

Problem Set 3: Back of the Envelope¹

Objective: The objective of this assignment is to introduce students to how developers and investors initially examine the financial feasibility of a deal². The intuition underlying this static approach is that an investor seeks solvency (breakeven) in the short run and profitability in the long run.³ It is also a useful method to (stress) test the initial cash flow assumptions that create the yield. This is important because if the initial cash flow in year one is faulty, by simply doing discounted cash flow analysis, an investor is first compounding the errors into the future and then discounting these errors back to the present. Finally, this approach is useful in determining the highest and best use or most probable use of a given site⁴.

The deal: The Shoppes at Chino Hills which had its grand opening on May 23, 2008, is currently being offered for sale by Eastdil Secured. Located in the lucrative Inland Empire West submarket at Grand Avenue and Peyton Drive in Chino Hills, California just west of the Chino Valley Freeway (SR-71), this lifestyle center⁵ is part of a new 750,000-square-foot master plan that will include a luxury hotel, upscale housing, a new civic center, a community library, county fire department headquarters, and a police station. Designed to capture an upscale Main Street feel, The Shoppes features a pedestrian-friendly promenade with shaded seating areas, an interactive "dancing waters" fountain, and outdoor shopping with store-adjacent parking.



Developed by Phoenix-based Opus West Corporation and designed by internationally renowned architects, Alton & Porter, the official groundbreaking for the \$200 million project occurred in October 2006. The developer contends that Chino Hills' upscale

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²This is known in the trade as the "back of the envelope" or the backdoor-frontdoor approach.

³This is the philosophy that used to be taught at the University of Wisconsin by the late Professor James A. Graaskamp, my mentor. Graaskamp coined the phrase backdoor-frontdoor.

⁴The use having the highest solvency (actual rent > required rent and/or justified value > current price) is deemed the highest and best use. The most probable use recognizes other constraints e.g. practical realities of the market.

⁵Often found near affluent residential neighborhoods, lifestyle centers cater to the lifestyle pursuits of the surrounding neighborhood. They typically include upscale restaurants and retailers on 10 to 40 acres of land. Anchor tenants often account for up to 50 percent of leased space. The center's primary trade area stretches out eight to twelve miles. The International Council of Shopping Centers (ICSC) has a specific definition for a lifestyle center. It must have an open-air format, upscale orientation with proximity to affluent neighborhoods, and range of 150,000 to 500,000 square feet of gross leasable area containing a minimum of 50,000 square feet of national specialty chain stores. Kierland Commons in Scottsdale is one example of a lifestyle center. Tempe Marketplace and Desert Ridge Marketplace are not considered to be a lifestyle center in terms of the ICSC definition.

demographics, the driving time and distance to other Inland malls, pent-up demand for retail and a lineup of savvy retailers and restaurants all increase the mall's chances for success. Strategically located at the border of Orange, Los Angeles and San Bernardino counties, Chino Hills is known for its high-end luxury homes, extensive parks and open space. Chino Hills' median household income, the sixth-highest in the nation as of 2006 according to U.S. Census Bureau figures, is higher than that of Beverly Hills, a city about half its size. The trade area of the lifestyle center does not overlap those of other local malls since the major centers are all at least 15 to 20 miles from The Shoppes. Prior to the opening of The Shoppes, the first major upscale shopping center to be located in the lucrative Chino Hills, Chino Hills residents drove as long as 45 minutes one way to reach regional centers.



The Shoppes at Chino Hills is anchored by Barnes & Noble, Trader Joe's, Victoria's Secret, Banana Republic, H&M and Chicos. P.F. Chang's, Wood Ranch BBQ and a Yard House Bar & Grill are among the restaurants at the mall.

The lifestyle center has a total gross leaseable area of 379,817 square feet with 83% (316,189 sqft) devoted to retail and office space accounting for the remaining 17% (63,628 sqft) on 25.57 acres of land. Over 88.8% of the center's space has been leased with 95.8% of the retail space and 53.8% of the office space occupied. The mall has a parking ratio of 4.7 parking stalls for every 1,000 square feet of leaseable space or 1,784 parking spaces which includes 420 city-owned spaces in a four level parking structure scheduled to open in November 2008.

Structurally, the foundation consists of conventional concrete spread footings with a minimum 4-inch reinforced concrete slabs on grade. The buildings consist of structural steel moment framed columns and beams with composite metal deck and concrete at the second floors. Framing for the restaurants are conventional wood framed. Retail space floors are a minimum 4-inch thick concrete slab. In terms of walls, the buildings are metal stud framed with conventional stucco, brick masonry, tile, metal panel, cement fiberboard, wood, pre-cast concrete, and stone with extensive detailing. Interior wall partitions are typically metal stud with finish taped gypsum wallboard. Demising wall partitions are non-load bearing walls with tenant-side drywall. All wall finishes are treated with a U.L. listed fire retardant.

The city of Chino Hills is investing \$75 million to establish or relocate civic services to land adjacent to the retail center. The city anticipates that the development will generate about \$1.5 million in new yearly revenue for Chino Hills services based on an anticipated \$200 million to \$300 million annually in taxable sales.



Property Assumptions:

| Category | Description | | | | | | | | | |
|-------------------------------|--|------------|----------------------------|------------|--------|-----------------------|----|--------|-----------------------|---|
| Date of Analysis | August 30, 2008 | | | | | | | | | |
| Rental Rates | <p>All market rents are triple net (with some exceptions for the Major tenants and the office space) and are projected to increase 10% midterm</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Rent Increases During Term</th> <th>Lease Term</th> </tr> </thead> <tbody> <tr> <td>Retail</td> <td>10% Increase Month 61</td> <td>10</td> </tr> <tr> <td>Office</td> <td>10% Increase Month 43</td> <td>7</td> </tr> </tbody> </table> | Category | Rent Increases During Term | Lease Term | Retail | 10% Increase Month 61 | 10 | Office | 10% Increase Month 43 | 7 |
| Category | Rent Increases During Term | Lease Term | | | | | | | | |
| Retail | 10% Increase Month 61 | 10 | | | | | | | | |
| Office | 10% Increase Month 43 | 7 | | | | | | | | |
| Pending Leases | There are currently six (6) pending leases totaling 10,871 square feet at the property. | | | | | | | | | |
| Expense Reimbursement Revenue | Tenant expense reimbursement revenues are typically calculated on a net basis, with tenants paying their pro-rata shares of common area maintenance (CAM) based on the provisions detailed in their leases. Expenses for the property have been divided into three cost pools: Retail expenses, Office Building #2 Expenses and Office Building #4 expenses. Retail tenants (with the exception of several pad tenants) reimburse only the retail expenses at the Property. Certain tenants have expense reimbursement caps. | | | | | | | | | |
| Net Percent Rent | Represents projected percentage rent paid by tenants as well as net percentage rent in lieu of base rent for XXI Forever and H&M. See the "Tenant Rollover Schedule" worksheet for the projected rent per square foot for XXI Forever and H&M. | | | | | | | | | |
| Kiosk & Sponsorship Income | Kiosk income includes 6 kiosks, each paying i) \$1,200 per month base rent, and ii) kiosk percentage rent projected as 20% of base rent. Sponsorship income includes signed, prospective and in-negotiation contracts for soft drink vending, ATMs, internal ads, recycling as well as dealership and DirecTV sponsorships. | | | | | | | | | |
| Parking Meter Income | There are currently 127 parking meters with 102 parking meters located in the front of the storefronts (80% occupancy rate assumed) and 25 parking meters located in the back of the buildings (70% occupancy assumed). At a cost of \$1.00 per hour and an average 10 hour day, each of the front and back meters are projected to collect \$8.00 and \$7.00 per day, respectively, seven days per week for 365 days in a calendar year. | | | | | | | | | |

