United Technologies: DCF parts valuation
Cost of capital, by business

Division	Unlevered Beta	Debt/Equity Ratio	Levered beta	Cost of equity	After-tax cost of debt	Debt to Capital	Cost of capital
Carrier	0.83	30.44%	0.97	9.32%	2.95%	23.33%	7.84%
Pratt & Whitney	0.81	30.44%	0.95	9.17%	2.95%	23.33%	7.72%
Otis	1.19	30.44%	1.39	12.07%	2.95%	23.33%	9.94%
UTC Fire & Security	0.65	30.44%	0.76	7.95%	2.95%	23.33%	6.78%
Hamilton Sundstrand	1.04	30.44%	1.22	10.93%	2.95%	23.33%	9.06%
Sikorsky	1.17	30.44%	1.37	11.92%	2.95%	23.33%	9.82%

United Technologies: DCF valuation Fundamentals, by business

Division	*Total Assets*	*Capital Invested*	*Cap Ex*	*Allocated Reinvestment*	*Operating income after taxes*	*Return on capital*	*Reinvestment Rate*
Carrier	$10,810	$6,014	$191	$353	$816	13.57%	43.28%
Pratt & Whitney	$9,650	$5,369	$412	$762	$1,316	24.51%	57.90%
Otis	$7,731	$4,301	$150	$277	$1,536	35.71%	18.06%
UTC Fire & Security	$10,022	$5,575	$95	$176	$336	6.03%	52.27%
Hamilton Sundstrand	$8,648	$4,811	$141	$261	$681	14.16%	38.26%
Sikorsky	$3,985	$2,217	$165	$305	$296	13.37%	102.95%

United Technologies, DCF valuation Growth Choices

Division	Cost of capital	*Return on capital*	*Reinvestment Rate*	*Expected growth*	*Length of growth period*	*Stable growth rate*	*Stable ROC*
Carrier	7.84%	13.57%	43.28%	5.87%	5	3%	7.84%
Pratt & Whitney	7.72%	24.51%	57.90%	14.19%	5	3%	12.00%
Otis	9.94%	35.71%	18.06%	6.45%	5	3%	14.00%
UTC Fire & Security	6.78%	6.03%	52.27%	3.15%	0	3%	6.78%
Hamilton Sundstrand	9.06%	14.16%	38.26%	5.42%	5	3%	9.06%
Sikorsky	9.82%	13.37%	102.95%	13.76%	5	3%	9.82%

United Technologies, DCF valuation
Values of the parts

Business	*Cost of capital*	*PV of FCFF*	*PV of Terminal Value*	*Value of Operating Assets*
Carrier	7.84%	$2,190	$9,498	$11,688
Pratt & Whitney	7.72%	$3,310	$27,989	$31,299
Otis	9.94%	$5,717	$14,798	$20,515
UTC Fire & Security	6.78%	$0	$4,953	$4,953
Hamilton Sundstrand	9.06%	$1,902	$6,343	$8,245
Sikorsky	9.82%	-$49	$3,598	$3,550
Sum				*$80,250*

United Technologies, DCF valuation
Sum of the Parts

Value of the parts = $80,250

Value of corporate expenses

$$= \frac{\text{Corporate Expenses}_{\text{Current}}(1-t)(1+g)}{(\text{Cost of capital}_{\text{Company}} - g)} = \frac{408(1-.38)(1.03)}{(.0868-.03)} = \$\ 4{,}587$$

Value of operating assets (sum of parts DCF) = $75,663

Value of operating assets (sum of parts RV) = $74,230

Value of operating assets (company DCF) = $71,410

Enterprise value (based on market prices) = $52,261

PRIVATE COMPANY VALUATION

Aswath Damodaran

Process of Valuing Private Companies

- The process of valuing private companies is not different from the process of valuing public companies. You estimate cash flows, attach a discount rate based upon the riskiness of the cash flows and compute a present value. As with public companies, you can either value
  - The entire business, by discounting cash flows to the firm at the cost of capital.
  - The equity in the business, by discounting cashflows to equity at the cost of equity.
- When valuing private companies, you face two standard problems:
  - There is not market value for either debt or equity
  - The financial statements for private firms are likely to go back fewer years, have less detail and have more holes in them.

