Professor Crocker H. Liu November 26, 2006
Real Estate Process

# Cash Flow Analysis: Angus and ARGUS[1]

**Objective**: The purpose of this assignment is to give you experience in setting up and analyzing real estate cash flow spreadsheets. Besides this, the project demonstrates your ability to integrate the lectures and readings through practical application of real estate finance principles.

**Practical Use of Project**: Once you have completed this project, you can take the report with you on job interviews. This will help you demonstrate to potential employers that you can set up a spreadsheet, validate the numbers in your spreadsheet using ARGUS, do the necessary analysis, and effectively communicate the results of this analysis. Students have used the project not only to get investment banking jobs/managerial consulting jobs in real estate such as in the Kenneth Leventhal division of Ernst & Young but also to obtain corporate finance jobs as well.

**Strategy for Analysis**: In analyzing this case, you are expected to use the scientific method/process. This process involves defining what the problem is, discussing what possible alternatives are available to solve the problem, what are the qualitative and quantitative criteria which you will use in choosing among the alternatives, and finally, selecting the most probable "fit" -- criteria vs. alternatives.

1. Executive Summary (15 points): The executive summary is a stand alone document which provides a capsulized summary of your detailed analysis. As such it includes the problem statement, alternatives to address the problem, the criteria used to choose among the alternatives, and also the most probable solution to the problem. Your executive summary should include tables which i) summarize the salient qualitative findings with respect to the 4 properties, ii) summarize the salient quantitative findings for the 4 alternatives, and iii) summarize the results of your sensitivity analysis. Please limit your executive summary to 8 pages.

2. Detailed Analysis : In addition to your executive summary, you are required to do a detailed analysis which elaborates on the executive summary. The components of the detailed analysis are as follows:

   - Problem Statement (1 point): State what problem Angus Cartwright is faced with.

   - Alternatives to Address the Problem (4 points): Discuss the alternatives to the problem. Please do not copy verbatim from the case.

| Building Picture |  |  |  |  |
|---|---|---|---|---|
| Project | Alison Green (AG) | 900 Stony Walk(SW) | Ivy Terrace (IV) | Fowler (FB) |
| Profile | AG is a 100 unit existing garden apartment building located in Montgomery County, MD. | SW is an existing five story, 40,000 square foot office building that is also located in Montgomery County, MD. | IV is an 80 unit apartment building under construction near Arlington, VA. | FB is a two-story, 45,000 sqft office building under construction in Arlington, VA. |

- Criteria Used to Choose Among the Alternatives: The criteria used to address this problem involve the use of qualitative and quantitative criteria.

**Qualitative Criteria**:

Profile Each Investor (5 points): Please profile Martha DeRight and John DeRight in terms of their risk and return requirements. Your profile should also include qualitative considerations such as stage in the life cycle, aversion to risk, preference for dividends vs. capital gains, etc.

Profile Each Property (10 points): Discuss the qualitative factors which have an impact on risk and return. Be sure to discuss what the impacts are on risk and return. One qualitative factor, for example, is the building moratorium which is in effect for Montgomery County, MD. The consequence of the moratorium is that it constrains supply and stabilizes/increases rent in the short run.

**Quantitative Criteria:**

Discounted Cash Flow Analysis (40 points): Do the Exhibits 1-10 for each property using Excel. You should first set up your spreadsheet and replicate the numbers for Allison Green. Look at the risk and return measures. Compare and contrast the risk and return measures with respect to each property. To facilitate easier readability, you should include charts and graphs. Please use the text wrap option in inputting with your graphs into the report. Next, use ARGUS to generate the same output that you generated using Excel. Please discuss the results of your analysis.

Sensitivity Analysis (20 points): Do sensitivity analysis on all feasible alternatives using either Excel or ARGUS (your choice). In particular, change the vacancy rate, the growth rate in rents, the growth rate in operating expenses, change the interest

rate, etc. and see what the impact is on key risk and return measures. These measures should include but not be limited to the default point, added margin, cash on cash before taxes, IRR, NPV, and also a partitioning of the IRR. The main focus of sensitivity analysis is to see which variables have a major impact on risk and return i.e., what are the key drivers. Please discuss the results of your analysis.


- Most Probable Solution (5 points): Discuss which property(ies) is suitable for James and Martha DeRight by fitting their respective investor profiles to the profile of each property. Do not recommend that they should form a portfolio and each take shares in this portfolio. The goal of this case is to choose a project(s) for each of them given their respective criteria and profile relative to the profile of the building.

This is an individual project. No late projects will be accepted. Please do not email me your project. You will receive 3 scores: one for analysis, one for quantitative ability, and the third for grammar. Please format your report so that it resembles a Wall Street report from a major Investment Bank. I will discuss how this format looks like in class.

## Appendix A: Calculating IRR and NPV with Excel

Among the performance measures that you will need to calculate in the Angus Cartwright case are the internal rate of return (IRR) and the net present value (NPV). This is easy to do in Excel using the IRR and NPV functions. Suppose that we have the following set of cash flows for our property.

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Rate | 12% | | | | | | | |
| 2 | Time | Cash Flow | | | | | | | |
| 3 | 0 | -3600 | | Performance Measures | | | | | |
| 4 | 1 | 343 | | Internal Rate of Return (IRR) | 14.9% | =IRR(B2:B12) | | | |
| 5 | 2 | 358 | | Net Present Value (NPV) | $735 | =NPV(B1,B4:B13)+B3 | | | |
| 6 | 3 | 374 | | | | | | | |
| 7 | 4 | 390 | | | | | | | |
| 8 | 5 | 407 | | | | | | | |
| 9 | 6 | 424 | | | | | | | |
| 10 | 7 | 441 | | | | | | | |
| 11 | 8 | 459 | | | | | | | |
| 12 | 9 | 478 | | | | | | | |
| 13 | 10 | 6914 | | | | | | | |

The current period (time 0) is when the investor invests his money which is entered as a *negative* number since it is a cash outflow. Starting in the next period (time 1) the investor will receive a cash inflow, a *positive* number, which will continue until year 10 when the property is sold.

IRR: The syntax for the IRR in Excel is IRR(values,guess) where values is an array or a reference to cells that contain numbers for which you want to calculate the internal rate of return. Values must contain at least one positive value and one negative value to calculate the internal rate of return. IRR uses the order of values to interpret the order of cash flows. Guess is a number that you guess is close to the result of IRR. In our example above, we don't use a guess.

NPV: The syntax for the NPV in Excel is NPV(rate,value1,value2, ...) where Rate is the discount rate, value1, value2, ... are 1 to 29 arguments representing the cash inflows. Recall that the value starts from time period 1 if cash flows are presumed to occur at the end of each period. If your first cash flow occurs at the *beginning* of the first period (e.g., cash outflow), the first value must be added to the NPV result, not included in the values arguments. Intution: NPV = Present Value of Benefits - Present Value of Costs = NPV(B1,B4:B13) + B3 where NPV(B1,B4:B13) is the Present Value of Benefits and B3 is equal to - Present Value of Costs.