| Category | Description | | | | | | | | | | |
|----------------------------------|--|-------------------------|--|---------------------|-----|---------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
| psf | per square foot of net rentable area. | | | | | | | | | | |
| Expected Selling Price | According to the offering memorandum, The Shoppes at Chino Hills is offered for sale without an asking price on a "Market Determined" basis. Using the "RCA Sales Comps (LA Malls)" worksheet, take the average sales price per square foot for malls sold in 2007 that were built after 2001. Multiply this average sales price per square foot by the total rentable area for The Shoppes at Chino Hills (include the office space). | | | | | | | | | | |
| Going-In Cap Rate | Use the average of the cap rates for malls built in Year 2000 or later in the "RCA CapRates (US Malls)" worksheet. We assume that this is what market participants are currently buying properties at. | | | | | | | | | | |
| Potential Rental Revenue | Assumes 100% occupancy. | | | | | | | | | | |
| Annual Market Rents psf | See "Inland Empire MktStats (CoStar)" worksheet, Quoted Rent (Total) for 2nd Quarter 2008. | | | | | | | | | | |
| Base Rent Abatements (Free Rent) | <p>No free rent is assumed or projected. Free rent is typically given when the market is "soft". Lessors give free rent of so many months e.g. 5 months of free rent to entice tenants to rent their space. Base rent abatements a.k.a. free rent are subtracted from potential gross revenue to obtain Scheduled Base Rental Revenue as follows:</p> <table> <tr> <td>Potential Gross Revenue</td> <td></td> </tr> <tr> <td>Base Rental Revenue</td> <td>xxx</td> </tr> <tr> <td>- Absorption & Turnover Vacancy</td> <td>xxx</td> </tr> <tr> <td>- <u>Base Rent Abatements</u></td> <td>xxx</td> </tr> <tr> <td>Scheduled Base Rental Revenue</td> <td>xxx</td> </tr> </table> | Potential Gross Revenue | | Base Rental Revenue | xxx | - Absorption & Turnover Vacancy | xxx | - <u>Base Rent Abatements</u> | xxx | Scheduled Base Rental Revenue | xxx |
| Potential Gross Revenue | | | | | | | | | | | |
| Base Rental Revenue | xxx | | | | | | | | | | |
| - Absorption & Turnover Vacancy | xxx | | | | | | | | | | |
| - <u>Base Rent Abatements</u> | xxx | | | | | | | | | | |
| Scheduled Base Rental Revenue | xxx | | | | | | | | | | |
| Vacancy | The market vacancy rate is 3% (see "Inland Empire MktStats (CoStar)" worksheet). As of the analysis date, The Shoppes at Chino Hills is 88.8% percent leased. It is anticipated that the occupancy rate will increase to 95.3% if all pending leases are signed. | | | | | | | | | | |

| Category | Description |
|--|--|
| Operating Expense | Anticipated operating expenses are reported in the "Projected CF (FY 2009)" worksheet for the initial lease-up periods. Operating expenses are either reimbursable or non-reimbursable. Reimbursable expenses mean that the tenant will reimburse the landlord for these expenses. Total operating expenses are \$9.66 per square foot. However, expense reimbursement revenue is \$7.55 per square foot for a net operating expense of \$2.11 per square foot (this is what the landlord actually pays for operating expenses since the leases are triple net). Non-reimbursable expenses include marketing and miscellaneous administrative expenses associated with operations at the shopping center. Real estate taxes have NOT been reassessed to reflect a sale of the asset. |
| Capital Expenditures | |
| Tenant Improvements psf (Lease concession). Also known as TI or Finish Out Allowance | <p>Tenant improvements are reported in the "Available Space Lease-Up" worksheet. This is considered to be a type of Capital Expenditure (CapEx).</p> <p>The landlord aka lessor pays for this cost (TI) and represents a concession that effectively lowers the rental rate. We assume that TI is amortized (depreciated) over the life of the lease e.g. assumes that the life of Tenant Improvements is equal to the length of the lease. Note: any cost in excess of the agreed amount is to be paid by the tenant. No excessive TI allowance is assumed for our property e.g., additional amount above standard TI.</p> |
| Leasing commissions | Leasing commissions are calculated based on the total aggregate rents over the respective lease term and are reported in the "Available Space Lease-Up" worksheet. This is considered to be a type of Capital Expenditure (CapEx). |
| Capital Reserves | Capital reserves are \$0.10 PSF of GLA, increased 3% per annum thereafter. This is considered to be a type of Capital Expenditure (CapEx). |
| Parking | Assume that a parking stall consists of 450 square feet inclusive of the driveway. The construction cost for parking is reported in the "Construction Costs" worksheet. Use the Above Ground Parking, High Estimate. In terms of parking spaces per 1,000 square feet of GLA, assume that this should be 5 for a typical mall. |

| Category | Description |
|--|--|
| Loan Balance | The property is offered free and clear. |
| Interest Rate on Commercial Mortgages | <p>The interest rate on a new loan is calculated as the yield on the Treasury bond (see “Treasury Rates” worksheet) + risk premium (see “BondMkt Rates” worksheet) based on the average credit risk of the major tenants that you calculate using the “3. Altman Z-Score” worksheet in conjunction with the “Imputed Bond Ratings” worksheet and the various 10Q worksheets. Use the lease maturity to figure out the appropriate Treasury bond to use. For example, if the maturity of the lease is 5 years, then we use the yield on a 5 year Treasury bond as the risk free rate⁶.</p> <p>Note: This pre-tax cost of debt is the borrowing cost if the borrower were to borrow money directly from the capital markets instead of using bank financing.</p> <p>Example: Suppose that the average credit risk of our major tenants is AA and the weighted average lease maturity (WALM) for these tenants is 5 years. Then the expected interest rate using the numbers in our spreadsheet is</p> <p>Riskfree rate: 3.05% (bcs its a 5-year lease) + <u>Default premium</u>: 1.40% (5-yr Treas bcs 5 yr lease) Pre-tax Cost of Debt 4.45%</p> |
| Mortgage Constant | Annual mortgage constant is calculated using the payment on a \$1 loan for 360 months at the monthly interest rate (see above). This monthly mortgage constant is multiplied by 12 to arrive at the annual mortgage constant. |
| Loan to Value (LTV) | The lesser of i) up to 75% (unanchored), 80% (anchored, shadowanchored) of MAI appraised value conforming to FIRREA and USPAP guidelines and ii) 95% (anchored, shadow anchored) of loan to acquisition cost (if applicable), up to 85% (unanchored). |
| Amortization Period or Term of Loan ⁷ | The term of the loan is 10 years with a 30 year amortization. |

⁶If the lease has a 7 year maturity, take the weighted average of the 5-year and 10-year Treasury yield for the risk free rate e.g. 60%*5-year Treasury yield + 40%*10-year Treasury yield.

⁷The loan terms are from the Retail Mortgage Program at Deutsche Bank. Eligible property types include anchored, shadow-anchored and unanchored shopping centers, lifestyle centers, power centers and outlet centers. Single tenant retail properties will be considered on a case-by-case basis.

http://www.corporatefinance.db.com/home/index.php?id=cre_financing_solutions_conduit_loans®ion=americas#retail

| Category | Description |
|--|--|
| Debt Coverage Ratio | 1.20; This is the minimum for anchored malls. The DSCR may be adjusted depending upon the credit quality of the tenant base. |
| Before-tax Cash on Cash (Return on Equity) | 10.8% (Source: RealtyRates.com) |

Assignment: Please prepare a spreadsheet to answer the following questions and highlight your answers in yellow. *This is an individual assignment.* Please format your report in a Wall Street presentation style so that you can use this case in the interview process.

1. Weighted Average Lease Maturity (10 points): Using the information on tenants in the "Tenant Rollover Schedule" worksheet, calculate the weighted average lease maturity in years using the "1. WALM" worksheet by filling in the area highlighted in yellow where

Time Remaining (Months): is the time in months from the current month to the end of the lease (Lease Ends). To calculate the time in months, use the Year (x) and Month (x) functions in Excel. Suppose for example, that column G4 contains the beginning of the lease and column F4 contains the end of the lease. Then the time in months = (YEAR(F4)-YEAR(G4))*12+MONTH(F4)-MONTH(G4)

Time * Leased RSF = Time (Months) * Leased Rentable Square Feet. Calculate this only for suites that are occupied. Do not calculate for vacant units, pending leases or leases where the tenant has not yet moved into their space.

Wtd Time (Months) = [Time (Months) * Leased RSF]/Total Occupied RSF. This is the weighted time in months calculated as Time (Months) weighted by Leased RSF divided by Total Occupied RSF where RSF is rentable square feet. Total Occupied RSF excludes vacant units as well as units on pending leases or leases where the tenant has not yet moved into their space.

