premium
T Bills	6.30%	2.83%	NA
G Bonds	9.74%	11.76%	3.44%
Real Estate*	9.91%	9.02%	3.61%
Stocks	12.72%	17.48%	6.42%

*NCREIF: large, institutional quality commercial properties

Quarterly returns on NPI index

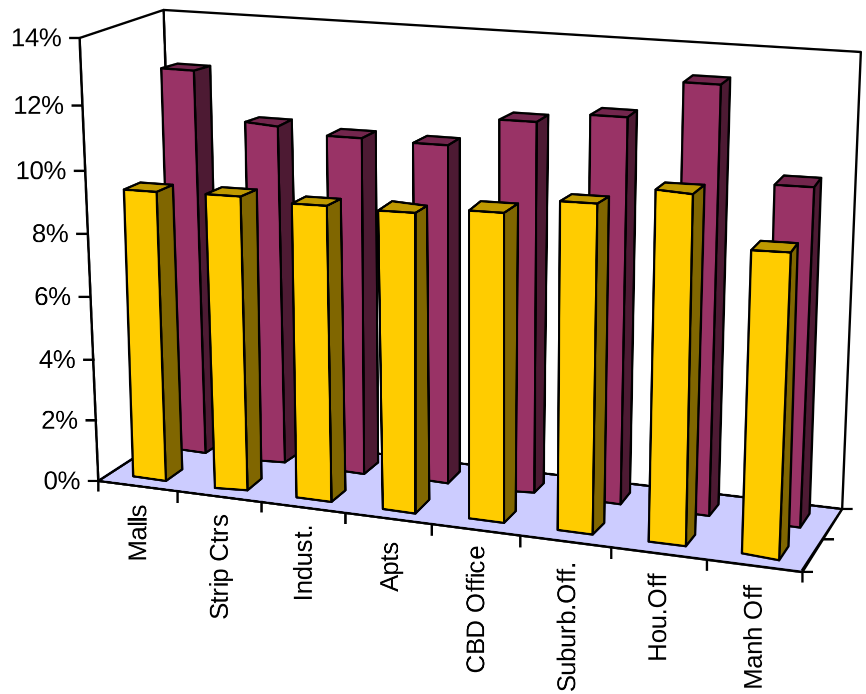




Value of $1 reinvestment: 1969-2003
$50
$45
$40
$35
$30
$25
$20
$15
$10
$5
$0
69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 01 03
Stocks $38.04
NCREIF 22.18
LT Bond 19.63
TBills 7.89
CPI 4.88
CPI
TBill
SP500
LGBond
RE

Survey evidence

Exh.11-6a: Investor Total Return Expectations (IRR) for Various Property Types*



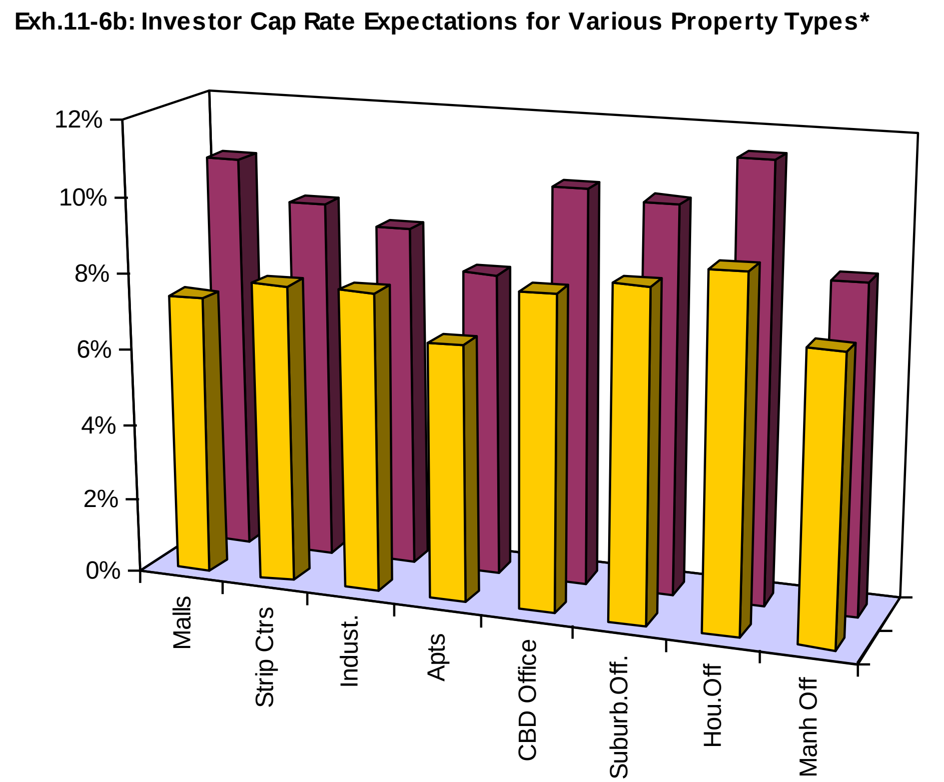
*Source: Korpacz Investor Survey, 1st quarter 2005

