

2.2 Executive summary of the project.

The business that my project is designed to facilitate is that of real estate investing.

This spreadsheet is designed to accomplish two business purposes:

1. Quickly produce a customizable “shell,” discounted-cash-flow-model (DCF Model), tailored to an investment in real estate.
2. Gather and organize data relevant to the inputs of that model.

Real estate can be an excellent opportunity to store and grow your wealth. However, it becomes a daunting task evaluating a real estate investment opportunity, to the extent that you become comfortable with investing such a large amount of your personal net worth. This spreadsheet is designed to assist in the investment decision analysis.

DCF Model

The DCF model is ubiquitous in the business world. It is a decision tool that allows finance professionals to decide which ventures/projects to undertake. Real estate can be approached in the same way. Deriving the free cash flows of a real estate investment can be difficult. Taxes, assumptions, and imperfect market data, and other economic complexities lend to the difficulty of creating a DCF model for a piece of real estate. This workbook generates a spreadsheet that takes all of these complexities into consideration. With the click of a button a spreadsheet is created, ready for the user to ingress his/her inputs. Then, the model does the rest of the calculation, generating over 10 figures to evaluate the investment.

Market Data

This is not all that the spreadsheet does. A model only generates outputs as good as its inputs, or in other words “garbage in, garbage out.” For this reason, I have built a significant amount of tools that allow a real estate investor to analyze “the market,” enabling him/her to more accurately determine the inputs to the model. These tools query online, up-to-date real estate databases and extract information into organized tables. The user can input any city in Arizona and their maximum price (either rental or purchase price) and the workbook will return information matching those criteria for residential detached homes and townhouses. From that point the user has an organized table of properties that can be analyzed. If more information is needed regarding any single property the user has the capability to pull more information on that specific property at the click of a button. The workbook also allows for quick web access to any particular property, at the click of a button.

2.3 Implementation documentation.

This project evolved as I built it. I would finish one aspect of the workbook, discover something else I would like it to do automatically, and then begin to build the procedures necessary to create the desired feature. The stages of evolution and progression will be enumerated in the following bulleted list:

- The first task I faced was building the DCF model. I built out the model by first designing a spreadsheet manually, with all the formulas necessary to derive the free cash flows of an investment property. I designated an area for inputs where the user must put in his/her specific assumptions pertaining to the investment property. Then I designed an area for output performance measures and the cash flows net present value and internal rate of return. After manually building this spreadsheet I created a sub procedure that would extract all of values from each cell of the model and print them out in the immediate window. By altering my debug.print statement I was able to do this in such a way that I was then able to copy the contents of the immediate window and copy it into a sub procedure. Now that sub procedure, when executed, creates the DCF model that I created manually, automatically. I programed this sub procedure to automatically size and reformat the spreadsheet so that it is easy to navigate the inputs, the model, and the outputs. Below is a screen shot of the model:

| | A | B | |
|----|--|---------------|-------------------|
| 1 | Rental Unit Address: | | ← The inputs area |
| 2 | Inputs | | |
| 3 | Purchase Price | \$100,000.00 | |
| 4 | Land Value | \$20,000.00 | |
| 5 | Improvement Value | \$80,000.00 | |
| 6 | | | |
| 7 | Investors Criteria and Contribution | | |
| 8 | Initial Equity Investment | \$20,000.00 | |
| 9 | Investors Required Rate of Return | 12.00% | |
| 10 | | | |
| 11 | Financing Information | | |
| 12 | Mortgage Amount | \$80,000.00 | |
| 13 | Financing Term (Years) | 30 | |
| 14 | No. of Payment Per Year | 12 | |
| 15 | Annual Mortgage Interest Rate | 4.00% | |
| 16 | Private Mortgage Insurance (yearly) | 0 | |
| 17 | Investment Term: Use Ribbon to Change | 5 | |
| 18 | | | |
| 19 | Tax Information | | |
| 20 | Depreciable Life (27.5 Res 39 Comm) | 27.5 | |
| 21 | Marginal Income Tax Rate | 28.00% | |
| 22 | Capital Gains Tax Rate | 15.00% | |
| 23 | Recapture Tax Rate | 20.00% | |
| 24 | Investor's Modified Adjusted Gross Inc. | \$100,000.00 | |
| 25 | Investor's Participation, Active? Y/N | y | |
| 26 | | | |
| 27 | Forecast Operating Data | | |
| 28 | First Year forecast PGI | \$15,000.00 | |
| 29 | Annual Growth in PGI | 3.00% | |
| 30 | % Annual Vacancy | 8.00% | |
| 31 | % Operating Expenses of EFI | 25.00% | |
| 32 | Other Income | 0 | |
| 33 | Future Sales Information | | |
| 34 | Forecast Future Sales Price | \$115,000.00 | |
| 35 | Future Selling Expenses | 8.00% | |
| 36 | | | |
| 37 | Discounted Cash Flows | | |
| 38 | Potential Gross Income | \$15,000.00 | \$15,450.00 |
| 39 | Less Vacancy & Collection Loss | (\$1,200.00) | (\$1,236.00) |
| 40 | Plus Other Income | \$0.00 | \$0.00 |
| 41 | Effective Gross Income | \$13,800.00 | \$14,214.00 |
| 42 | Less Operating Expenses | (\$3,450.00) | (\$3,553.50) |
| 43 | Net Operating Income | \$10,350.00 | \$10,660.50 |
| 44 | Less Private Mortgage Insurance | \$0.00 | \$0.00 |
| 45 | Less Annualized Mortgage Payments | (\$4,583.19) | (\$4,583.19) |
| 46 | Before Tax Cash Flows | \$5,766.81 | \$6,077.31 |
| 47 | Less Annual Depreciation | (\$2,909.09) | (\$2,909.09) |
| 48 | Plus Annual Principal Paid | \$1,408.83 | \$1,585.79 |
| 49 | Taxable Income | \$4,266.55 | \$4,754.01 |
| 50 | Less Taxes from BTFC | (\$1,194.63) | (\$1,331.12) |
| 51 | Savings from Passive Activity Loss | \$0.00 | \$0.00 |
| 52 | After-tax Cash Flow from Operations | \$4,572.18 | \$4,746.19 |
| 53 | Initial Equity Investment | (\$20,000.00) | |
| 54 | After-tax Cash on Sale | | |
| 55 | Total After-tax Cash Flow | (\$20,000.00) | \$4,572.18 |
| 56 | IRR Partition Data: | (\$20,000.00) | \$3,518.27 |
| 57 | Reversion Value: | | |
| 58 | Investment Measures | | |
| 59 | First Year Measures: | | |
| 60 | Payback Period (years): | 4.374282153 | |
| 61 | Profit Margin: | 33.13% | |
| 62 | Default or Breakeven Ratio: | 58.21% | |
| 63 | Operating Expense Ratio: | 25.00% | |
| 64 | Debt Coverage Ratio: | 2.258253999 | |
| 65 | Loan to Value Ratio: | 80.00% | |
| 66 | Effective Gross Income Multiplier: | 7.246376812 | |
| 67 | Capitalization Rate: | 10.35% | |
| 68 | Before Tax Cash on Cash Return: | 28.83% | |
| 69 | After Tax Cash on Cash Return: | 22.86% | |
| 70 | | | |
| 71 | Holding Period Measures: | | |
| 72 | Net Present Value: | \$14,869.94 | |
| 73 | Internal Rate of Return: | 29.96% | |
| 74 | IRR Partition: | | |
| 75 | IRR attributable to ATCF: | \$15,804.21 | 66.00% |
| 76 | IRR attributable to Reversion Value: | \$8,139.94 | 34.00% |
| 77 | PV | \$23,944.15 | |