Example: Suppose there are only 2 tenants in an office building that has 3 suites:

| Tenant | Leased RSF | Lease Begins | Lease Ends | Time (Months) | Time * Leased RSF | Wtd Time (Months) |
|-------------|------------|--------------|------------|---------------|-------------------|-------------------|
| Office Comp | 5,671 | Jan-06 | Jul-07 | 18 | 102,078 | 8.34516 |
| Vacant | 8,144 | | | | | |
| Polka Dots | 6,561 | May-02 | Aug-09 | 87 | 570,807 | 46.665506 |

Then

$$\text{Time * Leased RSF (Office Comp)} = 5,671 * 18 = 102,078$$

$$\text{Time * Leased RSF (Polka Dots)} = 6,561 * 87 = 570,807$$

$$\text{Wtd Time (Months) (Office Comp)} = 102,078 / (5,671 + 6,561) = 8.34516$$

$$\text{Wtd Time (Months) (Polka Dots)} = 570,807 / (5,671 + 6,561) = 46.665506$$

$$\text{WALM (in yrs)} = (8.34516 + 46.665506) / 12 \text{ months} = 55.01022 / 12 \text{ mos} = 4.58 \text{ yrs.}$$

What is the weighted average lease maturity for tenants that have already signed (not pending)? If you were an investor, would you use a 5 year, 7 year or 10 year holding period? In terms of calculating the interest rate for this deal, would you use a 5 year, 7 year or 10 year Treasury bond? Please explain your rationale. Is there any difference between the weighted average lease maturity of the Major Tenants and All Other Tenants? In theory, should you expect to see a difference between the WALM for Major Tenants vs. Other Tenants? What is the tradeoff between length of the lease and the amount of rent charged?

From a tenant mix perspective, what types of upscale tenants are missing from this lifestyle center? Is this worrisome or is it an advantage? Is the tenant mix balanced or are there too many of the same type of shops? Please explain. What type of clientele does this lifestyle center seem to appeal to given its tenant roster?

2. Tenant Rollover (10 points): Using the information on tenants in the “Tenant Rollover Schedule” worksheet, complete the “2. Tenant Rollover” worksheet by filling in the area highlighted in yellow. Be sure to include all *pending* leases in your analysis. What are the critical years with respect to leases potentially rolling over? Discuss why it is important to do a lease rollover analysis?
3. Imputed Bond Rating of Major Tenants (10 points): Using the financial statement information provided in the “Barnes & Noble 10Q (BKS)”, “The Limited 10Q (LTD)”, “The Gap 10Q (GPS)”, “PF Chang 10Q (PFCB)”, “Charming Shoppes 10Q (CHRS)”, “Coldwater Creek (CWTR)”, and the “Imputed Bond Ratings” worksheets, complete the worksheet labeled “3. Altman Z-Score”. A discussion on how to calculate Altman Z-Scores is contained in Appendix A of this case. Since you are using historical 10Q statements, please be aware that the balance sheet contains “stock” items while the income statement is associated with “flow” items. Since we are trying to calculate items on a trailing twelve month (TTM) basis, we use the number that is reported for a stock item at a given moment in time as its TTM e.g., as of a certain date, what are the total assets on hand? Flow items in contrast need to be summed up over 4 quarters. Using 10Q statements are preferred to that of 10K statements for timeliness of financial information.

Note: For EBIT (earnings before interest and taxes), if there is a Depreciation and Amortization number reported in line 69 (this depends on which firm you are looking at) then $EBIT = INC\ BEF\ DEP\ \&\ AMORT - DEPRECIATION\ \&\ AMORT$. However if Depreciation and Amortization = "NA", then $EBIT = INC\ BEF\ DEP\ \&\ AMORT$. The intuition for this is that some firms already include Depreciation and Amortization in Cost of Goods Sold.

If the Z-Score falls between 2 ratings, calculate the average of the 2 Z scores. If it is higher (lower) then that average, use the higher (lower) rating.

On average, what is the health of the publicly traded tenant's based on their bond ratings? Given the health of the publicly traded tenant's average bond rating, if the investor used Deutsche Banc⁸ to finance the deal, what is the most probably debt

⁸http://www.corporatefinance.db.com/home/index.php?id=cre_financing_solutions_conduit_loans®ion=americas#retail

coverage service ratio they would get? Which tenants might we be concerned about even though they have a relatively high rating? Why the concern? Please explain.

4. Cap Rate Frontdoor Approach (20 points):

- a. Required Rent (10 points): Calculate the required asking rent per square foot of **net rentable area** using the cap rate version of the front door approach located in the “4. Frontdoor” worksheet. Assume that no capital expenditures (CapEx) are necessary for this scenario since the mall has only recently been built. Is the deal financially feasible? Please explain.
- b. Sensitivity Analysis via Data Table (5 points): In addition to calculating required rent, prepare a two way Data Table showing the required rent at varying levels of total operating expenses per square foot and going-in cap rates. To access the Data Table command in Excel click on **Data** submenu on the Excel toolbar → **Table ...**. Appendix E gives an illustration of how to use the Data Table function. What is the most probable cap rate that makes the deal work at various vacancy rate levels? What range of operating expense per square foot (excluding TI/LC) in combination with the cap rate(s) makes the deal feasible? Why might you expect operating expenses to increase once you purchase the property?
- c. Sensitivity Analysis via Solver (3 points): This is where we try to structure the deal to make it financially feasible by varying the terms of the deal. Only one term is varied with all other terms/parameters remaining constant. I have provided a “4.c Frontdoor Sensitivity” worksheet for you to put your final answers into. Please discuss whether the following terms make financial sense:
 - What is the highest purchase price that an institutional investor should pay and still have the deal be financially feasible all other variables remaining constant?
 - What would the highest going-in cap rate have to be for the deal to breakeven all other variables remaining constant? Note: Some developers such as the Reichmans use the interest rate in lieu of the going-in cap rate. This implicitly assumes that no equity is put into the deal e.g., 100% debt financing so the investor “mortgages-out”. (Please see Appendix E of this case study).
 - What is the highest vacancy rate that the building can have and still have the investor remain solvent all other variables remaining constant including the purchase price?
 - What is the highest operating expense per square foot that the property could have to be for the deal to breakeven all other variables remaining constant?

Hint: Make a copy of your Frontdoor worksheet by right clicking on the mouse, selecting the **Move or Copy....** option, highlighting the Frontdoor worksheet, click on the box at the lower left hand corner **Create a copy** and then click the **OK** button. Next, use the **Solver...** subroutine located under the **Tools** submenu in

Excel and set the justified rent equal to the asking rent. Appendix F of this case gives an example of how to use Solver.

5. Backdoor using Debt Coverage Ratio Approach (20 points): What is the justified price per square foot of gross building area for The Shoppes given the assumptions listed in the case and the “5. Backdoor (DSCR)” worksheet? What is the justified price per square foot of gross building area for The Shoppes at Chino Hills? Is the deal financially feasible from a backdoor perspective if we use a price per square foot based on comparable properties that recently sold as the benchmark? Please explain. Please use the Data Table command in Excel to set up a two-way table showing the justified price per square foot of gross building area at i) various combinations of mortgage constant and operating expenses per square foot, ii) various combinations of the debt coverage ratio and the cash-on-cash. Are there any scenarios for which the deal is financially feasible? What does your analysis suggest about their likely "implied" investment strategy?
6. Parking and Other Considerations (10 points): Malls typically have a 5 stalls per 1,000 square feet of Gross leasable area. For example, a 1-million-square-foot mall had a parking ratio of 5, meaning that for every 1,000 square feet of building, there were 5 parking spaces. This means that there are 5,000 parking spaces for the property. The Shoppes at Chino Hills has 1,784 parking spaces which includes 420 city-owned spaces in a four level parking structure opening in November 2008 (this case is of August 2008). Please discuss whether there is enough parking for our mall if we use this criteria and what the implications are from a cash flow perspective if this criteria is not met. How much additional investment or CapEx is necessary? A worksheet labeled “6. Prkg & Other Considerations“ is provided for you to do the necessary calculations.

What happened in July 29, 2008 in the Chino Hills area? Is this something that would make you avoid any investments in the area altogether? Are there any other negative factors (for example, economy, transportation, etc in the area) which would impact on your decision? Please discuss.
7. Recalculating the Frontdoor (5 points): Recalculate the frontdoor approach using your answer in question 6 above for additional capital improvements. Is the deal still financially feasible? Please explain.
8. Recalculating the Backdoor (5 points): Recalculate the backdoor approach using your answer in question 6 above for additional capital improvements. Is the deal still financially feasible from a backdoor perspective if the buyer has to build a parking garage? Please explain. What impact does the cost of constructing a parking garage have on the project feasibility when viewed from a sensitivity analysis perspective. Please explain.
9. Conclusion (5 points): Based on the frontdoor-backdoor solvency analysis as well as your qualitative assessment of the property and its location, would you recommend that the property be purchased. Please explain the rationale for your decision.