1. No Market Value?

- Market values as inputs: Since neither the debt nor equity of a private business is traded, any inputs that require them cannot be estimated.
  1. Debt ratios for going from unlevered to levered betas and for computing cost of capital.
  2. Market prices to compute the value of options and warrants granted to employees.
- Market value as output: When valuing publicly traded firms, the market value operates as a measure of reasonableness. In private company valuation, the value stands alone.
- Market price based risk measures, such as beta and bond ratings, will not be available for private businesses.

2. Cash Flow Estimation Issues

- Shorter history: Private firms often have been around for much shorter time periods than most publicly traded firms. There is therefore less historical information available on them.
- Different Accounting Standards: The accounting statements for private firms are often based upon different accounting standards than public firms, which operate under much tighter constraints on what to report and when to report.
- Intermingling of personal and business expenses: In the case of private firms, some personal expenses may be reported as business expenses.
- Separating "Salaries" from "Dividends": It is difficult to tell where salaries end and dividends begin in a private firm, since they both end up with the owner.

Private Company Valuation: Motive matters

- You can value a private company for
  - 'Show' valuations
    - Curiosity: How much is my business really worth?
    - Legal purposes: Estate tax and divorce court
  - Transaction valuations
    - Sale or prospective sale to another individual or private entity.
    - Sale of one partner's interest to another
    - Sale to a publicly traded firm
  - As prelude to setting the offering price in an initial public offering
- You can value a division or divisions of a publicly traded firm
  - As prelude to a spin off
  - For sale to another entity
  - To do a sum-of-the-parts valuation to determine whether a firm will be worth more broken up or if it is being efficiently run.

Private company valuations: Four broad scenarios

- Private to private transactions: You can value a private business for sale by one individual to another.
- Private to public transactions: You can value a private firm for sale to a publicly traded firm.
- Private to IPO: You can value a private firm for an initial public offering.
- Private to VC to Public: You can value a private firm that is expected to raise venture capital along the way on its path to going public.

I. Private to Private transaction

- In private to private transactions, a private business is sold by one individual to another. There are three key issues that we need to confront in such transactions:
  - Neither the buyer nor the seller is diversified. Consequently, risk and return models that focus on just the risk that cannot be diversified away will seriously under estimate the discount rates.
  - The investment is illiquid. Consequently, the buyer of the business will have to factor in an "illiquidity discount" to estimate the value of the business.
  - Key person value: There may be a significant personal component to the value. In other words, the revenues and operating profit of the business reflect not just the potential of the business but the presence of the current owner.

An example: Valuing a restaurant

- Assume that you have been asked to value a upscale French restaurant for sale by the owner (who also happens to be the chef). Both the restaurant and the chef are well regarded, and business has been good for the last 3 years.
- The potential buyer is a former investment banker, who tired of the rat race, has decide to cash out all of his savings and use the entire amount to invest in the restaurant.
- You have access to the financial statements for the last 3 years for the restaurant. In the most recent year, the restaurant reported $ 1.2 million in revenues and $ 400,000 in pre-tax operating profit . While the firm has no conventional debt outstanding, it has a lease commitment of $120,000 each year for the next 12 years.

Past income statements…

	3 years ago	2 years ago	Last year	
Revenues	$800	$1,100	$1,200	Operating at full capacity
- Operating lease expense	$120	$120	$120	(12 years left on the lease)
- Wages	$180	$200	$200	(Owner/chef does not draw salary)
- Material	$200	$275	$300	(25% of revenues)
- Other operating expenses	$120	$165	$180	(15% of revenues)
Operating income	$180	$340	$400	
- Taxes	$72	$136	$160	(40% tax rate)
Net Income	$108	$204	$240	