	Malls	Strip Ctrs	Indust.	Apts	CBD Office	Suburb. Off.	Hou.Off	Manh Off
Institutional	9.27%	9.35%	9.28%	9.31%	9.56%	10.03%	10.58%	9.11%
Non-institutional	12.53%	11.00%	10.81%	10.80%	11.68%	12.05%	13.19%	10.38%

Capitalization rate approach

- Cap rate = (current NOI or PBTCF) / Property Value
- Assume current PBTCF cap rate is y, and that we expect PBTCF to grow at rate g for ever
- Then IRR on property is $r \approx y + g$

Survey evidence *(!! on NOI cap rates !!)*



*Source: Korpacz Investor Survey, 1st quarter 2005

	Malls	Strip Ctrs	Indust.	Apts	CBD Office	Suburb. Off.	Hou.Off	Manh Off
Institutional	7.33%	7.86%	7.88%	6.74%	8.26%	8.63%	9.19%	7.45%
Non-institutional	10.51%	9.50%	9.02%	8.00%	10.38%	10.18%	11.44%	8.59%

Asset pricing models

- Find the average <u>unlevered</u> equity beta of similar properties, using, presumably, REITs or NCREIF data
- Invoke CAPM to calculate required return on equity
- Calculate WACC
- Discount

Multiple/Ratio approach

- Find a group of peer properties on which good value data is available due to recent transaction, or rock-solid appraisal
- Alternatively, collect/purchase info on appropriate multiples
- Apply Cap rate and GRM approach to current property

When does the multiple approach work?

- When comparable properties don't just have the same y, but also when they have the same g
- Outside of fixed g world, we need comparable properties to be roughly scaled up or down version of the target property
- Heroic, but standard, and a good way to frame an argument over value

Debt and taxes

- Many investors are subject to taxes at the property level, which matters greatly for value

- Two ways to deal properly with the effects of debt and taxes:
  1. Discount after tax cash flows at after tax WACC
  2. Discount flows-to-equity (EATCF) at the required rate of equity

- First approach yields the property's total value, the second one yields the value of equity in the property

Leverage refresher

1. Leverage raises expected returns to equity if and only if the expected unlevered return exceeds the cost of debt

2. Leverage raises the variance and the "beta" of equity returns provided debt payments are not too risky

3. In a perfect world, leverage would not affect value (MM)

4. In the world we live in, leverage affects value by reducing tax liabilities (+), raising bankruptcy risks (-), disciplining magagers (+)…

Calculating taxes and flows-to-equity

- Taxable income = NOI – Depreciation – Interest expenses
- Income taxes = Taxable income x Tax rate
- ATCF= PBTCF – Income taxes
- EATCF=ATCF – Debt service payments

Depreciation

- Value of property= Value of Land + Value of Structures and Equipment

- Land cannot be depreciated

- Depreciable cost basis < Value of the property

- Depreciation rates and methods vary for different items

- Buildings: 27.5 years straight-line (residential, US)
  39 years (non-residential, US)

Calculating reversion cash flows

- Capital gains = Net sale proceeds – Adjusted basis
- Adjusted basis= Original basis + (Total CAPEX – Depreciation)
- Capital gains tax = Capital gains x relevant tax rate
- It is also proper to show a final debt payment in a pro-forma table (even though, in principle, it could be folded into standard debt service line)

Capital Gains Tax

- Capital gains = (Net sale price – (Original basis +Capex)) + Depreciation

- The two pieces are taxed differently

- *Net sale proceeds – (Original Basis+Capex)* is taxed at the capital gains tax rate

- *Depreciation* is taxed at the "depreciation recapture tax rate", which is typically higher