Appendix A: Altman Z-Score Model

There are several versions of the Altman z-score model. We will use one version of his model (EM-score). Professor Edward Altman of NYU developed these models using multiple discriminant analysis in conjunction with financial ratios to predict the probability of business failure leading to bankruptcy.

Model 1: The EM-score (emerging markets) model is defined as

$$\text{EM Score} = 3.25 + 6.56(X_1) + 3.26(X_2) + 6.72(X_3) + 1.05(X_4)$$

where $X_1 = \text{Working Capital/Total Assets} = (\text{Current Assets} - \text{Current Liabilities})/\text{TA}$
 $X_2 = \text{Retained Earnings/Total Assets}$
 $X_3 = \text{EBIT/Total Assets}$
 $X_4 = \text{Book Value of Equity/Total Liabilities}$

| Bond Rating | Altman Z-Score | Bond Rating | Altman Z-Score |
|-------------|----------------|-------------|----------------|
| AAA | 8.15 | BB+ | 5.25 |
| AA+ | 7.60 | BB | 4.95 |
| AA | 7.30 | BB- | 4.75 |
| AA- | 7.00 | B+ | 4.50 |
| A+ | 6.85 | B | 4.15 |
| A | 6.65 | B- | 3.75 |
| A- | 6.40 | CCC+ | 3.20 |
| BBB+ | 6.25 | CCC | 2.50 |
| BBB | 5.85 | CCC- | 1.75 |
| BBB- | 5.65 | D | 0.00 |



Ed Altman, NYU

Model 2: This is the original version of Altman's model that is on the Bloomberg machine and websites such as <http://www.jaxworks.com/calc2.htm> as a worksheet.

$$Z = 1.21(Y_1) + 1.4(Y_2) + 3.3(Y_3) + .6(Y_4) + 1.0(Y_5)$$

where $Y_1 = \text{Working Capital/Total Assets}$
 $Y_2 = \text{Retained Earnings/Total Assets}$
 $Y_3 = \text{EBIT/Total Assets}$
 $Y_4 = \text{Book Value of Equity/Total Liabilities}$
 $Y_5 = \text{Sales/Total Assets}$

A Z-Score ≥ 2.99 indicates that the firm is solvent (e.g., is in good shape)

$1.81 \leq \text{Z-Score} \leq 2.99$ indicates a warning

Z-Score < 1.81 indicates that the firm could be heading towards bankruptcy

Note: The z-score represents a point in time. As such, the z-scores should be examined over time. Consistently low scores each year are more of a concern than a one time low score. The model is applicable to *manufacturing* firms.

Appendix B: Equivalent Annual Annuity (EAA)

The Equivalent Annual Annuity method begins with the calculation of the NPV (or PV) of each project under consideration. This value is converted to an annuity given the number of years in the project's life span. That is, given the number of years and the discount rate, there is an amount which if paid at regular intervals for the same period would equal the NPV (or PV). The annuity can be calculated using the following formula:

$$\text{Annuity} = \frac{\text{Net Present Value or Present Value}}{\sum_{t=1}^T \left(\frac{1}{1+r} \right)^t}$$

Example: Suppose that our building has 100,000 square feet. Leases have 15 year terms and tenants in our building have BBB credit ratings. All of the leases are new. The treasury yield on a 10 year bond is 4.54% and on a 30 year bond is 4.81%. The default spread associated with a BBB bond at 10 years is 156 bps (basis points) and is 172 bps for a 30 year bond. Tenant improvements per square foot per year (psf/yr) are \$20.

| | | |
|---------------------------------------|--------------|---------------------------------|
| Risk-free rate ⁹ | 4.68% | ((4.54%+4.81%)/2) |
| <u>+ Default premium¹⁰</u> | <u>1.64%</u> | <u>((1.56%+1.72%)/2)</u> |
| Pre-tax Cost of Debt | 6.32% | (This is our discount rate (r)) |

Tenant Improvements: \$20 * 100,000 sqft = \$2,000,000 (this is our present value (PV))

Length of lease (T): 15 years

$$\text{PVIFA} = 1 / \sum_{t=1}^T \left(\frac{1}{1+r} \right)^t = 1 / \sum_{t=1}^T \left(\frac{1}{1+.0632} \right)^t = 9.51236281$$

EAA = Total Tenant Improvements/PVIFA = \$2,000,000/9.51236281 = \$210,253

TI psf/yr = EAA/Square Feet = \$210,253/100,000 sqft = \$2.10 psf/yr

⁹A Use "15 year" treasury yield since leases are 15 yrs. Since there is no "15 year" treasury, we take the average of the yield on a 10 year and a 30 year Treasury bond

¹⁰Averaged the default premium of a 10 year BBB bond and a 30 year BBB bond. Since 100 basis points (bps) = 1%, it follows that 156 bps = 1.56%.

Appendix C: Example of Simplistic Way of Calculating Effective Rent

Assume that

Square feet of tenant: 5,000 square foot

Term of lease: 36 months

Base rent: \$25 psf

Annual escalations: \$.50

Free rent: 1 month (first month)

| | Formulas | Total Rent |
|---|---|------------------------|
| Year 1 (11 months) | $\$25.00 * 5,000 \text{ sqft} * (11/12 \text{ months}) =$ | \$114,583 |
| Year 2 (12 months) | $\$25.50 * 5,000 \text{ sqft} =$ | \$127,500 |
| Year 3 (12 months) | $\$26.00 * 5,000 \text{ sqft} =$ | <u>\$130,000</u> |
| Total Rent (all periods) | | \$372,083 |
| Effective Rent: $\$372,083/5,000 \text{ sqft}/3 \text{ years} =$ | | \$24.81/sf/year |
| Rent Abatement (free rent): $\$25*(1/12 \text{ months})/3\text{years} =$ | | \$ 0.69/sf/year |
| <u>÷ Average Rent: $\\$382,500/5,000 \text{ sqft}/3 \text{ years} =$</u> | | <u>\$25.50/sf/year</u> |
| Haircut (percentage free rent) | | 2.7% |

where $\$382,500 = \$125,000 + \$127,500 + \$130,000$ (if no free rent exists in yr 1)

Appendix D: The Brothers Reichmann

The Brothers Reichman and the Strategy of “More is More” (5 Points)¹¹: In an interview with Olympia and York’s executive vice president Edward Minskoff,

“Just how well the market adapts to rent increases is the determining factor in Olympia & York’s planning for new developments. The go-ahead is very much a function of projected income exceeding projected costs. ‘Before flashing the green light for a new project, the developer has to tally both hard and soft costs,’ Minskoff explains. ‘The former refers to expenses incurred on the actual construction work; the latter includes design, legal and accounting fees, marketing, expenses and so forth.

In New York today (1983), hard and soft costs to develop new properties range from \$150 to \$250 per square foot depending on the cost of the land. For argument’s sake, let’s figure \$150 as the average cost. With financing at 15 percent, interest would be \$22.50 per square foot, add another \$7 per square foot for taxes and \$7 for maintenance and you have a breakeven figure of \$36.50 per square foot. Projected market rent levels will have to be at a minimum \$38 to \$40 per square foot



Paul Reichmann

level to make the development economically feasible. We also figure our rent adjustments this way. They should reflect replacement costs to develop similar buildings in the current market.

The same kind of thinking applies to property purchases, as well. One of the reasons we bought the Uris buildings was that calculations showed the asking price to be about a third of replacement costs. We’d have had to spend three times as much to build comparable properties.’ ”

In 1964, the Reichmann brothers: Albert, Paul and Ralph, established Olympia and York Industrial Development Company, which, at its peak, constituted the greatest real estate empire the world had ever seen. Two sentences could express the Reichmann’s way of doing business: “Their edge was their integrity” and “Their word was their bond”. The Reichmanns were one of the ten wealthiest families in the world, ranking just below the British Royal family in the 1980s. Paul Reichmann has been at the same time one of the most resourceful and resilient entrepreneurs of the 20th century. Notable buildings that the Reichmanns have developed include the World Financial Center and Canary Wharf¹².