All numbers are in thousands

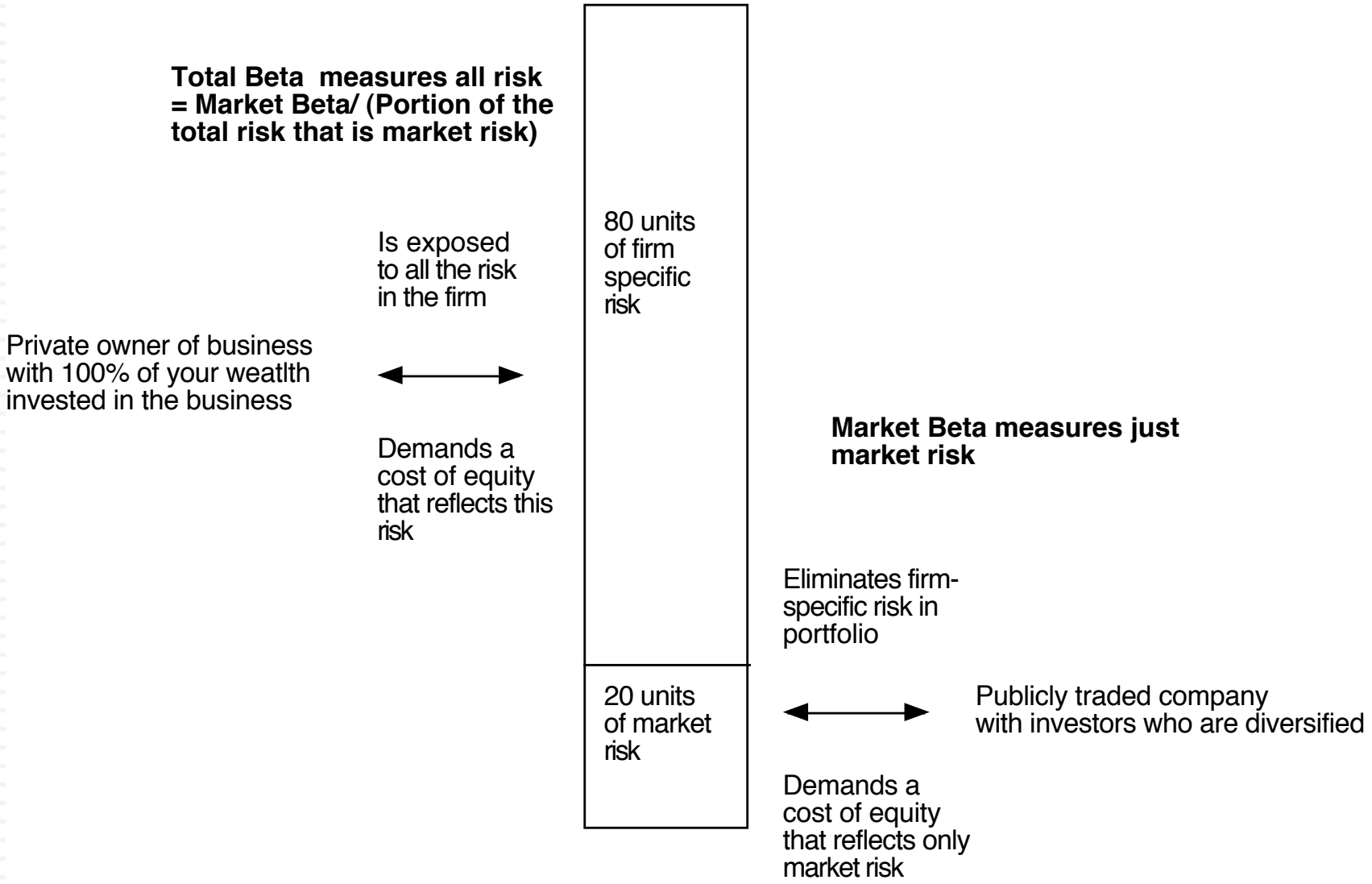
Step 1: Estimating discount rates

- Conventional risk and return models in finance are built on the presumption that the marginal investors in the company are diversified and that they therefore care only about the risk that cannot be diversified. That risk is measured with a beta or betas, usually estimated by looking at past prices or returns.
- In this valuation, both assumptions are likely to be violated:
  - As a private business, this restaurant has no market prices or returns to use in estimation.
  - The buyer is not diversified. In fact, he will have his entire wealth tied up in the restaurant after the purchase.