Example

- Net sale price=$1,000,000, Original Basis=$800,000, CAPEX=$100,000, Depreciation=$50,000
- Capital gains tax: 15%, Recapture Tax: 25%
- CGT = (1,000,000 – 800,000 -100,000) x 0.15
  + (50,000) x 0.25
  = 27,500

Calculating reversion cash flows

- EATCF (reversion) = **Net** Sale Price – Loan Balance - CGT

And we're done

- Discount ATCF at WACC, or EATCF at required return on equity
- One should do an obvious set of multiple calculations too, but in practice it is seldom done
- Key point: leverage can make a deal worth it, or kill it, depending on the direct and indirect costs of debt

EATCF from operations

Exhibit 14-1a: Equity After-Tax Cash Flows from Operations

PGI
- vacancy
= EGI
- OEs
=NOI

Cash Flow
- Capital Improvements Exp.
= PBTCF
- Debt Service (Int. & Principal)
- Income Tax
= EATCF

Taxes
Net Operating Income (NOI)
-Interest (I)
-Depreciation expense (DE)
= Taxable Income
x Investor's income tax rate
= Income Tax Due

Exhibit 14-2: Example After-Tax Income & Cash Flow Proformas . . .

			Unlevered:	Levered:
Property Purchase Price (Year 0):	$1,000,000			
Depreciable Cost Basis:	$800,000	Before-tax IRR:	6.04%	7.40%
Ordinary Income Tax Rate:	35.00%	After-tax IRR:	4.34%	6.44%
Capital Gains Tax Rate:	15.00%	Ratio AT/BT:	0.719	0.870
Depreciation Recaptu	25.00%			

	Year:									Oper.	Reversion	Rever.	Total
Operating:	1	2	3	4	5	6	7	8	9	Yr.10	Item:	Yr.10	Yr.10
Accrual Items:													
NOI	$60,000	$60,600	$61,206	$61,818	$62,436	$63,061	$63,691	$64,328	$64,971	$65,621	Sale Price	$1,104,622	
- Depr.Exp.	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	- Book Val	$809,091	
- Int.Exp.	$41,250	$41,140	$41,030	$40,920	$40,810	$40,700	$40,590	$40,480	$40,370	$40,260			
=Net Income (BT)	($10,341)	($9,631)	($8,915)	($8,193)	($7,465)	($6,730)	($5,990)	($5,243)	($4,490)	($3,730)	=Book Gain	$295,531	$291,801
- IncTax	($3,619)	($3,371)	($3,120)	($2,867)	($2,613)	($2,356)	($2,096)	($1,835)	($1,571)	($1,305)	- CGT	$73,421	
=Net Income (AT)	($6,722)	($6,260)	($5,795)	($5,325)	($4,852)	($4,375)	($3,893)	($3,408)	($2,918)	($2,424)	=Gain (AT)	$222,111	$219,686
Adjusting Accrual to Reflect Cash Flow:													
- Cap. Imprv. Expdtr.	$0	$0	$50,000	$0	$0	$0	$0	$50,000	$0	$0			
+ Depr.Exp.	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	$29,091	+ Book Val	$809,091	
-DebtAmort	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	-LoanBal	$730,000	
=EATCF	$20,369	$20,831	($28,704)	$21,766	$22,239	$22,716	$23,198	($26,317)	$24,173	$24,667	=EATCF	$301,202	$325,868
+ IncTax	($3,619)	($3,371)	($3,120)	($2,867)	($2,613)	($2,356)	($2,096)	($1,835)	($1,571)	($1,305)	+ CGT	$73,421	
=EBTCF	$16,750	$17,460	($31,824)	$18,898	$19,626	$20,361	$21,101	($28,152)	$22,601	$23,361	=EBTCF	$374,622	$397,983