Canary Wharf, UK

¹¹from Mark Stevens, *Land Rush: The Secret World of Real Estate’s Super Brokers & Developers*, 1984, McGraw-Hill

¹²www.shemayisrael.co.il/orgs/ozar/reichman.htm

Appendix E: How to Use the Data Table Function

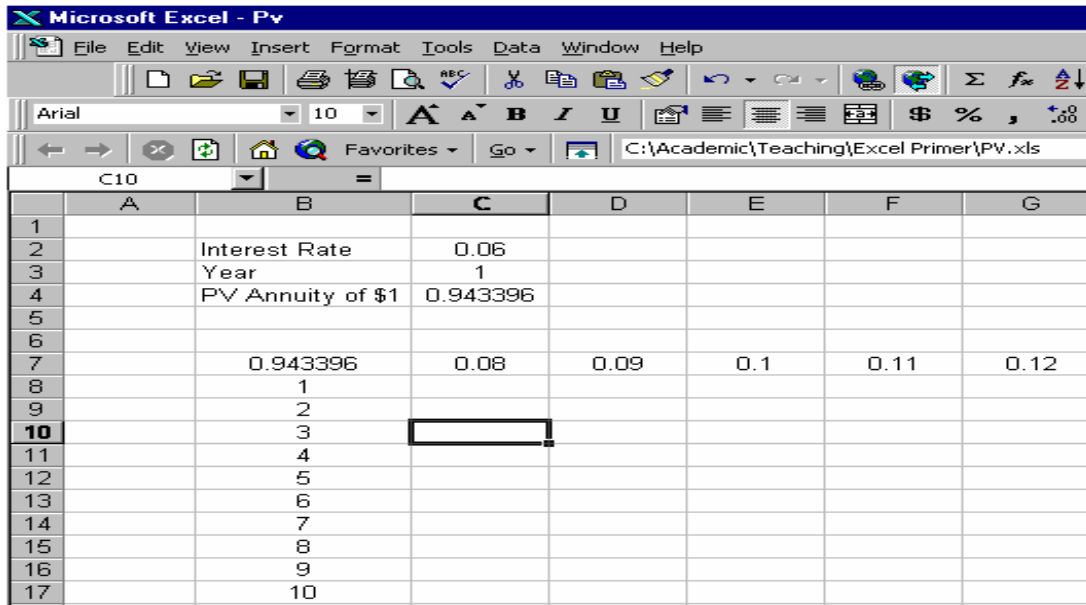
One method to do sensitivity analysis is by using the DATA TABLE command. This command allows the user to build a table in which only one variable is changed. Alternatively, the user can build a table in which two variables are changed. The nice feature of a DATA TABLE is that the table changes when the corresponding reference cells are changed.

Warning: One quirk of the Data Table command is that it can only be used on the same sheet that the formulas are on. As such, a Data Table cannot be constructed by linking together several worksheets (We will discuss how to link worksheets later on)

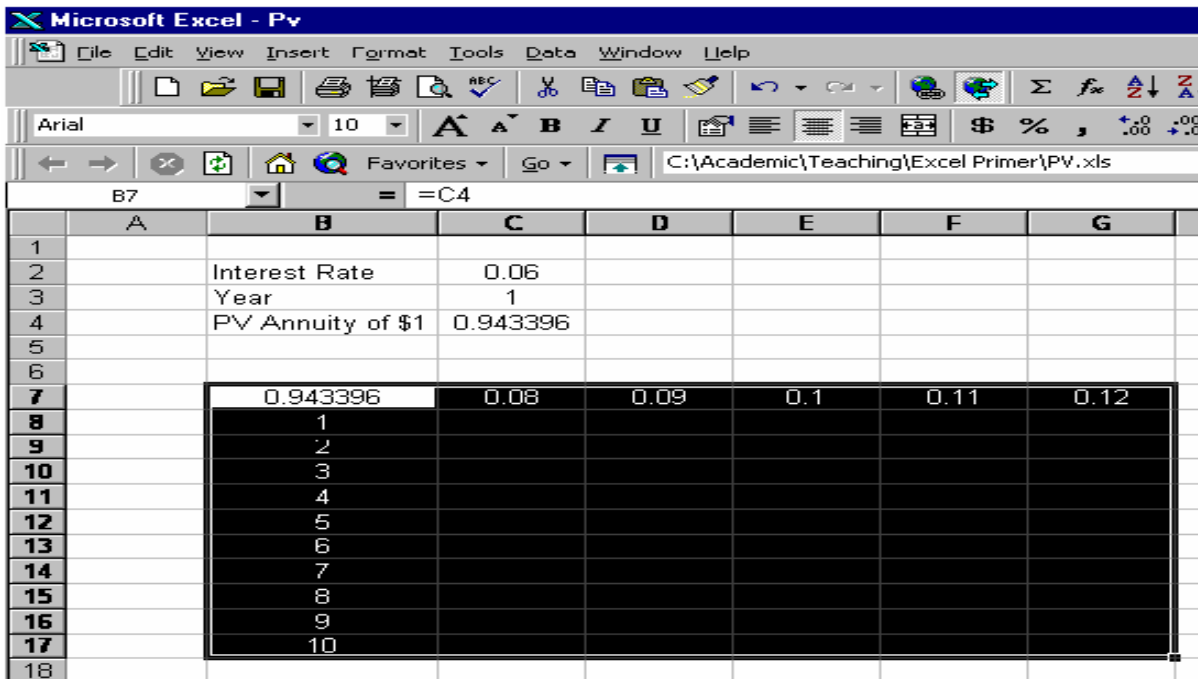
Example: Time value of money tables are frequently included at the back of most corporate finance textbooks. We will construct a present value of an annuity of \$1 per period table.

- ① We will use a new worksheet in our workbook. Go to the lower left hand corner of the worksheet and click on Sheet 2. Rename this sheet PV of an Annuity of \$1. Type the following words and numbers in the appropriate cells

| Cell | What to Type in the Cell |
|----------|---|
| B2 | Interest Rate |
| C2 | .06 (you can click on the % icon after you type this in) |
| B3 | Year |
| C3 | 1 |
| B4 | PV Annuity of \$1 |
| C4 | = $(1 - (1 / (1 + \$C\$2)^{C3})) / \$C\2 or =PV(\$C\$2,C3,-1,0) |
| B8 – B17 | Type in the numbers 1 through 10 in sequential order |
| C7 – G7 | Type in the numbers .08 to .12 in sequential order |
| B7 | =C4 (This is the reference cell used to generate the Table) |

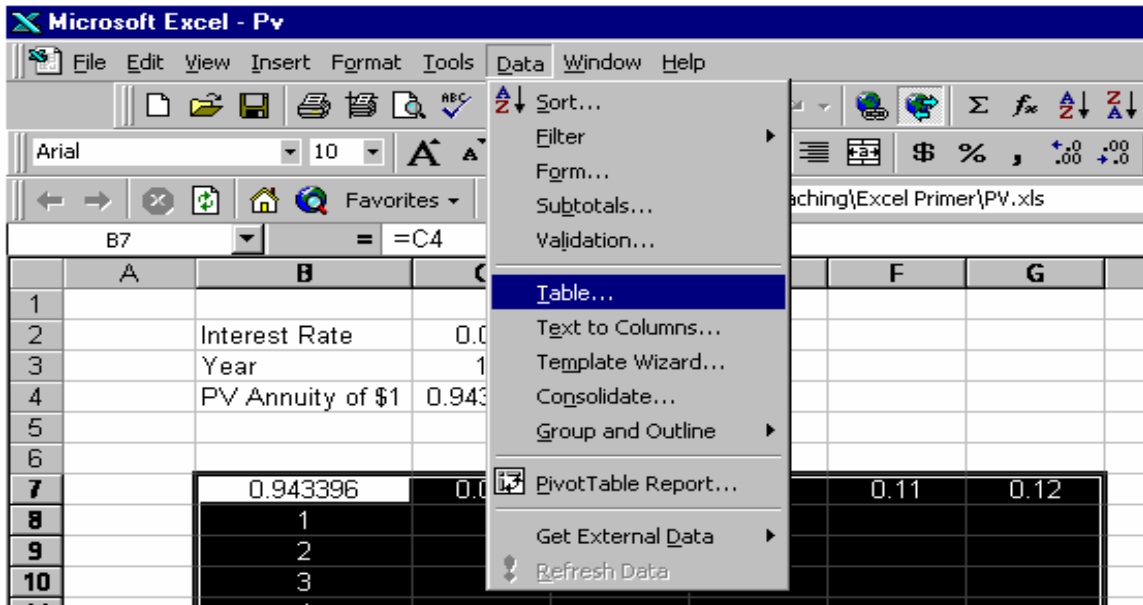


- 2 Click on cell B7. Hold down the Shift key and then click on cell G17. Column B through Column G should be highlighted in black from row 7 through row 17.



