

Problem Set 1

To be discussed Sept. 20 during recitation

PART C and D are REQUIRED (ARGUS Tutorial)

PART A: Chapter 8

Please use your calculator to do all even-numbered study questions at the end of Geltner-Miller Chapter 8 EXCEPT #s 20,26,32,36. You only need to hand in the answers. Note, these problems are similar to the preceding odd-numbered questions are answered at the end of the book (pp.851-852). Calculator steps for solving the odd-numbered problems are available on the course web site in the folder of materials.

We also encourage you to get familiar with using Excel to solve these types of problems. An Excel file with formulas and functions for solving the odd-numbered Chapter 8 questions will be made available for downloading from the course web site.

The Chapter 8 PowerPoint lecture notes which should also be available for downloading from the course web site may also be helpful as a tutorial for students not familiar with solving PV math problems and the use of business calculators and computer spreadsheets for solving such problems.

PART B: Chapter 10

Note that you can use the standard MS Windows "Copy/Paste" procedure (select material, click "copy" or type ctrl-c, then click "paste" or type ctrl-v) to copy/paste figures from a MS Word document table into a MS Excel worksheet. If you download the MS Word file of this homework assignment from the course web site, you can use this ability to quickly copy the data for problems 1 & 2 below into an Excel worksheet, which is probably the best way to do these problems.

1. The table below shows two 10-year cash flow projections (in \$ millions, including reversion) for the same property. The upper row is the projection that will be presented by the broker trying to sell the building; the bottom row is the realistic expectations. Suppose that it would be relatively easy for any potential buyers to ascertain that the most likely current market value for the property is about \$10 million. (a) What going-in IRR (blended rate) will equate the presented cash flow projection to the observable \$10 million present value (as of Year 0)? (b) What rate will equate the realistic projection to that same present value? (c) What is the most likely amount of "disappointment" in the ex post rate of return earned by an investor who buys this property believing the broker's cash flow projection (i.e., difference in presented vs realistic return)?

Year	1	2	3	4	5	6	7	8	9	10
Presented seller's broker	\$1.0000	\$1.0250	\$1.0506	\$1.0769	\$1.1038	\$1.1314	\$1.1597	\$1.1887	\$1.2184	\$13.0501
Realistic	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$11.0000

2. The projected cash flows (including reversion) are shown in the table below for Property A and Property B. (a) If both properties sell at cap rates (initial and terminal cash yields) of 8%, what is the expected total return on a 10-year investment in each property? (b) If the 8% cap rate represents a fair market value for each property, then which property is the more risky investment (and how do you know)? (c) What is the annual growth rate in operating cash flows for each building during the first nine years? (d) How is this growth rate related to the (constant) cap rate and the investor's expected total return (IRR) in each property?

Annual net cash flow projections for two properties (\$ millions)										
Year	1	2	3	4	5	6	7	8	9	10
A	\$1.0000	\$1.0050	\$1.0100	\$1.0151	\$1.0202	\$1.0253	\$1.0304	\$1.0355	\$1.0407	\$14.185
B	\$1.0000	\$1.0200	\$1.0404	\$1.0612	\$1.0824	\$1.1041	\$1.1262	\$1.1487	\$1.1717	\$16.433

3. In a certain market the typical lease is net to the landlord with a term of five years, and rents typically grow 2% per year, both within leases (due to built-in step-ups) and in the prevailing market rents charged on new leases. Properties typically have a single tenant, and are sold with a new lease just signed (i.e., five years of contractual cash flows). Tenants typically can borrow at 9%, and the going-in cap rate prevailing in the property market is 8% (initial cash yield). Assuming annual cash flows in arrears and no vacancy between leases, what is the implied inter-lease and reversion discount rate?

4. (This problem is based on the Ch.10 Appendix.) A 10-year property investment is characterized by the net cash flow stream indicated in the table below (including initial investment and reversion at the end of year 10). Compute the: (a) Overall total IRR; (b) Initial cash yield component; (c) Cash flow growth component; (d) Yield-change component; and (e) Interaction effect.

Yr	0	1	2	3	4	5	6	7	8	9	10	11
(1) Actual Oper.CF		\$1,000	\$1,030	\$900	\$1,061	\$1,093	\$1,126	\$850	\$1,159	\$1,194	\$1,230	\$1,267
(2) Actual Capital CF	-10,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,050	
(3) Actual Total CF (=1+2)	-10,000	\$1,000	\$1,030	\$900	\$1,061	\$1,093	\$1,126	\$850	\$1,159	\$1,194	\$14,280	

REQUIRED: Part C- CASH FLOW PRO FORMA

In this assignment you are to develop a multi-year cash flow proforma projection for an office building with multiple long-term leases, using an Excel spreadsheet (you will duplicate something similar to this exercise in Part D using Argus software). The office building is Rentleg Plaza, which has 30,000 net rentable square feet divided into two office suites. Suite 100 is 20,000 SF and is leased out under a 5-year lease signed 2 years ago (3 more years left on the lease) at \$15.00/SF (per year). (Suppose it is the end of 2000, so the lease expires in 3 years at the end of 2003.) The other office, Suite 200, is 10,000 SF and is currently vacant.