No market price, no problem… Use bottom-up betas to get the unlevered beta

- The average unlevered beta across 75 publicly traded restaurants in the US is 0.86.
- A caveat: Most of the publicly traded restaurants on this list are fast-food chains (McDonald's, Burger King) or mass restaurants (Applebee's, TGIF…) There is an argument to be made that the beta for an upscale restaurant is more likely to be reflect high-end specialty retailers than it is restaurants. The unlevered beta for 45 high-end retailers is 1.18.

Private Owner versus Publicly Traded Company Perceptions of Risk in an Investment



Estimating a total beta

- To get from the market beta to the total beta, we need a measure of how much of the risk in the firm comes from the market and how much is firm-specific.
- Looking at the regressions of publicly traded firms that yield the bottom-up beta should provide an answer.
  - The average R-squared across the high-end retailer regressions is 25%.
  - Since betas are based on standard deviations (rather than variances), we will take the correlation coefficient (the square root of the R-squared) as our measure of the proportion of the risk that is market risk.
- Total Unlevered Beta

  = Market Beta/ Correlation with the market

  = 1.18 / 0.5 = 2.36

The final step in the beta computation: Estimate a Debt to equity ratio and cost of equity

- With publicly traded firms, we re-lever the beta using the market D/E ratio for the firm. With private firms, this option is not feasible. We have two alternatives:
  - Assume that the debt to equity ratio for the firm is similar to the average market debt to equity ratio for publicly traded firms in the sector.
  - Use your estimates of the value of debt and equity as the weights in the computation. (There will be a circular reasoning problem: you need the cost of capital to get the values and the values to get the cost of capital.)
- We will assume that this privately owned restaurant will have a debt to equity ratio (14.33%) similar to the average publicly traded restaurant (even though we used retailers to the unlevered beta).
  - Levered beta = 2.36 (1 + (1-.4) (.1433)) = 2.56
  - Cost of equity =4.25% + 2.56 (4%) = 14.50%

  (T Bond rate was 4.25% at the time; 4% is the equity risk premium)

Estimating a cost of debt and capital

- While the firm does not have a rating or any recent bank loans to use as reference, it does have a reported operating income and lease expenses (treated as interest expenses)

  Coverage Ratio = Operating Income/ Interest (Lease) Expense
  = 400,000/ 120,000 = 3.33

  Rating based on coverage ratio = BB+ Default spread = 3.25%

  After-tax Cost of debt = (Riskfree rate + Default spread) (1 – tax rate)
  = (4.25% + 3.25%) (1 - .40) = 4.50%

- To compute the cost of capital, we will use the same industry average debt ratio that we used to lever the betas.
  - Cost of capital = 14.50% (100/114.33) + 4.50% (14.33/114.33) = 13.25%
  - (The debt to equity ratio is 14.33%; the cost of capital is based on the debt to capital ratio)

Step 2: Clean up the financial statements

	Stated	Adjusted	
Revenues	$1,200	$1,200	
- Operating lease expenses	$120		Leases are financial expenses
- Wages	$200	$350	! Hire a chef for $150,000/year
- Material	$300	$300	
- Other operating expenses	$180	$180	
Operating income	$400	$370	
- Interest expnses	$0	$69.62	7.5% of $928.23 (see below)
Taxable income	$400	$300.38	
- Taxes	$160	$120.15	
Net Income	$240	$180.23	

Debt	0	$928.23	! PV of $120 million for 12 years @7.5%

Step 3: Assess the impact of the "key" person

- Part of the draw of the restaurant comes from the current chef. It is possible (and probable) that if he sells and moves on, there will be a drop off in revenues. If you are buying the restaurant, you should consider this drop off when valuing the restaurant. Thus, if 20% of the patrons are drawn to the restaurant because of the chef's reputation, the expected operating income will be lower if the chef leaves.
  - Adjusted operating income (existing chef) = $ 370,000
  - Operating income (adjusted for chef departure) = $296,000
- As the owner/chef of the restaurant, what might you be able to do to mitigate this loss in value?