Alternatively, you can click on cell B7 and highlight the area by holding down the left button on your mouse and moving your cursor to cell G17.

- ③ From the **TITLE** toolbar, click on **Data** and then choose the **Table...** option.

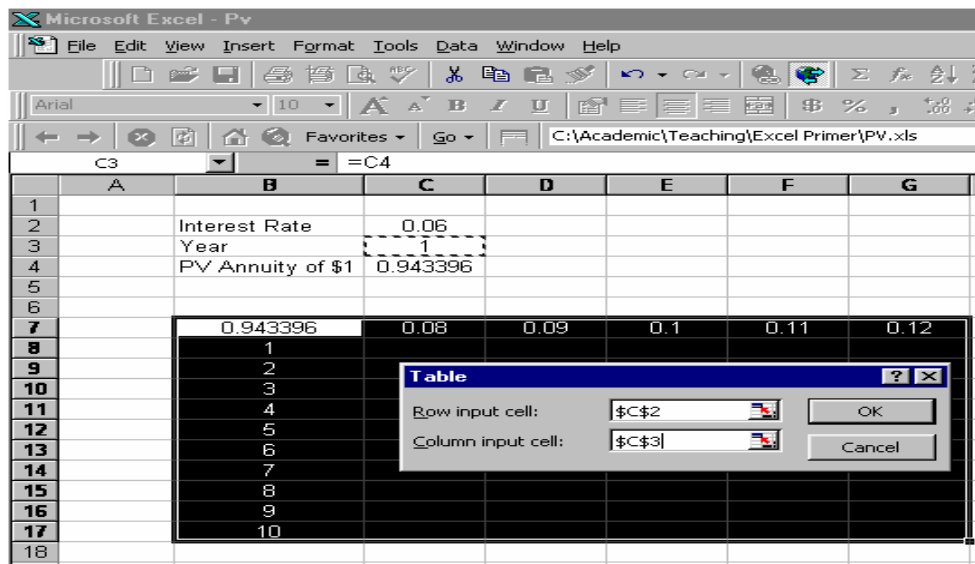


- ④ In the Table box which appears on your screen, there is a **Row Input Cell** and a **Column Input Cell**.

For the **Row Input Cell**, click on cell C2. The first box should now have \$C\$2 in it. Cell C2 (\$C\$2) is the Absolute Cell Reference for the initial discount rate. Notice that in the table we have constructed, all of our discount rates are in a ROW.

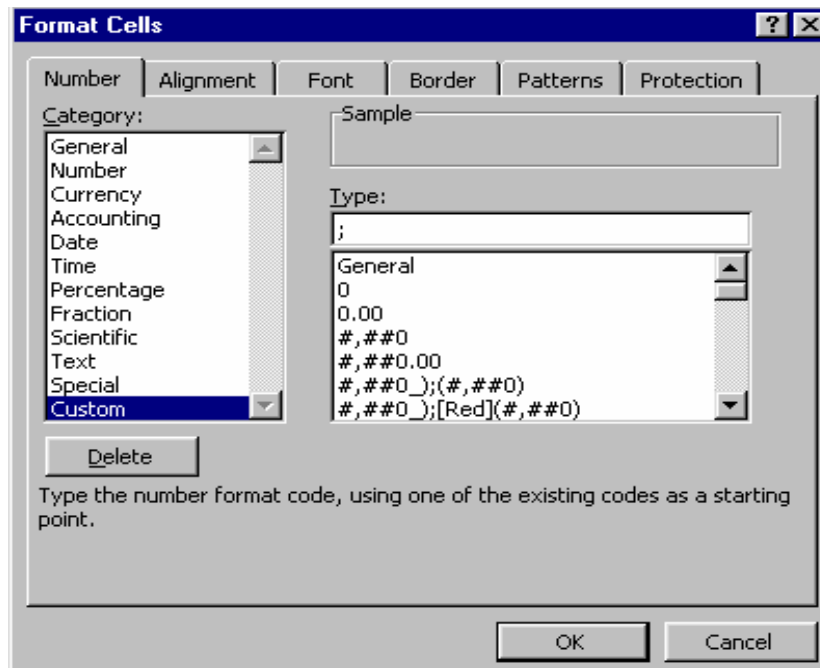
Next, for the **Column Input Cell**, click on cell C3. The second box should now have \$C\$3 in it. Cell C3 (\$C\$3) is the Absolute Cell Reference for the initial year (T). Observe that in the table we have constructed. All of our years are in a COLUMN.

Click the OK button.



| | A | B | C | D | E | F | G |
|----|---|-------------------|----------|----------|----------|----------|----------|
| 1 | | | | | | | |
| 2 | | Interest Rate | 0.06 | | | | |
| 3 | | Year | 1 | | | | |
| 4 | | PV Annuity of \$1 | 0.943396 | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | 0.943396 | 0.08 | 0.09 | 0.1 | 0.11 | 0.12 |
| 8 | | 1 | 0.925926 | 0.917431 | 0.909091 | 0.900901 | 0.892857 |
| 9 | | 2 | 1.783265 | 1.759111 | 1.735537 | 1.712523 | 1.690051 |
| 10 | | 3 | 2.577097 | 2.531295 | 2.486852 | 2.443715 | 2.401831 |
| 11 | | 4 | 3.312127 | 3.23972 | 3.169865 | 3.102446 | 3.037349 |
| 12 | | 5 | 3.992710 | 3.889651 | 3.790787 | 3.695897 | 3.604776 |
| 13 | | 6 | 4.622880 | 4.485919 | 4.355261 | 4.230538 | 4.111407 |
| 14 | | 7 | 5.206370 | 5.032953 | 4.868419 | 4.712196 | 4.563757 |
| 15 | | 8 | 5.746639 | 5.534819 | 5.334926 | 5.146123 | 4.967640 |
| 16 | | 9 | 6.246888 | 5.995247 | 5.759024 | 5.537048 | 5.328250 |
| 17 | | 10 | 6.710081 | 6.417658 | 6.144567 | 5.889232 | 5.650223 |
| 18 | | | | | | | |

- ⑤ **Improving the Presentation of the Data Table:** We shall first convert the discount rates from decimals into percentages in cell C7 through cell G7 by clicking on the % icon in the MENU toolbar. Next, we will hide the cell B7. First, click on cell B7 and then click on the right button of the mouse. Select **Format Cells...** In the left window (denoted **Category:**) of the Format Cells box, click on **Custom**. In the right window (**Type:**) of the Format Cells box, insert a semicolon (;) in the box. Click the OK button.



| | A | B | C | D | E | F | G |
|----|---|-------------------|----------|----------|----------|----------|----------|
| 1 | | | | | | | |
| 2 | | Interest Rate | 0.06 | | | | |
| 3 | | Year | 1 | | | | |
| 4 | | PV Annuity of \$1 | 0.943396 | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | 8% | 9% | 10% | 11% | 12% |
| 8 | | 1 | 0.925926 | 0.917431 | 0.909091 | 0.900901 | 0.892857 |
| 9 | | 2 | 1.783265 | 1.759111 | 1.735537 | 1.712523 | 1.690051 |
| 10 | | 3 | 2.577097 | 2.531295 | 2.486852 | 2.443715 | 2.401831 |
| 11 | | 4 | 3.312127 | 3.23972 | 3.169865 | 3.102446 | 3.037349 |
| 12 | | 5 | 3.992710 | 3.889651 | 3.790787 | 3.695897 | 3.604776 |
| 13 | | 6 | 4.622880 | 4.485919 | 4.355261 | 4.230538 | 4.111407 |
| 14 | | 7 | 5.206370 | 5.032953 | 4.868419 | 4.712196 | 4.563757 |
| 15 | | 8 | 5.746639 | 5.534819 | 5.334926 | 5.146123 | 4.967640 |
| 16 | | 9 | 6.246888 | 5.995247 | 5.759024 | 5.537048 | 5.328250 |
| 17 | | 10 | 6.710081 | 6.417658 | 6.144567 | 5.889232 | 5.650223 |
| 18 | | | | | | | |

- ⑥ **Changing the discount rates and/or years in the Data Table:** Earlier, we stated that the Data Table changes when the related Relative cell references are changed. To see that this is the case, replace the percentages 8% - 12% in cells C7 through G7 with 14% - 18%. Observe that the present value of an annuity table is recalculated. This will not be the case however, if cell C2 or cell C3 are changed because these are Absolute cell references.