In the land where Rentleg Plaza is located, the past few years have seen the office market soften greatly due to excess supply of newly-built space. As a result, rents have fallen. The currently typical rental rate in the market for buildings like Rentleg Plaza is \$14.00/SF on 5-year leases, with concessions amounting to one month free rent up front for each year of lease term (e.g., a 5-year lease would get the first 5 months rent free). In these conditions, you expect Suite 200 will not lease up for a year (i.e., expected occupancy after 12 months, at the beginning of 2002, in a 5-year lease running through 2006), and will require \$10/SF Tenant Improvement ("Tenant Finishing") expenditures by the landlord at that time.

With virtually no new office building development on the horizon, it is likely that the present modest growth in office demand will bring the rental market back into equilibrium within, say, 3 years, so that by 2003 we will be back into something like equilibrium. In these circumstances, it is reasonable to forecast no growth in (nominal) rental rates in the market for the next two years (2000-2002) followed by a rent growth "spike" of, let's say, 20%, in 2003, with then no further growth in rents for the next few years beyond that time. We would also expect the rent concessions (e.g., the free rent up front) to disappear from typical market deals by 2003.

Suppose it is reasonable to assume that when the lease on Suite 100 expires, there is only a 50% chance the existing tenant will renew. If they do not renew, there will be 6 months vacancy in the space, and it will require \$10.00/SF in tenant improvement expenditures (TI) paid for by the landlord (plus a 6% commission to a leasing broker) to obtain a new tenant. On the other hand, if the current tenant does renew (50% probability), it will only require \$3.00/SF in TI plus a 3% brokerage commission. (The brokerage commissions are paid by the landlord, up front at the time the lease is signed, based on the entire (undiscounted) cumulative revenue of the lease, less free rent concessions. For example a 5% commission on a 10-year, \$10.00/SF lease, would be \$5.00/SF if there were no concessions, or \$4.50/SF if there was 1-year free rent.)

The type of lease that is common in the market in which Rentleg Plaza competes is what is known as a "gross" or "full service" lease, with an "expense stop". This means that the landlord pays the building operating expenses, except that the tenant must pay their pro-rata share of any expenses over and above a "stop" amount specified in the lease. The "stop" amount is typically defined at or near the annual operating expenses (per SF) which the building was experiencing as of the time when the lease was signed. The expense stop on the existing lease in Suite 100 is \$4.00/SF.

The current operating expenses of the building (projected for 2001) would be \$4.81/SF if the building were fully occupied all year. However, the building is expected to be 33% vacant during the year, which will keep operating expenses down a bit. In fact, 19% of the operating expenses are "variable", that is, directly proportional to occupancy, while the remaining 81% are "fixed" (independent of

occupancy). Thus, the 2001 projected expenses are \$135,161 [calculated as: $30,000 * \$4.81 * (.81 + (2/3) * .19)$]. Operating expenses are expected to grow at the rate of 4% per year.

In addition to normal operating expenses and the previously noted leasing and tenant improvement expenditures, there is also expected to be \$1.00/SF/yr of general capital improvement expenditures.

Assuming reversion at the end of year 5, with a sale price equal to 10 times the following year's expected Net Operating Income (NOI), and at a discount rate of 12% per annum, you should be able to verify using your proforma that Rentleg Plaza has a present value of \$2,292,810.

In developing your Excel spreadsheet proforma, you should use the format indicated by the table on the following page, and employ the guidelines indicated in the footnotes to compute the tagged numbers. This is the type of pro forma that a broker would typically take to a potential investor, or a borrower would take to a lender. (Keep in mind that a real world pro forma is typically 10 years, not 5, and buildings often have dozens of spaces and leases (not just two), as well as several individual operating expense line items. Nevertheless, this simple example should be sufficient to help you to understand the basic “nuts and bolts”.)