Step 4: Don't forget valuation fundamentals

- To complete the valuation, you need to assume an expected growth rate. As with any business, assumptions about growth have to be consistent with reinvestment assumptions. In the long term,

  Reinvestment rate = Expected growth rate/Return on capital

- In this case, we will assume a 2% growth rate in perpetuity and a 20% return on capital.

  Reinvestment rate = g/ ROC = 2%/ 20% = 10%

- Even if the restaurant does not grow in size, this reinvestment is what you need to make to keep the restaurant both looking good (remodeling) and working well (new ovens and appliances).

Step 5: Complete the valuation

- Inputs to valuation
  - Adjusted EBIT = $ 296,000
  - Tax rate = 40%
  - Cost of capital = 13.25%
  - Expected growth rate = 2%
  - Reinvestment rate (RIR) = 10%
- Valuation

Value of the restaurant = Expected FCFF next year / (Cost of capital –g)

= Expected EBIT next year (1- tax rate) (1- RIR)/ (Cost of capital –g)

= 296,000 (1.02) (1-.4) (1-.10)/ (.1325 - .02)

= $1.449 million

Value of equity in restaurant = $1.449 million - $0.928 million (PV of leases) b= $ 0.521 million

Step 6: Consider the effect of illiquidity

- In private company valuation, illiquidity is a constant theme. All the talk, though, seems to lead to a rule of thumb. The illiquidity discount for a private firm is between 20-30% and does not vary across private firms.
- But illiquidity should vary across:
  - Companies: Healthier and larger companies, with more liquid assets, should have smaller discounts than money-losing smaller businesses with more illiquid assets.
  - Time: Liquidity is worth more when the economy is doing badly and credit is tough to come by than when markets are booming.
  - Buyers: Liquidity is worth more to buyers who have shorter time horizons and greater cash needs than for longer term investors who don't need the cash and are willing to hold the investment.

The Standard Approach: Illiquidity discount based on illiquid publicly traded assets

- Restricted stock: These are stock issued by publicly traded companies to the market that bypass the SEC registration process but the stock cannot be traded for one year after the issue.
- Pre-IPO transactions: These are transactions prior to initial public offerings where equity investors in the private firm buy (sell) each other's stakes.
- In both cases, the discount is estimated the be the difference between the market price of the liquid asset and the observed transaction price of the illiquid asset.
  - Discount Restricted stock = Stock price – Price on restricted stock offering
  - Discount_{IPO} = IPO offering price – Price on pre-IPO transaction