| | 0 | 1 | 2 | 3 | 4 | 5 | |
|----|--|---------------|--------------|--------------|--------------|--------------|--|
| 37 | | | | | | | Termination (Reversion) Statement |
| 38 | Potential Gross Income | \$15,000.00 | \$15,450.00 | \$15,913.50 | \$16,390.91 | \$16,882.63 | Gross Future Sales Price |
| 39 | Less Vacancy & Collection Loss | (\$1,200.00) | (\$1,236.00) | (\$1,273.08) | (\$1,311.27) | (\$1,350.61) | Less Selling Expenses |
| 40 | Plus Other Income | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | Net Sales Proceeds |
| 41 | Effective Gross Income | \$13,800.00 | \$14,214.00 | \$14,640.42 | \$15,079.63 | \$15,532.02 | Less Mortgage Balance |
| 42 | Less Operating Expenses | (\$3,450.00) | (\$3,553.50) | (\$3,660.11) | (\$3,769.91) | (\$3,883.01) | Before Tax Cash on Sale |
| 43 | Net Operating Income | \$10,350.00 | \$10,660.50 | \$10,980.32 | \$11,309.72 | \$11,649.02 | |
| 44 | Less Private Mortgage Insurance | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | Net Sales Proceeds |
| 45 | Less Annualized Mortgage Payments | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | Less Cost Basis |
| 46 | Before Tax Cash Flows | \$5,766.81 | \$6,077.31 | \$6,397.13 | \$6,726.54 | \$7,065.83 | Capital Gain (Economic Gain) |
| 47 | Less Annual Depreciation | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | X Capital Gains Rate |
| 48 | Plus Annual Principal Paid | \$1,408.83 | \$1,585.79 | \$1,650.40 | \$1,717.64 | \$1,787.62 | Capital Gains Taxes |
| 49 | Taxable Income | \$4,266.55 | \$4,754.01 | \$5,138.43 | \$5,535.08 | \$5,944.36 | |
| 50 | Less Taxes from BTFC | (\$1,194.63) | (\$1,331.12) | (\$1,438.76) | (\$1,549.82) | (\$1,664.42) | Accumulated Depreciation |
| 51 | Savings from Passive Activity Loss | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | X Recapture Tax Rate |
| 52 | After-tax Cash Flow from Operations | \$4,572.18 | \$4,746.19 | \$4,958.37 | \$5,176.71 | \$5,401.41 | Recapture Taxes |
| 53 | Initial Equity Investment | (\$20,000.00) | | | | | |
| 54 | After-tax Cash on Sale | | | | | \$30,171.18 | Before Tax Cash on Sale |
| 55 | Total After-tax Cash Flow | (\$20,000.00) | \$4,572.18 | \$4,746.19 | \$4,958.37 | \$5,176.71 | Less Capital Gains Taxes |
| 56 | IRR Partition Data: | (\$20,000.00) | \$3,518.27 | \$2,810.33 | \$2,259.21 | \$1,815.00 | Less Recapture Taxes |
| 57 | Reversion Value: | | | | | \$8,139.94 | After Tax Cash on Sale |

| | | | |
|----|--------------------------------------|-------------|--------|
| 58 | Investment Measures | | |
| 59 | First Year Measures: | | |
| 60 | Payback Period (years): | 4.374282153 | |
| 61 | Profit Margin: | 33.13% | |
| 62 | Default or Breakeven Ratio: | 58.21% | |
| 63 | Operating Expense Ratio: | 25.00% | |
| 64 | Debt Coverage Ratio: | 2.258253999 | |
| 65 | Loan to Value Ratio: | 80.00% | |
| 66 | Effective Gross Income Multiplier: | 7.246376812 | |
| 67 | Capitalization Rate: | 10.35% | |
| 68 | Before Tax Cash on Cash Return: | 28.83% | |
| 69 | After Tax Cash on Cash Return: | 22.86% | |
| 70 | | | |
| 71 | Holding Period Measures: | | |
| 72 | Net Present Value: | \$14,869.94 | |
| 73 | Internal Rate of Return: | 29.96% | |
| 74 | IRR Partition: | | |
| 75 | IRR attributable to ATCF: | \$15,804.21 | 66.00% |
| 76 | IRR attributable to Reversion Value: | \$8,139.94 | 34.00% |
| 77 | PV | \$23,944.15 | |

The Model Area




← The investment measures area

This model is created whenever the user presses this,  , button found on the “Real Estate Analysis” tab in the ribbon.