Rentleg Plaza, 5-year Pro Forma Cash Flow Projection:

Year:	2000	2001	2002	2003	2004	2005	2006
Market Rent		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Potential Gross Revenue:							
Rent Roll:							
Suite 100		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Suite 200		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Total		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Vacancy		(\$nnnn) ¹			(\$nnnn) ²		
Abatements			(\$nnnn) ³				
Reimbursements:							
Suite 100		\$nnnn ⁴	\$nnnn ⁴	\$nnnn ⁴	\$0 ⁵	\$nnnn ⁵	\$nnnn ⁵
Suite 200			\$nnnn ⁶	\$nnnn ⁶	\$nnnn ⁶	\$nnnn ⁶	\$nnnn ⁶
Total		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Total Revenue		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Operating Expenses		\$135,161	\$nnnn	\$nnnn	\$nnnn ⁷	\$nnnn	\$nnnn

NOI:		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn
Leasing & Capital Expenditures:							
TI			\$nnnn		\$nnnn ⁸		
Commissions			\$nnnn ⁹		\$nnnn ¹⁰		
Cap. Expenditures		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	
Total		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	
Operating PBTCF		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	
Reversion						\$nnnn ¹¹	
PBTCF		\$nnnn	\$nnnn	\$nnnn	\$nnnn	\$nnnn	
Present Value @12%:	\$2,292,810 ₁₂						

¹Based on Suite 200 vacant all year.

²Based on Suite 100 expected vacancy (50%*6mo = 25% of Potential Gross Revenue from Suite 100).

³Based on free rent concession of 5 months offered to new lease in Suite 200.

⁴Based on expense stop of \$4.00/SF in the existing lease in Suite 100.

⁵Based on expense stop in new lease exactly equal to projected operating expenses per SF in 2004.

⁶Based on expense stop of \$5.00/SF in the new lease in Suite 200.

⁷Reflects expected vacancy of 50%*6 mo = 0.25yr in Suite 100 in 2004.

⁸Reflects expected renewal probability: (50%*\$10/SF + 50%*\$3/SF)*20,000 SF.

⁹Reflects free rent concession: 0.06*(5*14 - (5/12)*14)*10,000.

¹⁰Reflects expected renewal probability: (50%*0.06 + 50%*0.03)*(5*\$16.80/SF)*20,000 SF.

¹¹Reflects selling broker's commission of 5% taken from sales price equal to 10 times next year projected NOI.

¹²Assumes first cash flow occurs 1 year from present.

REQUIRED: Part D – ARGUS TUTORIAL

ARGUS is a software package produced by ARGUS Financial Software of Houston, TX. It provides a relatively user-friendly and simple environment to enter information about the current leases in a building, and about the rental market in which the building is situated (user judgement), from which ARGUS then calculates the implied future cash flow from the building. You can also enter loan parameters. ARGUS will tell you cash flows before and after debt service. You can easily do sensitivity analysis (compare the cash flow and present value impacts of different lease or rental and expense assumptions or scenarios) by making different versions of the same building (use the "make another" option in the "file" menu in the ARGUS toolbar).

The purpose of this assignment is to familiarize you with a type of computer software known as "lease-by-lease" analysis packages. These types of programs are in widespread use among commercial property investment analysts, advisors, lenders, property managers, and appraisers. Some familiarity with such programs is therefore part of the preparation we need to give you in this course.

In this assignment you will walk through an example which, though greatly simplified, contains some the essential features of a typical medium size class A- or B+ office building investment, as of the early 1990s. (This period is chosen to allow you to see the effect of a slack market, where current market rents are below long-run equilibrium levels, and analysts must try to project when equilibrium will be restored.)

There are three parts to this assignment. The first part you have already done in Part C. There you prepared a simple spreadsheet to reflect the pro-forma future cash flows of a simple example office building. There you used a general-purpose electronic spreadsheet (EXCEL), so the calculations used to compute the projected cash flows were (or should be by now) completely "transparent" to you (in the formulas of the Excel spreadsheet). Based on that assignment, you should be able to understand what ARGUS is doing in the current assignment (behind the scenes, for ARGUS is a bit of a "black box" -- its calculations are not readily apparent). In effect, this second part of the assignment is simply an ARGUS "tutorial" in which I will step you through some of the basics of ARGUS, by walking through the same example office building as in Part C. In the second part of the Argus exercise you will be asked to change the input assumptions and report your findings.

I: Background: Review of Example Office Building ProForma

The office building is Rentleg Plaza, which has 30,000 net rentable square feet divided into two office suites. Suite 100 is 20,000 SF and is leased out under a 5-year lease signed 2 years ago (3 more years left on the lease) at \$15.00/SF (per year). (Suppose it is the end of 2000, so the lease expires in 3 years at the end of 2003.) The other office, Suite 200, is 10,000 SF and is currently vacant.