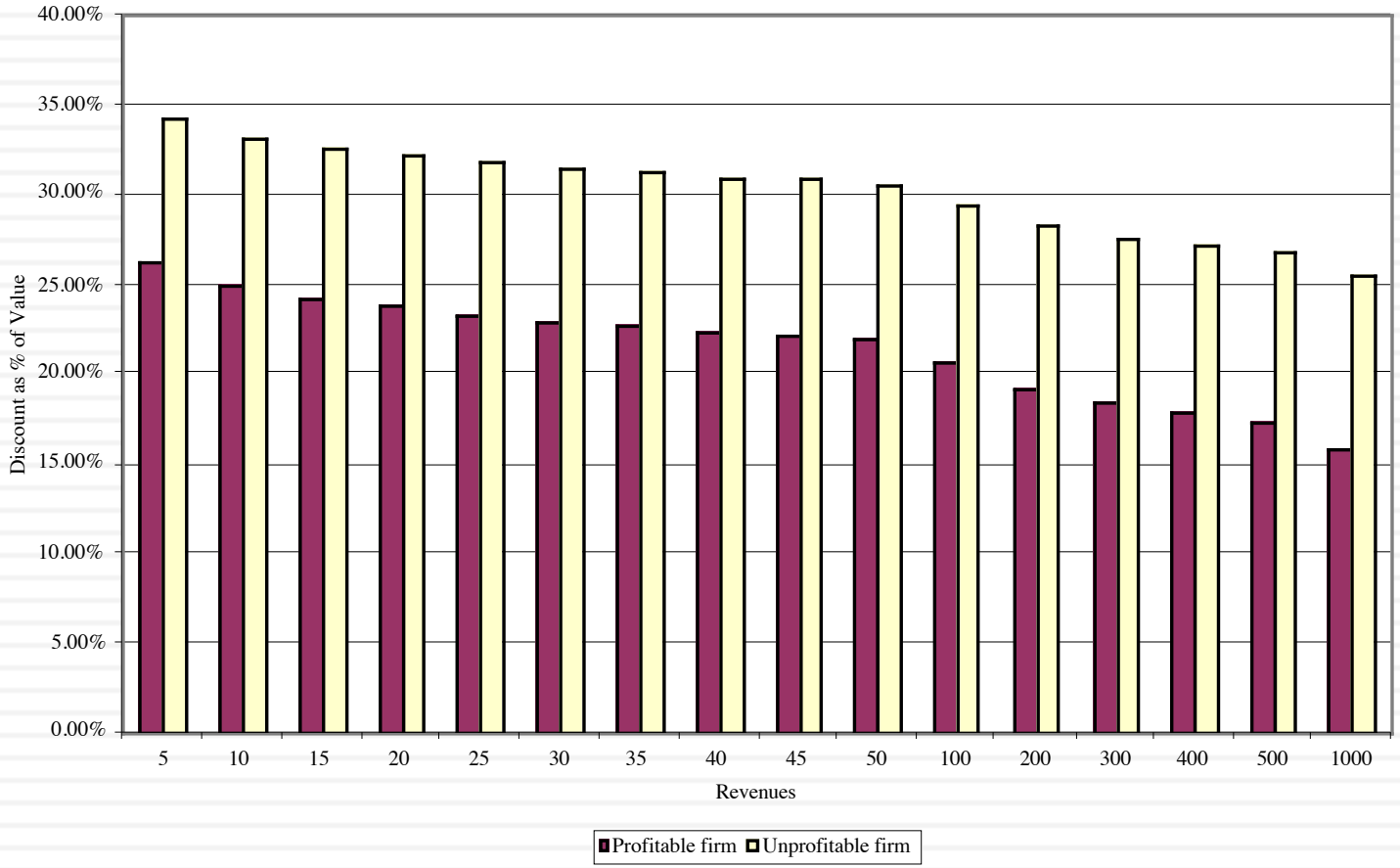
The Restricted Stock Discount

- Aggregate discount studies
  - Maher examined restricted stock purchases made by four mutual funds in the period 1969-73 and concluded that they traded an average discount of 35.43% on publicly traded stock in the same companies.
  - Moroney reported a mean discount of 35% for acquisitions of 146 restricted stock issues by 10 investment companies, using data from 1970.
  - In a study of restricted stock offerings from the 1980s, Silber (1991) finds that the median discount for restricted stock is 33.75%.
- Silber related the size of the discount to characteristics of the offering:

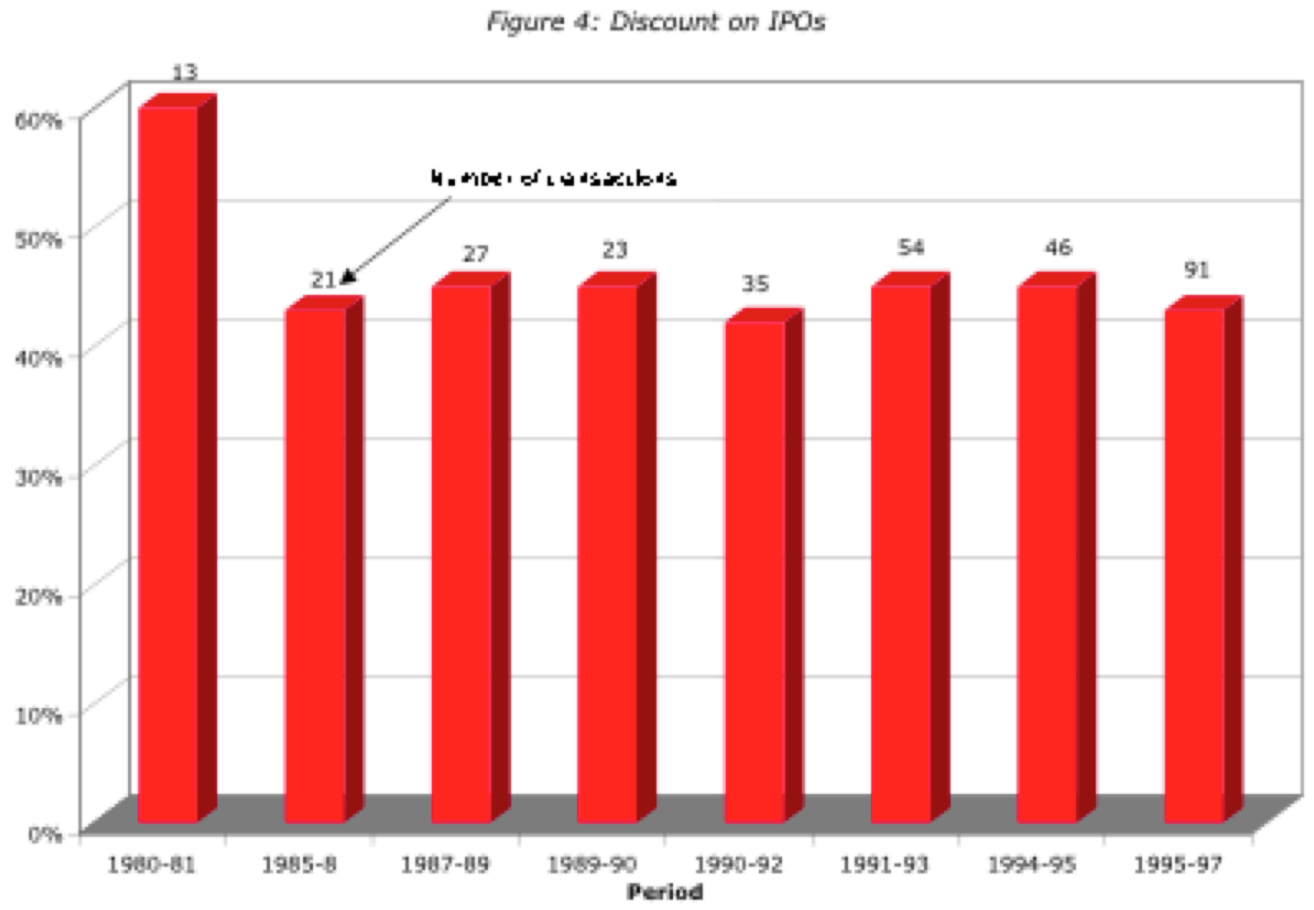
  LN(RPRS) = 4.33 +0.036 LN(REV) - 0.142 LN(RBRT) + 0.174 DERN + 0.332 DCUST
  - RPRS = Relative price of restricted stock (to publicly traded stock)
  - REV = Revenues of the private firm (in millions of dollars)
  - RBRT = Restricted Block relative to Total Common Stock in %
  - DERN = 1 if earnings are positive; 0 if earnings are negative;
  - DCUST = 1 if there is a customer relationship with the investor; 0 otherwise;

Cross sectional differences in Illiquidity: Extending the Silber regression

Figure 24.1: Illiquidity Discounts: Base Discount of 25% for profitable firm with $ 10 million in revenues



The IPO discount: Pricing on pre-IPO transactions (in 5 months prior to IPO)



The "sampling" problem

- With both restricted stock and the IPO studies, there is a significant sampling bias problem.
  - The companies that make restricted stock offerings are likely to be small, troubled firms that have run out of conventional financing options.
  - The types of IPOs where equity investors sell their stake in the five months prior to the IPO at a huge discount are likely to be IPOs that have significant pricing uncertainty associated with them.
- With restricted stock, the magnitude of the sampling bias was estimated by comparing the discount on all private placements to the discount on restricted stock offerings. One study concluded that the "illiquidity" alone accounted for a discount of less than 10% (leaving the balance of 20-25% to be explained by sampling problems).