This button creates a new sheet for the model naming the sheet DCF1, or if it is the second model to be created in the workbook it creates a sheet named DCF2 and puts the new model there, and so on and so forth as many times as you push the button.

When the new model appears all of the inputs will be blank and many of the formulas will display “#DIV/0!” but this will change as soon as you enter numbers into the input area.

Another problem I came across while developing this project was that anytime I created a new model and keyed in the inputs, most of the cells in the model area would display “#####.” When the model is created, the sub procedure autofits all of the columns; however, I found it irritating that the columns would not be the right size after placing

numbers into the input area. So for that reason I designed this button, , in the ribbon that autofits all of the columns in the active spreadsheet.

Every other part of this project revolves around the DCF model and its inputs. I developed tools to assist the real estate investor in gathering information on what the inputs to the model should be.

As a side note, examples of inputs to the model are these:

- Purchase Price of the property
- Land Value (as opposed to the value of the improvements/building)
- Improvement Value
- Investor’s Criteria and Contribution
 - Initial Equity Investment
 - Investor’s required rate of return
- Financing Information
 - Mortgage Amount
 - Financing Terms (years)
 - No. of payments per year
 - Annual mortgage interest rate
 - Private mortgage insurance (yearly)
 - Investment term (this is input through the ribbon)
- Tax Information
 - Depreciable life of the property for tax (usually 27.5 years)
 - Marginal Income tax rate
 - Capital gain tax rate
 - Recapture tax rate
 - Investor’s AGI
 - Investor’s participation, Active? (Y/N)

- Forecast Operating data
 - First year forecast PGI (potential gross income/rent revenue)
 - Annual growth in PGI
 - % Annual vacancy
 - % Operating expenses of EFI (Effective gross income)
 - Other income
- Future Sales Information
 - Forecast future sales price
 - Future selling expenses (as a percentage)

The main two inputs that the following tools give the investor information on are the rental property purchase price and the effective gross income (yearly rent revenue).

- One of the inputs is “investment term,” indicating the length in years that the investor desires to hold onto the rental property before selling it. This corresponds to the amount of columns in “The model area,” each column numbered at the top represents one year of cash flows. The inputs in the spreadsheet are keyed in after the user creates the initial model and can be changed at any time. The problem with this is that if the user changes the “Investment Term” input the model area did not correspondingly change the number of columns it contained. So, to solve this problem, I put a note next to the “Investment

Term” input cell that prompts the user to use a specially created ribbon button, to specify and change the desired investment term.

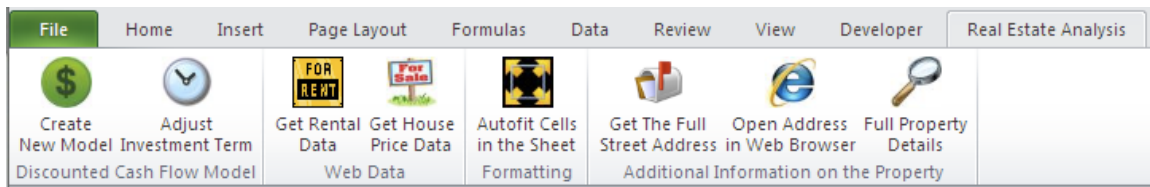
When the user presses this button in the ribbon, a user form pops up prompting them to indicate the desired investment term. This is the user form that pops up:

The image shows a small dialog box titled "Investment Term". Inside, it says "Investment Term in years:" followed by a text input field containing the number "9". At the bottom, there are two buttons: "Cancel" on the left and "OK" on the right.