In the land where Rentleg Plaza is located, the past few years have seen the office market softened greatly due to excess supply of newly-built space. As a result, rents have fallen. The currently typical rental rate in the market for buildings like Rentleg Plaza is \$14.00/SF on 5-

year leases, with concessions amounting to one month free rent up front for each year of lease term (e.g., a 5-year lease would get the first 5 months rent free). In these conditions, you expect Suite 200 will not lease up for a year (i.e., expected occupancy after 12 months, at the beginning of 2002, in a 5-year lease running through 2006), and will require \$10/SF Tenant Improvement ("Tenant Finishing") expenditures by the landlord at that time.

With virtually no new office building development on the horizon, it is likely that the present modest growth in office demand will bring the rental market back into equilibrium within, say, 3 years, so that by 2003 we will be back into something like equilibrium. In these circumstances, it is reasonable to forecast no growth in (nominal) rental rates in the market for the next two years (2000-2002) followed by a rent growth "spike" of, let's say, 20%, in 2003, with then no further growth in rents for the next few years beyond that time. We would also expect the rent concessions (e.g., the free rent up front) to disappear from typical market deals by 2003.

Suppose it is reasonable to assume that when the lease on Suite 100 expires, there is only a 50% chance the existing tenant will renew. If they do not renew, there will be 6 months vacancy in the space, and it will require \$10.00/SF in tenant improvement expenditures (TI) paid for by the landlord (plus a 6% commission to a leasing broker) to obtain a new tenant. On the other hand, if the current tenant does renew (50% probability), it will only require \$3.00/SF in TI plus a 3% brokerage commission. (The brokerage commissions are paid by the landlord, up front at the time the lease is signed, based on the entire (undiscounted) cumulative revenue of the lease, less free rent concessions. For example a 5% commission on a 10-year, \$10.00/SF lease, would be \$5.00/SF if there were no concessions, or \$4.50/SF if there was 1-year free rent.)

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The current operating expenses of the building (projected for 2001) would be \$4.81/SF if the building were fully occupied all year. However, the building is expected to be 33% vacant during the year, which will keep operating expenses down a bit. In fact, 19% of the operating expenses are "variable", that is, directly proportional to occupancy, while the remaining 81% are "fixed" (independent of occupancy). Thus, the 2001 projected expenses are \$135,161 [calculated as: $30,000 * \$4.81 * (.81 + (2/3) * .19)$]. Operating expenses are expected to grow at the rate of 4% per year.

In addition to normal operating expenses and the previously noted leasing and tenant improvement expenditures, there is also expected to be \$1.00/SF/yr of general capital improvement expenditures.

The following table presents the pro-forma developed on an Excel spreadsheet (downloadable from the course website as “431f02_ps4ANS.xls”). Assuming reversion at the end of year 5, with a sale price equal to 10 times the following year's expected Net Operating Income (NOI), and at a discount rate of 12% per annum, Rentleg Plaza has a present value of \$2,292,810.

Rentleg Plaza, 5-year Pro Forma Cash Flow Projection:

Year:	2000	2001	2002	2003	2004	2005	2006
Market Rent		\$14.00	\$14.00	\$14.00	\$16.80	\$16.80	\$16.80
Potential Gross Revenue:							
Rent Roll:							
Suite 100		\$300,000	\$300,000	\$300,000	\$336,000	\$336,000	\$336,000
Suite 200		\$140,000	\$140,000	\$140,000	\$140,000	\$140,000	\$140,000
Total		\$440,000	\$440,000	\$440,000	\$476,000	\$476,000	\$476,000
Vacancy		(\$140,000) ¹			(\$84,000) ²		
Abatements			(\$58,333) ³				
Reimbursements:							
Suite 100		\$10,107 ⁴	\$20,048 ⁴	\$24,050 ⁴	\$0 ⁵	\$7,755 ⁵	\$12,257 ⁵
Suite 200			\$24 ⁶	\$2,025 ⁶	\$2,393 ⁶	\$6,270 ⁶	\$8,521 ⁶
Total		\$10,107	\$20,072	\$26,075	\$2,393	\$14,025	\$20,778
Total Revenue		\$310,107	\$401,739	\$466,075	\$394,393	\$490,025	\$496,778
Operating Expenses		\$135,161	\$150,072	\$156,075	\$157,178 ⁷	\$168,811	\$175,563

NOI:		\$174,946	\$251,667	\$310,000	\$237,215	\$321,215	\$321,215
Leasing & Capital Expenditures:							
TI			\$100,000		\$130,000 ⁸		
Commissions			\$38,500 ⁹		\$75,600 ¹⁰		
Cap. Expenditures		\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	
Total		\$30,000	\$168,500	\$30,000	\$235,600	\$30,000	
Operating PBTCF		\$144,946	\$83,167	\$280,000	\$1,615	\$291,215	
Reversion						\$3,051,541 ¹¹	
PBTCF		\$144,946	\$83,167	\$280,000	\$1,615	\$3,342,755	
Present Value @12%:	\$2,292,810 ¹²						

¹Based on Suite 200 vacant all year.