| | A | B | C | D | E | F | G |
|----|---|-------------------|----------|----------|----------|----------|----------|
| 1 | | | | | | | |
| 2 | | Interest Rate | 0.06 | | | | |
| 3 | | Year | 1 | | | | |
| 4 | | PV Annuity of \$1 | 0.943396 | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | 14% | 15% | 16% | 17% | 18% |
| 8 | | 1 | 0.877193 | 0.869565 | 0.862069 | 0.854701 | 0.847458 |
| 9 | | 2 | 1.646661 | 1.625709 | 1.605232 | 1.585214 | 1.565642 |
| 10 | | 3 | 2.321632 | 2.283225 | 2.245890 | 2.209585 | 2.174273 |
| 11 | | 4 | 2.913712 | 2.854978 | 2.798181 | 2.743235 | 2.690062 |
| 12 | | 5 | 3.433081 | 3.352155 | 3.274294 | 3.199346 | 3.127171 |
| 13 | | 6 | 3.888668 | 3.784483 | 3.684736 | 3.589185 | 3.497603 |
| 14 | | 7 | 4.288305 | 4.16042 | 4.038565 | 3.922380 | 3.811528 |
| 15 | | 8 | 4.638864 | 4.487322 | 4.343591 | 4.207163 | 4.077566 |
| 16 | | 9 | 4.946372 | 4.771584 | 4.606544 | 4.450566 | 4.303022 |
| 17 | | 10 | 5.216116 | 5.018769 | 4.833227 | 4.658604 | 4.494086 |
| 18 | | | | | | | |

Appendix F: How to Use Solver

The Solver subroutine in Excel is a useful tool to help decision makers explore what-if scenarios. Using Solver, you can find the minimum (**Min**), maximum (**Max**), or a specified (**Value of**) value for a single cell, by modifying other cells that are directly or indirectly related to the target formula. The minimum, maximum, or specified value that is found by modifying other cells is called a target cell and the target **formula** resides in this cell. Constraints can be applied to restrict the values of the target cell using constrained cells. Solver adjusts the values in the specified adjustment cells. Solver commands are in a group called what-if analysis tools. We will use the following example involving the calculation of the internal rate of return to show how Solver works.

Example: The investment syndicate known as Professors Capital is deciding whether to purchase a building that costs \$10 million with cash flows in the first year \$2.5 million. His weighted average borrowing cost¹³ is 6.5%. Cash flows are expected to grow each year at 3% per annum. The net proceeds from the sale of the property at the end of a five year holding period is \$12.75 million. What is the internal rate of return on this property?

Initial set up of our spreadsheet with cash flow stated in 000s.

| | A | B | C | D | E |
|----|---------------|-------|----------------------|-------------------|--------------|
| 1 | Discount Rate | 0.065 | | | |
| 2 | Growth Rate | 0.03 | | | |
| 3 | | | | | |
| 4 | | Time | Cash Flow | PVF | PV |
| 5 | | 0 | -10000 | =1/(1+\$B\$1)^B5 | =C5*D5 |
| 6 | | 1 | 2500 | =1/(1+\$B\$1)^B6 | =C6*D6 |
| 7 | | 2 | =C6*(1+\$B\$2) | =1/(1+\$B\$1)^B7 | =C7*D7 |
| 8 | | 3 | =C7*(1+\$B\$2) | =1/(1+\$B\$1)^B8 | =C8*D8 |
| 9 | | 4 | =C8*(1+\$B\$2) | =1/(1+\$B\$1)^B9 | =C9*D9 |
| 10 | | 5 | =C9*(1+\$B\$2)+12750 | =1/(1+\$B\$1)^B10 | =C10*D10 |
| 11 | | | | | |
| 12 | | | | NPV | =SUM(E5:E10) |

¹³Cost of funds from using a mortgage (k_{Debt}) and cost of funds using the investment syndicate's own equity (k_{Equity}). For example, suppose that the syndicate borrows 80% from a bank at a cost of 5.5% (k_{Debt}) and they put in the rest of the funds (20%) expecting to earn a 12.5% (k_{Equity}) return on their investment. Then the weighted average borrowing cost from using both of these sources of capital to fund the deal is $((w_{Equity} * k_{Equity}) + (w_{Debt} * k_{Debt})) = 80% * 5.5% + 20% * 12.5% = 6.5%$.

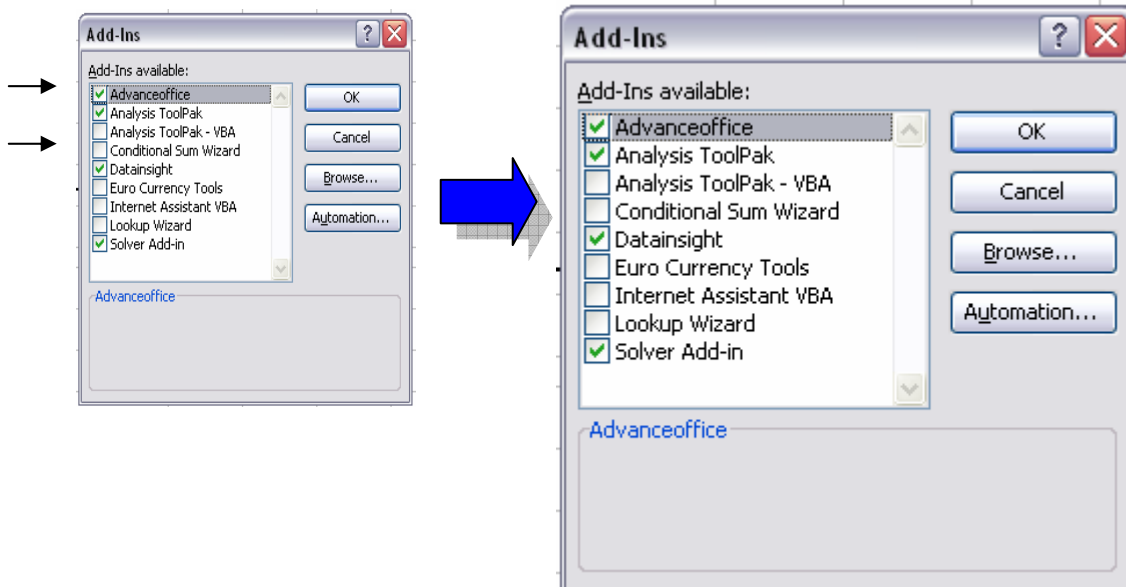
where PVF is the present value factor $(1/(1+r))^T$, r is the discount rate, and T is time.

Output (to see formulas in a spreadsheet type **Ctrl ~** and to get back to the regular mode type **Ctrl ~** again).

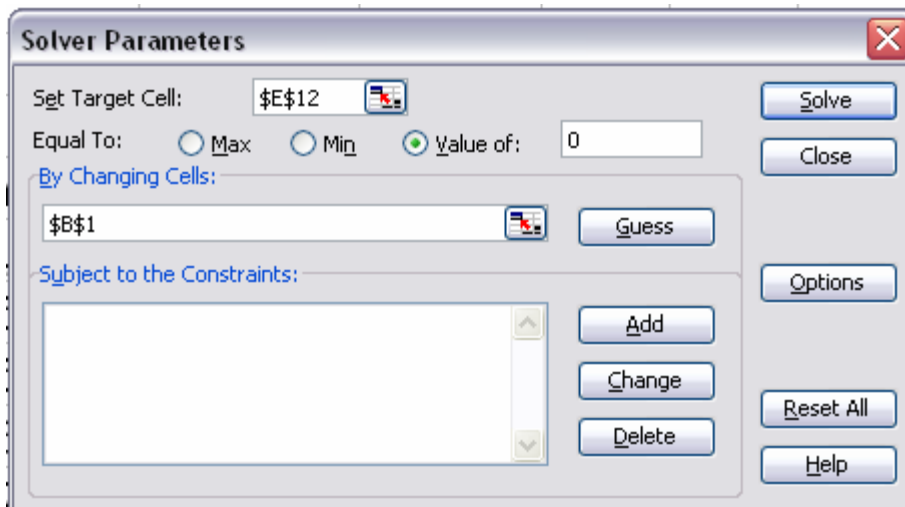
| | A | B | C | D | E |
|----|---------------|------|-----------|----------|---------|
| 1 | Discount Rate | 6.5% | | | |
| 2 | Growth Rate | 3.0% | | | |
| 3 | | | | | |
| 4 | | Time | Cash Flow | PVF | PV |
| 5 | | 0 | -10,000 | 1.000000 | -10,000 |
| 6 | | 1 | 2,500 | 0.938967 | 2,347 |
| 7 | | 2 | 2,575 | 0.881659 | 2,270 |
| 8 | | 3 | 2,652 | 0.827849 | 2,196 |
| 9 | | 4 | 2,732 | 0.777323 | 2,124 |
| 10 | | 5 | 15,564 | 0.729881 | 11,360 |
| 11 | | | | | |
| 12 | | | | NPV | 10,297 |

To calculate IRR, first recall from your finance class that IRR is the rate of return that makes the net present value equal to zero e.g., $NPV = 0$ or the present value of the benefits is equal to the present value of the cost of those benefits.