When the user presses the OK button a sub procedure places that amount into the correct investment term cell in the “Inputs Area” and then adjusts the model, either adding columns for cash flows or deleting them, and adjusts formulas in the “Model Area” and the “Investment Measures Area” so that the model still calculates correctly with the added columns of cash flows. Below is a picture of the model extended to 9 years so that the idea is clearly displayed. The cancel button just ends the sub procedure.

| | | | | | | | | | | | | | |
|----|-------------------------------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-----------------------------------|----------------|
| 37 | Discounted Cash Flows | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Termination (Reversion) Statement | |
| 38 | Potential Gross Income | \$15,000.00 | \$15,450.00 | \$15,913.50 | \$16,390.91 | \$16,882.63 | \$17,389.11 | \$17,910.78 | \$18,448.11 | \$19,001.55 | | Gross Future Sales Price | \$115,000.00 |
| 39 | Less Vacancy & Collection Loss | (\$1,200.00) | (\$1,236.00) | (\$1,273.08) | (\$1,311.27) | (\$1,350.61) | (\$1,391.13) | (\$1,432.86) | (\$1,475.85) | (\$1,520.12) | | Less Selling Expenses | (\$9,200.00) |
| 40 | Plus Other Income | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | | Net Sales Proceeds | \$105,800.00 |
| 41 | Effective Gross Income | \$13,800.00 | \$14,214.00 | \$14,640.42 | \$15,079.63 | \$15,532.02 | \$15,997.98 | \$16,477.92 | \$16,972.26 | \$17,481.43 | | Less Mortgage Balance | (\$63,940.68) |
| 42 | Less Operating Expenses | (\$3,450.00) | (\$3,553.50) | (\$3,660.11) | (\$3,769.91) | (\$3,883.01) | (\$3,999.50) | (\$4,119.48) | (\$4,243.06) | (\$4,370.36) | | Before Tax Cash on Sale | \$41,859.32 |
| 43 | Net Operating Income | \$10,350.00 | \$10,660.50 | \$10,980.32 | \$11,309.72 | \$11,649.02 | \$11,998.49 | \$12,358.44 | \$12,729.19 | \$13,111.07 | | | |
| 44 | Less Private Mortgage Insurance | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | | Net Sales Proceeds | \$105,800.00 |
| 45 | Less Annualized Mortgage Payments | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | (\$4,583.19) | | Less Cost Basis | (\$100,000.00) |
| 46 | Before Tax Cash Flows | \$5,766.81 | \$6,077.31 | \$6,397.13 | \$6,726.54 | \$7,065.83 | \$7,415.30 | \$7,775.25 | \$8,146.01 | \$8,527.88 | | Capital Gain (Economic Gain) | \$5,800.00 |
| 47 | Less Annual Depreciation | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | (\$2,909.09) | | X Capital Gains Rate | 15.00% |
| 48 | Plus Annual Principal Paid | \$1,408.83 | \$1,585.79 | \$1,650.40 | \$1,717.64 | \$1,787.62 | \$1,860.45 | \$1,936.24 | \$2,015.13 | \$2,097.23 | | Capital Gains Taxes | \$870.00 |
| 49 | Taxable Income | \$4,266.55 | \$4,754.01 | \$5,138.43 | \$5,535.08 | \$5,944.36 | \$6,366.66 | \$6,802.41 | \$7,252.05 | \$7,716.02 | | | |
| 50 | Less Taxes from BTIC | (\$1,194.63) | (\$1,331.12) | (\$1,438.76) | (\$1,549.82) | (\$1,664.42) | (\$1,782.66) | (\$1,904.67) | (\$2,030.57) | (\$2,160.49) | | Accumulated Depreciation | \$26,181.82 |
| 51 | Savings from Passive Activity Loss | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | | X Recapture Tax Rate | 20.00% |
| 52 | After-tax Cash Flow from Operations | \$4,572.18 | \$4,746.19 | \$4,958.37 | \$5,176.71 | \$5,401.41 | \$5,632.64 | \$5,870.58 | \$6,115.43 | \$6,367.40 | | Recapture Taxes | \$5,236.36 |
| 53 | Initial Equity Investment | (\$20,000.00) | | | | | | | | | | | |
| 54 | After-tax Cash on Sale | | | | | | | | | | \$35,752.96 | Before Tax Cash on Sale | \$41,859.32 |
| 55 | Total After-tax Cash Flow | (\$20,000.00) | \$4,572.18 | \$4,746.19 | \$4,958.37 | \$5,176.71 | \$5,401.41 | \$5,632.64 | \$5,870.58 | \$6,115.43 | \$42,120.36 | Less Capital Gains Taxes | (\$870.00) |
| 56 | IRR Partition Date: | (\$20,000.00) | \$3,569.28 | \$2,892.40 | \$2,358.90 | \$1,922.57 | \$1,566.00 | \$1,274.83 | \$1,037.24 | \$843.50 | \$6,367.40 | Less Recapture Taxes | (\$5,236.36) |
| 57 | Reversion Value: | | | | | | | | | | \$3,849.68 | After Tax Cash on Sale | \$35,752.96 |