An alternative approach: Use the whole sample

- All traded assets are illiquid. The bid ask spread, measuring the difference between the price at which you can buy and sell the asset at the same point in time is the illiquidity measure.
- We can regress the bid-ask spread (as a percent of the price) against variables that can be measured for a private firm (such as revenues, cash flow generating capacity, type of assets, variance in operating income) and are also available for publicly traded firms.
- Using data from the end of 2000, for instance, we regressed the bid-ask spread against annual revenues, a dummy variable for positive earnings (DERN: 0 if negative and 1 if positive), cash as a percent of firm value and trading volume.

  Spread = 0.145 – 0.0022 ln (Annual Revenues) -0.015 (DERN) – 0.016 (Cash/Firm Value) – 0.11 ($ Monthly trading volume/ Firm Value)

  You could plug in the values for a private firm into this regression (with zero trading volume) and estimate the spread for the firm.

Estimating the illiquidity discount for the restaurant

Approach used	Estimated discount	Value of restaurant
Bludgeon (Fixed discount)	25%	$0.521 (1- .25) = $0.391 million
Refined Bludgeon (Fixed discount with adjustment for revenue size/ profitability)	28.75% (Silber adjustment for small revenues and positive profits to a base discount of 25%)	$0.521 (1-.2875) = $0.371 million
Bid-ask spread regression	= 0.145 – 0.0022 ln (1.2) -0.015 (1) – 0.016 (.05) – 0.11 (0)= 12.88%	$0.521 (1-.1288) = $0.454 million

II. Private company sold to publicly traded company

- The key difference between this scenario and the previous scenario is that the seller of the business is not diversified but the buyer is (or at least the investors in the buyer are). Consequently, they can look at the same firm and see very different amounts of risk in the business with the seller seeing more risk than the buyer.
- The cash flows may also be affected by the fact that the tax rates for publicly traded companies can diverge from those of private owners.
- Finally, there should be no illiquidity discount to a public buyer, since investors in the buyer can sell their holdings in a market.

Revisiting the cost of equity and capital: Restaurant Valuation

	Private	Public
Unlevred beta	2.36	1.18
Debt to equity ratio	14.33%	14.33%
Tax rate	40%	40%
Pre-tax cost of debt	7.50%	7.50%
Levered beta	2.56	1.28
Riskfree rate	4.25%	4.25%
Equity risk premium	4%	4%
Cost of equity	14.5%	9.38%
After-tax cost of debt	4.50%	4.50%
Cost of capital	13.25%	8.76%

Revaluing the restaurant to a "public" buyer

	Private	*Public*
Adjusted EBIT =	*370*	*370*
Key person discount =	*20%*	*20%*
EBIT =	296	296
Expected growth rate =	2%	2%
Return on capital =	20%	20%
Reinvestment rate =	10.00%	10.00%
FCFF next year =	$163.04	$163.04
Cost of capital =	13.25%	8.76%
Value of business=	$1,449.22	$2,411.79
- Debt	$928.23	$928.23
Value of equity =	$520.99	$1,483.56
- Illiquidity discount	12.88%	0.00%
Value of equity	$453.88	$1,483.56

So, what price should you ask for?

- Assume that you represent the chef/owner of the restaurant and that you were asking for a "reasonable" price for the restaurant. What would you ask for?

a. $ 454,000

b. $ 1.484 million

c. Some number in the middle

- If it is "some number in the middle", what will determine what you will ultimately get for your business?

- How would you alter the analysis, if your best potential bidder is a private equity or VC fund rather than a publicly traded firm?