To use the Solver subroutine, select the **T**ools submenu and then choose the **S**olver... option. If you do not see the Solver option in the Tools submenu, go to the **T**ools submenu, select **A**dd-Ins... , choose **S**olver Add-Ins and then click OK. You should now see the **S**olver... option in the **T**ools submenu.



This is the next screen you see when you select the Solver subroutine:

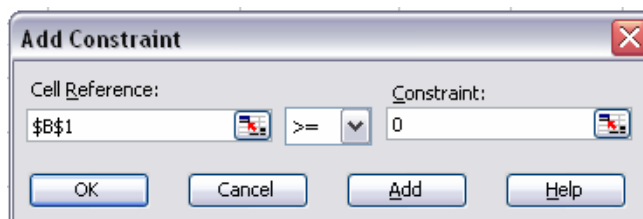


Target cell: Our NPV formula is located in cell E12 (row E, column 12). The target cell must contain a formula so it must have an = sign in it.

Value of the Target Cell: We are trying to change the value of the NPV from our current value of \$10,297 to a value of \$0. We do this by clicking on **Value of:** and inputting **0** as the value.

By Changing Cells: We will make $NPV = 0$ by changing the value of the discount rate which is located in cell B1. This is equivalent to us manually changing the discount rate until $NPV = 0$.

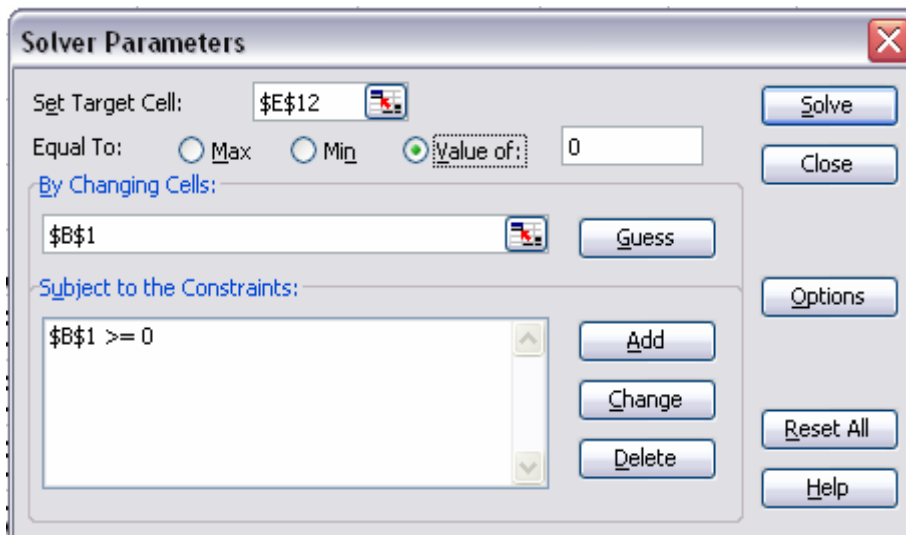
Since we wish to have a positive IRR (cell $B1 > 0$), we need to add a constraint. Click on the **Add** button to the right of the **Subject to the Constraints:** box. Next, we set cell B1 to be greater to or equal to 0 as follows:



Since this is the only constraint, we click the OK button. Note: we did not need to add this constraint in our current example since the sum of our cash flows is greater than our original investment which means that the IRR will be a positive number. I used this

example to demonstrate how to add a constraint. This is important when there are multiple IRRs on a project. Multiple IRRs exist when there are both positive and negative cash flows with one IRR for each change in sign from a positive to a negative or negative to a positive cash flow.

Our Solver box now shows our constraint that the IRR must be a positive number (>0)

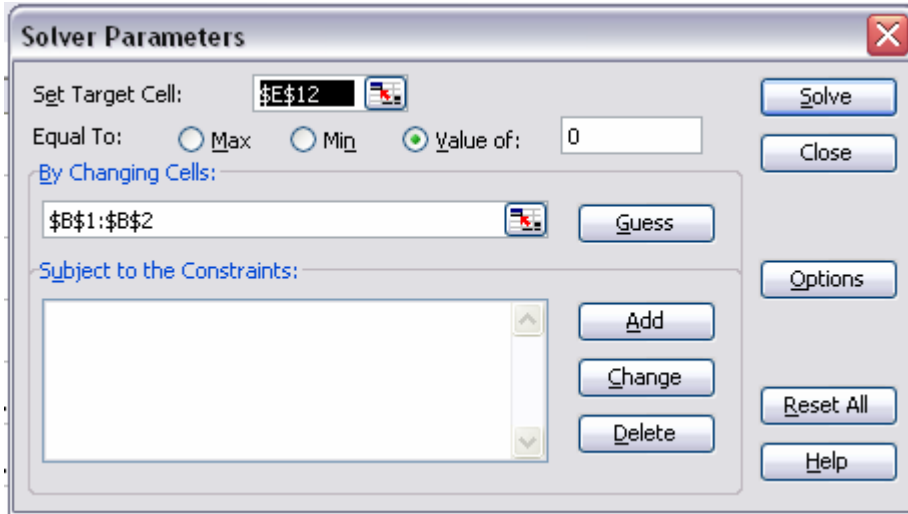


After clicking the **Solve** button, notice that our discount rate has changed. Our “new” discount rate of 29.2% is the IRR given a 3% growth rate in our cash flows.

| | A | B | C | D | E |
|----|---------------|-------|-----------|----------|---------|
| 1 | Discount Rate | 29.2% | | | |
| 2 | Growth Rate | 3.0% | | | |
| 3 | | | | | |
| 4 | | Time | Cash Flow | PVF | PV |
| 5 | | 0 | -10,000 | 1.000000 | -10,000 |
| 6 | | 1 | 2,500 | 0.773747 | 1,934 |
| 7 | | 2 | 2,575 | 0.598684 | 1,542 |
| 8 | | 3 | 2,652 | 0.463230 | 1,229 |
| 9 | | 4 | 2,732 | 0.358423 | 979 |
| 10 | | 5 | 15,564 | 0.277328 | 4,316 |
| 11 | | | | | |
| 12 | | | | NPV | 0 |

What if we allow the growth rate to also change? We can solve for the IRR (NPV = 0) by simultaneously changing both the discount rate AND the growth rate in the **By Changing Cells:** box.

This is our input box. Notice that we have taken out our constraint.



Our output is as follows:

| | A | B | C | D | E |
|----|---------------|-------|-----------|----------|---------|
| 1 | Discount Rate | 25.2% | | | |
| 2 | Growth Rate | -8.8% | | | |
| 3 | | | | | |
| 4 | | Time | Cash Flow | PVF | PV |
| 5 | | 0 | -10,000 | 1.000000 | -10,000 |
| 6 | | 1 | 2,500 | 0.799023 | 1,998 |
| 7 | | 2 | 2,279 | 0.638437 | 1,455 |
| 8 | | 3 | 2,078 | 0.510126 | 1,060 |
| 9 | | 4 | 1,895 | 0.407602 | 772 |
| 10 | | 5 | 14,477 | 0.325683 | 4,715 |
| 11 | | | | | |
| 12 | | | | NPV | 0 |

The new IRR is 25.2% based on a -8.8% growth rate. For further examples of how to use Solver, Microsoft includes an Excel file named Solvsamp.xls with every hard installation of the application. The spreadsheet goes through a complete explanation of several interrelated examples using Microsoft Excel Solver. To search for this file on your computer, click on the **start** button on the lower left hand corner of your screen, on the right hand side of your screen, click on **Search** then type **Solvsamp.xls**.