CASH FLOW COMPONENTS FORMAT

	Year:									Oper.	Reversion	Rever.	Total
Operating:	1	2	3	4	5	6	7	8	9	Yr.10	Item	Yr.10	Yr.10
Accrual Items:													
NOI	$60,000	$60,600	$61,206	$61,818	$62,436	$63,061	$63,691	$64,328	$64,971	$65,621	Sale Price	$1,104,622	
- Cap. Imprv. Expdtr.	$0	$0	$50,000	$0	$0	$0	$0	$50,000	$0	$0			
=PBTCF	$60,000	$60,600	$11,206	$61,818	$62,436	$63,061	$63,691	$14,328	$64,971	$65,621	=PBTCF	$1,104,622	$1,170,243
- Debt Svc	$43,250	$43,140	$43,030	$42,920	$42,810	$42,700	$42,590	$42,480	$42,370	$42,260	- LoanBal	$730,000	
=EBTCF	$16,750	$17,460	($31,824)	$18,898	$19,626	$20,361	$21,101	($28,152)	$22,601	$23,361	=EBTCF	$374,622	$397,983
-taxNOI	$21,000	$21,210	$21,422	$21,636	$21,853	$22,071	$22,292	$22,515	$22,740	$22,967	taxMktGain	$693	$23,661
+ DTS	$10,182	$10,182	$10,182	$10,182	$10,182	$10,182	$10,182	$10,182	$10,182	$10,182	- AccDTS	($72,727)	($62,545)
+ ITS	$14,438	$14,399	$14,361	$14,322	$14,284	$14,245	$14,207	$14,168	$14,130	$14,091			$14,091
=EATCF	$20,369	$20,831	($28,704)	$21,766	$22,239	$22,716	$23,198	($26,317)	$24,173	$24,667	EATCF	$301,202	$325,868

Cash flow components (operations)

- Cash Flows to Equity:

	PBTCF
-	Loan Debt Service
=	EBTCF
-	Taxes if no DTS or ITS
+	DTS
+	ITS
=	EATCF

- PATCF:

	PBTCF
-	Taxes if no DTS or ITS
+	DTS
=	PATCF
-	Loan Debt Service
+	ITS
=	EATCF

Breaking it down

Apprec.Rate =	1.00%	Bldg.Val/Prop.Val=	80.00%	Loan=	$750,000
Yield =	6.00%	Depreciable Life=	27.5 years	Int=	5.50%
Income Tax Rate =	35.00%	CGTax Rate =	15.00%	Amort/yr	$2,000
		DepRecapture Rate=	25.00%		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
					tax w/out		(4)-(5)+(6)		Loan		(4)-(9)	(7)-(9)+(10)	(9)-(10)
Year	Prop.Val	NOI	CI	PBTCF	shields	DTS	PATCF	LoanBal	DS	ITS	EBTCF	EATCF	LoanATCFs
0	$1,000,000			($1,000,000)			($1,000,000)	$750,000	($750,000)		($250,000)	($250,000)	($750,000)
1	$1,010,000	$60,000	$0	$60,000	$21,000	$10,182	$49,182	$748,000	$43,250	$14,438	$16,750	$20,369	$28,813
2	$1,020,100	$60,600	$0	$60,600	$21,210	$10,182	$49,572	$746,000	$43,140	$14,399	$17,460	$20,831	$28,741
3	$1,030,301	$61,206	$50,000	$11,206	$21,422	$10,182	($34)	$744,000	$43,030	$14,361	($31,824)	($28,704)	$28,670
4	$1,040,604	$61,818	$0	$61,818	$21,636	$10,182	$50,364	$742,000	$42,920	$14,322	$18,898	$21,766	$28,598
5	$1,051,010	$62,436	$0	$62,436	$21,853	$10,182	$50,765	$740,000	$42,810	$14,284	$19,626	$22,239	$28,527
6	$1,061,520	$63,061	$0	$63,061	$22,071	$10,182	$51,171	$738,000	$42,700	$14,245	$20,361	$22,716	$28,455
7	$1,072,135	$63,691	$0	$63,691	$22,292	$10,182	$51,581	$736,000	$42,590	$14,207	$21,101	$23,198	$28,384
8	$1,082,857	$64,328	$50,000	$14,328	$22,515	$10,182	$1,995	$734,000	$42,480	$14,168	($28,152)	($26,317)	$28,312
9	$1,093,685	$64,971	$0	$64,971	$22,740	$10,182	$52,413	$732,000	$42,370	$14,130	$22,601	$24,173	$28,241
10	$1,104,622	$65,621	$0	$1,170,243	$23,661	($62,545)	$1,084,037	$730,000	$772,260	$14,091	$397,983	$325,868	$758,169
IRR of above CF Stream =				6.04%			4.34%		5.50%		7.40%	6.44%	3.58%

Cash flow components (reversion)

- Cash Flows to Equity:

	Net Sale Price
-	Loan Debt Service
=	EBTCF
-	Taxes if no DTS
+	DTS (-)
=	EATCF

- PATCF

=	PBTCF
–	Taxes if no DTS
+	DTS (-)
=	PATCF
-	Loan Debt Service
=	EATCF

Projected IRR calculations

10-yr Going-in IRR:		
	Property (Unlvd)	**Equity (Levd)**
Before-tax	6.04%	7.40%
After-tax	4.34%	6.44%
AT/BT	434/604 = 72%	644/740 = 87%
➔ Effective Tax Rate With ord inc=35%, CGT=15%, Recapt=25%.	**100% – 72% = 28%**	**100% - 87% = 13%**

A puzzle

- Assume that deal is a zero NPV deal for this investor (investor is *marginal*)
- That is: $E(r^E)$ = IRR on EATCF at \$250,000 cost
  = 6.44%
- By the same logic, expected return on unlevered equity would seem to be:

  $E(r^U)$ = IRR on PATCF at \$1,000,000
  = 4.34%
- But $r^D = 5.5\% > E(r^U)$
- If MM holds: $E(r^E) = E(r^U) + ((1-\tau)\ D/E)\ (E(r^U) - r^D) < E(r^U)$

What's going on?

- IRR on PATCF at \$1,000,000 is not $E(r^U)$
- If the investor is willing to pay \$1,000,000 with some debt financing, she would not be willing to pay the same if constrained to go all-equity
- In other words $E(r^U)$> IRR on PATCF at \$1,000,000
- Can we tell what $E(r^U)$ is?

Value additivity principle

- NPV of investment = PV(ATCF) – Property Price (MV)

  = NPV of investment if 100% equity financed
  + NPV of financing

  = NPV(Property) + NPV(Financing)

  = *Adjusted Present Value (APV)*

  = [PV(PATCF) – MV] + NPV of financing

- If the investor is *marginal*, APV=0

- Market value (MV) of an asset is the value to marginal investor

Investment value

- Investment value: IV = MV + APV
- IV can exceed MV for some investors because:
  1. their tax rate is lower than that of marginal investors
  2. they have access to better/more financing
  3. they can squeeze more CFs out of the property
  4. they have some private information about PBTCF prospects
  5. …
- Investors whose IV>MV are called *intramarginal*
- !!!! Doesn’t mean they should pay above MV !!!!

What is $E(r^u)$?

- Assume that the investor in exhibit 14.2 is marginal at \$1,000,000 (i.e. $E(r^E)$ = IRR on EATCF at \$250,000)

- We have: APV = 0
  = NPV(Property) + NPV(Financing)
  = PV(PATCF) – MV + PV(ITS)

- It follows that PV(PATCF)= MV-PV(ITS)

- We know MV, we know all PATCF, $E(r^u)$ is the discount rate in PV(PATCF)

- If we can calculate PV(ITS), we will know $E(r^u)$

Discount rates

- ITS is highly correlated with debt service flows (perfectly so, in fact, for IOMs)
- The natural discount rate for ITS is the rate of interest on debt
- In earlier example, if investor is marginal, this implies $E(r^u)$=5.77% (see excel file), which is bigger than r^D
- Why is it bigger than 4.34%? Why is it lower than 6.44%?

What is the implicit average tax rate?

- If Modigliani-Miller is roughly right, then:

  $$E(r^E) = E(r^U) + ((1-\tau)\ D/E)\ (E(r^U) - r^D)$$

- We know $E(r^E)=6.44\%$ in previous example, while $D/E=750/250=3$, and $(E(r^U)-r^D)=.27\%$

- Given $E(r^u)$, the average tax rate consistent with MM formula is $\tau=17\%$ (roughly)

- Tax rate seems low

A word about the global property market

- The largest global investors are institutional (pension funds, sovereign funds, insurance companies…)
- Institutionally investable RE is estimated to be around $16trn (1.5 US GDP)
- Institutions are loath to invest RE directly because it is illiquid, lumpy, requires careful monitoring…
- Instead, they invest via listed (reits) and unlisted (funds) vehicles
- Funds can be open-ended (allow investment and redemption) or closed-ended (funds are raised once and for all and deployed for a fixed period of time)
- Funds are classified as core, core-plus, value-added and opportunistic
- The fund model worked well until 2008, but has been under pressure since then
- Investors are asking for more control and more manager investment
- What will the new fund model look like?
- Read Baum and Hartzell (2011) for more