²Based on Suite 100 expected vacancy (50%*6mo = 25% of Potential Gross Revenue from Suite 100).

³Based on free rent concession of 5 months offered to new lease in Suite 200.

⁴Based on expense stop of \$4.00/SF in the existing lease in Suite 100.

⁵Based on expense stop in new lease exactly equal to projected operating expenses per SF in 2004.

⁶Based on expense stop of \$5.00/SF in the new lease in Suite 200.

⁷Reflects expected vacancy of 50%*6 mo = 0.25yr in Suite 100 in 2004.

⁸Reflects expected renewal probability: (50%*\$10/SF + 50%*\$3/SF)*20,000 SF.

⁹Reflects free rent concession: 0.06*(5*14 - (5/12)*14)*10,000.

¹⁰Reflects expected renewal probability: (50%*0.06 + 50%*0.03)*(5*\$16.80/SF)*20,000 SF.

¹¹Reflects selling broker's commission of 5% taken from sales price equal to 10 times next year projected NOI.

¹²Assumes first cash flow occurs 1 year from present.

II: Tutorial

This tutorial should take you 1 to 2 hours. You don't need to do it all in one sitting.

Note: This tutorial may be based on an earlier version of Argus. If so, then there may be slight differences compared to the exact steps described here, but you should be able to translate these steps into the new version.

Click on the ARGUS icon. To begin to create an ARGUS file on a new property select the **File** popdown menu and **New...** . To instead open a pre-existing ARGUS file, you would select **Open...**, or to make a new version of an existing file, select **Make a Copy**. If the “New” window comes up, give your file a name (such as the first four letters of your last name followed by the numeral “1” to indicate that this is the first scenario of version of the pro-forma for this building). Don't forget to change the path to **A:** or whatever path you want so that the ARGUS file you will be creating will be saved where you want it to be. In the **Property Description** window which comes enter the property name, “Rentleg Plaza”. (The **Description** menu is found in the **Property** popdown menu in the main menu, if it does not come up automatically.) If this were a real property, you would then enter the rest of the actual information (address, etc.). Our example property is of the “office/industrial” type. Click on “OK”.

One of the useful features of ARGUS is that it explains, at the bottom of the window, the nature of the input item where your cursor is located on the screen. Always read this information before entering the input.

Recall that we are working with a 30,000 square foot office building. So, in the **Property** menu, **Area Measures** window, select “**Property Size**” and “**Edit...**” and then enter 30000 in the “size” box. Click on OK and then close the Area Measures box to get back to the main menu.

Now within the **Property** popdown click on the **Timing** menu. Assume the analysis period starts at the beginning of 01/2001 (1/01). We will do a 5-year analysis from 1/01 (end of the first year is obviously 12/01).

Go back to the main menu and select **Property, Inflation Rates...** menu and edit **General** Inflation. Assume a general inflation rate of 4% per year for all the years in the analysis. Note, however, that we could have entered different inflation rates for each year, and also that this general inflation rate can be overridden for specific variables later on.

Now from the **Property** popdown of the Main Menu select **Reimbursable Expenses**. (Note that in our building the leases are of the Expense-Stop type.) To have this type of lease, we need to use the Reimbursable Expense Menu. (However, ARGUS has the ability to handle a wide variety of lease types, including purely gross leases where there is no expense stop, for which we would use the Non-Reimbursable Expenses Menu.)

In the **Reimbursable Expense** Menu press the **insert** button to describe the expense categories in the property. To simplify matters we have assumed our example building has only a single all-encompassing category of operating expenses, which you should label "**General Expenses**" in the "Name" column. More realistically there would be several categories of expenses, each with possibly different percents fixed and inflation rates. Enter the amount of \$4.81/SF/Yr as the current expense **Amount** (units is \$/Area). This \$4.81/SF would be the expense amount if the building were fully occupied, so select "**Property Size**" in the Area box. Enter 81 in the %Fixed item, to reflect the assumption that 81% of the expenses are fixed while 19% are directly proportional to building occupancy. In reality, this percentage would vary with different categories of expenses. For example, property taxes and insurance expenses are usually assumed to be 100% fixed, while many other expenses, such as maintenance & repair, utilities, management, are at least partially variable (depending on the nature of the building, e.g., how much common area or security needs). (This 81% assumption will give projected operating expenses of approximately \$4.50/SF in 2001 with the building 2/3 occupied -- Reimbursement based on actual occupancy, so as to agree with our example assumptions.) We assume that expenses would grow at the general inflation rate of 4% per year on a constant-occupancy basis, so we don't need to enter any special inflation assumptions in the "Inflation" box. Note that the "gross up for reimbursements" box should *not* be checked in our case. The expense stops on our leases will be based on actual building operating expenses no matter how full or vacant the building is. (The alternative, to "gross up", would adjust the expense calculation to reflect what the expenses would be if the building were fully occupied, for purposes of computing the expense stop on new leases and for calculating the reimbursable expenses.)

Now go to the **Capital Expenditures** menu in the Property popdown. Recall that in the example there are general building improvement expenditures of \$30,000 per year, every year. We can get ARGUS to reflect this pattern of capital improvement expenditure by inserting a capital expense item and entering 30000 in the amount item, "\$ Amount" in the units item, "year" in the frequency item, 100 in the %Fixed item, and **0** in inflation.

Now in the Main Menu now select the **Yield** popdown and get into the **Property Purchase & Resale** menu. Leave the "Initial Purchase Price" blank (you would only fill this in if you wanted to have ARGUS determine the IRR of property at a given price). The most common way to calculate the resale price is to **Capitalize Net Operating Income** the property will be earning at the time of the resale, so select this option. The assumed going out cap rate is **10** percent, with **5** percent resale commission. Check the box to **Apply Rate to following year income**. Make sure the box for "calculate resale all years" is left blank (not checked). Click **OK** to get back to the Main Menu.

From the Main Menu select the **Market** popdown and the **Market Leasing Assumptions** menu. It is in the Market Leasing Assumptions Menu that you tell ARGUS what to assume about the future rental market in which your property is situated. Conceivably, you might want to identify more than one sub-market in which your building operates. For example, some of your space might be "Class A" while other parts of your building might be "Class B". Or, you might have some retail space, some office space, and/or some warehouse space in your building. Or, more commonly, there might be a particular space in the building which is oddly shaped or sized, so that it is difficult to lease out at the same rate as the rest of the building (and/or, it would typically remain vacant longer between tenants). ARGUS thus allows you to specify more than one Market Leasing Assumption Category. In the Rent Roll Menu (which we will get to in a minute), you will then tell ARGUS which category of market assumptions to apply to which space in the building. Thus, when you select the Market Leasing Assumptions Menu, you have the choice of creating a new category or editing an existing category. Initially, you will select the **New** button. In the example all the spaces are in the same sub-market and are equally easy to lease, so we will identify only one market leasing category, which we will call "OfficeMkt". When you initially enter the Market Leasing Assumptions Menu, you must name the Market Assumption Category as "OfficeMkt".

Now fill in the table in the Market Leasing Assumptions Menu with the appropriate assumptions to reflect the assumptions in the example. The renewal probability is **50** percent under **Renewal Mkt** column, the current market rent is \$14.00/SF, so enter **14** under the **New Market** column. You can leave the market rent row blank for the subsequent columns to the right ("Renewal Mkt", "Term 2", etc), as we will be taking care of that in the "Inflation Rates..." menu. Enter **6** in the Months Vacant row under **New Market**, **10** dollars in the **Tenant Improvements** item under the **New Market**, but only **3** dollars for that item under the **Renewal Market** column. Enter **6** percent **Leasing Commissions** for the **New market**, but only **3** percent for the **Renewal Mkt**. Enter **5** months in the **Rent Abatement** item for the **New Market** column, but **0** for the **Renewal Mkt**. For a new file click on "Overrides" to bring up the subsequent lease terms inputs. The only item for which you need to worry about entering assumptions for the subsequent terms (Term 2, Term 3,...) is the Rent Abatement item, for recall that we assumed there would be no further rent abatements after the Suite 200 lease, so enter **0** in all the subsequent Terms. In the bottom part of the Market Leasing Assumptions Menu we tell ARGUS what type of leases we are dealing with in both the current and future market. Enter **Base Stop** in the **Reimbursement** category so ARGUS knows we are in a market where expense-stop leases are the norm. Finally, enter **5** in the **Term Lengths** category to indicate the typical length of leases in the market.

To deal with the expected inflation or growth rate in the market rent, we need to go back into the **Inflation Rates** under **Property** and edit the "Market Rent" inflation rate assumption (unless we were simply going to use the default inflation assumption of 4% entered in the General Inflation menu, which in this case we are not). Consistent with our example, we assume 0% growth in the market rent for the next 3 years (so years 2001 through 2003 will all have market rents of \$14.00/SF, note that "Year 1" is 2001), reflecting the current over-

built soft leasing market. Then we assumed a rent growth "spike" consisting of a 1-year 20% increase in 2004 (year 4), followed by 0 growth again after that. (Actually, it might be more realistic to assume a small positive growth rate after the rent spike, assuming that the rental market would then be back at long-run equilibrium, we might assume a growth rate 1 or 2 percent less than the general inflation rate. But let's stick with our existing example for comparability.) Thus, in the market rent inflation rates you have: 0, 0, 20, 0, 0, 0.

Now from the Main Menu select the **Tenants** popdown and get into the **Rent Roll** menu. In the Rent Roll Menu you tell ARGUS what leases or spaces exist in the building, and what rental rates, lease terms and rental market leasing assumption categories apply to those leases or spaces. In the example there were two spaces in the building (suites 100 and 200), the latter of which was vacant as of the beginning of the analysis period. While it is possible to treat vacant space in the Rent Roll Menu (by entering a future date in the "Start Date" column, reflecting the time expected until the space will lease), it is generally easier to treat large vacant spaces in the **Space Absorption** Menu. So we only enter the one lease, the existing tenant in Suite 100, in the Rent Roll Menu. Recall from the example, we assumed that lease had been signed a couple of years ago at \$15.00/SF, with 3 years remaining on the lease (through the end of 2003), and an expense stop at \$4.00/SF. Press the **insert** button in the Rent Roll menu. You can leave the tenant name blank, but fill in the suite# as **100**, of the **office** type, with **20000** SF. The lease began 2 years ago on **1/99** and ends in three more years at **12/03**. The **Base Rent** is **\$15/SF/Yr**, with no rent changes, retail space, abatements, or leasing costs (as these are all water over the dam for the existing lease, and will be dealt with subsequently by the market leasing assumptions we entered in the Market Leasing Assumptions menu). In the **Reimbursements** item enter **4** dollars to reflect the expense stop in the existing lease. In the **Market Leasing** column we tell ARGUS to use Market Leasing Assumption "**OfficeMkt**" Category we previously defined in the Market Leasing Assumptions Menu for the Suite 100 space. **Upon Expiration**, the lease will be subject to the **Market**. This means that, upon the expiration of the existing lease on Suite 100, ARGUS will apply the rental market leasing assumptions described in the "OfficeMkt" Category.

From the Main Menu next select **Space Absorption** from the **Tenants** popdown. In the Space Absorption Menu you tell ARGUS about major areas of space in your building that are currently vacant. ARGUS will automatically have these spaces "leased up" at a rate (over a time period) which you indicate in this menu. Depending on your judgement about the current rental market your building finds itself in, you may wish to have the space leased up rapidly or slowly, immediately or after a delay. The rate of lease-up should also depend on the rent to be charged (and concessions to be given) for the space, in relation to what is typically prevailing in the market today. In our example building, there was one vacant space, Suite 200 (10,000 SF). We assumed Suite 200 would remain vacant for the entire first year, and then be leased out in a 5-year lease at the prevailing market rent of \$14.00/SF (with one month free rent for each year of lease term) with an expense stop approximately equal to the second year's expenses of \$5.00/SF. This is indicated in the Space Absorption Menu much as the Rent Roll menu was, only with some differences to reflect the vacant Suite 200 space. Insert a space description line for "**Suite 200**", with **10000** SF in the **Office** type, available from **1/01** but we don't expect it to **Begin Leasing** until **1/02** (to reflect the 12 months anticipated vacancy in the sluggish current market). There is **1** lease, with **annual** creation frequency. In this way we tell ARGUS

to lease out the entire Suite 200 all at once, after one year. (Alternatively, ARGUS will gradually lease out the vacant space at the rate you indicate.). Enter **5** years in the term expiration item, and a **Base Rent** of **14** dollars with no rent changes or retail in the lease. The \$5.00 anticipated expense stop is reflected in the **Reimbursements** item, and the **5** months anticipated free rent is in the **Rent Abatements** item. Enter **Yes** in the **Lease Cost** item and fill in the **details** to tell ARGUS that the **tenant improvement** allowance will be **10** dollars and the **leasing commission** will be **6** percent. Enter **OfficeMkt** in the Market Leasing assumption, and expose the space to the **Market** upon lease expiration. In a more complicated building you could identify other vacant spaces, or groups of spaces (for example, if there were several different vacant offices, or if you wanted to treat some space as leasing up quickly while other space leases up slowly).

Back at the Main Menu, we need to keep the leasing cost assumption constant to be consistent with our Part I example (we assumed there, perhaps unrealistically but simply, that the TIs would always be \$10 or \$3). To do this, we need to go once again to the **Inflation Rates** under Property menu and edit the **Leasing Costs** inflation to have **0** in all years.

Now we have completed all of our cash flow related inputs for the example building we considered in Part I. We need only to tell ARGUS what discount rate to apply in order to get ARGUS to calculate the present value of the example property. To do this, go to the **Yield** popdown from the Main Menu and get into the **Present Value Discounting** Menu. As investors are often not sure exactly what discount rate is correct, ARGUS allows a sensitivity analysis to be easily conducted using different rates. However, in theory, only one rate can be correct (in the sense of reflecting the true market opportunity cost of capital as of a given point in time). Recall that the discount rate is derived essentially from the capital markets, as the riskfree interest rate (from long-term Government Bonds) plus a risk premium (reflecting how the markets currently perceive real estate risk, and the relative riskiness of this particular type of property, and the particular circumstances of the subject property). The discount rate is a total return (confusingly also called the "overall yield rate", labelled Y_O , according to appraisal lore). We selected a 12.00% rate in the example in Part I, reflecting a 6% current Long-Term Government Bond yield plus a 6.00% risk premium. If you only want to use a single discount rate, you enter that rate for both the Low and High rates in the Present Value Discounting Menu. As indicated below, we are valuing the property itself, rather than a levered equity interest in the property, so we leave the second part of the input menu blank.

Now you are ready to have ARGUS calculate the cash flow projection and perform the valuation. From the Main Menu select the **Reports** popdown and select the **Property Level** reports. Check the "Schedule of Cash Flow from Operations", the "Prospective Present Value Summary", and the "Property Summary Report", at the **annual** frequency. Press the **view** button to see the results. They should match those from the answer to HW#2, reproduced in Part I of this assignment. If your results do not match, try to figure out where the mistake is (but don't waste too much time). If your results match, ARGUS should not be a "black box" to you. You should understand what ARGUS is doing to arrive at its output numbers. That, and to familiarize you with lease-by-lease software, was the

purpose of this assignment. To print results, press the **print** button. (Notice that the “Export...” button there allows you to export ARGUS output to an excel spreadsheet.)

Notice on the Present Value output that ARGUS tells what proportion of the present value comes from discounting the operating cash flows versus what proportion comes from discounting the reversion cash flow (Resale Proceeds). This is an important item to consider. In general, reversion cash flows are more risky than operating cash flows (future sale prices are hard to predict with accuracy). Therefore, it is considered desirable when employing the multi-year discounted cash flow ("Yield Capitalization") method of valuation used here for no more than about half of the total present value to come from the discounted resale proceeds. In this case over 75% of the present value comes from the reversion, which is probably unacceptable. The remedy would be to extend the analysis horizon to 10 years from 5 years, to push the reversion year farther back in time and give it a smaller discounted present value. This is the main reason why an analysis horizon of 10 years is typically used. The idea in multi-year discounted cash flow (DCF) valuation is to force the analyst to go through the exercise of trying to explicitly forecast the rental market and the building cash flows for the foreseeable future, to prevent "lazy" valuations that might overlook important influences on value.

Written Assignment—Examining alternative input assumptions

In this part of this assignment you will generate some new ARGUS analysis to hand in on the due date of this assignment.

One of the great features of software packages like ARGUS is that it is very easy to quickly examine the cash flow and valuation impacts of alternative input assumptions. This is useful because the analyst is rarely completely sure about the exact value of many of the input assumptions he or she is using in the valuation. To examine alternative input assumptions in ARGUS, you create new versions using the **Make a Copy** option in the **File** menu. Do this by naming the new file "NAME2" (using the first 4 letters of your last name). When you have completed the new inputs, print the results from the REPORTS Menu. (The same three reports noted above.)

Questions to answer & reports to turn in...

The question I would like you to examine at this point is, what is the effect if the rent growth "spike" occurs 5 years from now rather than 4 years from now as we assumed previously? This would seem to be a small change in our input assumptions. The analyst could easily be wrong by a year regarding when the market perceives or expects the rent spike will occur. [Remember, for purposes of estimating the current market value of the property, it does not matter per se when (or even if) the rent spike actually will occur, or when the analyst

thinks it will occur -- what matters is what the market (i.e., the typical investor who might buy the subject property) currently "thinks" or expects, regarding when the rent spike will occur.]

You should turn in the changed versions of the three output reports noted previously in Part II (Cash Flow Schedule, Prospective Present Value, and Property Summary). On the first of these, circle the changes caused by the changed input assumption. On the second output report, write the percentage change in property present value caused by the changed assumption. Finally, from the REPORTS Menu, select **Market Leasing Assumptions** and press the print button. Turn in this print of your Market Leasing Assumptions Menu with your new (Case #2) inputs, and hand in this input printout together with your output. (Alternatively you can print and hand in the "Inflation Rates" inputs from the "Input Assumptions" report.)