- Just to have an idea at this point, this is what the entire customized ribbon looks like:



- After developing everything previously mentioned, I developed several tools to help the investor get a feel for the market and to gain insight into what the inputs of the DCF model should be. These tools are represented in the “Web Data” and “Additional Information on the Property” groups on the toolbar. I’ll discuss each of these tools.
- First, the Button labeled “Get Rental Data” with a “FOR RENT” icon launches a userform shown below:

The caption of the form indicates that this will query “RENTAL DATA,” meaning this will return a list of rental properties that meet the user criteria. The user enters in the Arizona city for the market they wish to investigate. (If you want to try this then here are some Arizona cities: Mesa, Tempe, Gilbert, Chandler, Queen Creek, Scottsdale, and of course Phoenix) Then the user enters the maximum monthly rental rate for the rental market they wish to investigate.

I included a text box at the bottom, which the user cannot edit, but if the user double clicks on the text box the URL where the rental property data is being queried will be copied to the clipboard. If the user so desires they can navigate to this website by pasting the URL in a web browser.

For example, if the user entered “gilbert” into the city text box and “1000” into the max monthly rate text box and pushed the ok button then a new sheet would be created and named “Rent in Gilbert1.” If the user then performed a subsequent search in gilbert, a new sheet would be created and named “Rent in Gilbert2,” and so on and so forth. The table that would be generated looks like this:

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|----|---------|--------------|---------|-------|----------|------|-------|-------------|-----------|------------|----------------|---------------------|---------|
| 1 | MLS ID | Rental Price | City | State | Zip Code | Beds | Baths | Square Feet | \$/Sqft | \$/Bedroom | \$bed and bath | | |
| 2 | 4740758 | 1000 | Gilbert | AZ | 85297 | 3 | 2 | 1458 | \$ 0.69 | \$ 333.33 | \$ 200.00 | City Searched: | Gilbert |
| 3 | 4727137 | 995 | Gilbert | AZ | 85296 | 3 | 2 | 1313 | \$ 0.76 | \$ 331.67 | \$ 199.00 | Max Price Searched: | 1000 |
| 4 | 4742451 | 995 | Gilbert | AZ | 85296 | 3 | 2 | 0 #DIV/0! | \$ 331.67 | \$ 199.00 | | | |
| 5 | 4718794 | 950 | Gilbert | AZ | 85296 | 2 | 2 | 1188 | \$ 0.80 | \$ 475.00 | \$ 237.50 | | |
| 6 | 4736050 | 950 | Gilbert | AZ | 85233 | 2 | 2 | 1189 | \$ 0.80 | \$ 475.00 | \$ 237.50 | | |
| 7 | 4738482 | 950 | Gilbert | AZ | 85298 | 3 | 2 | 1421 | \$ 0.67 | \$ 316.67 | \$ 190.00 | | |
| 8 | 4725725 | 900 | Gilbert | AZ | 85296 | 2 | 2 | 1000 | \$ 0.90 | \$ 450.00 | \$ 225.00 | | |
| 9 | 4738492 | 895 | Gilbert | AZ | 85234 | 3 | 2 | 1262 | \$ 0.71 | \$ 298.33 | \$ 179.00 | | |
| 10 | 4720462 | 600 | Gilbert | AZ | 85295 | 2 | 1 | 0 #DIV/0! | \$ 300.00 | \$ 200.00 | | | |
| 11 | 4734260 | 595 | Gilbert | AZ | 85295 | 1 | 1 | 625 | \$ 0.95 | \$ 595.00 | \$ 297.50 | | |
| 12 | 4427702 | 500 | Gilbert | AZ | 85295 | 1 | 1 | 0 #DIV/0! | \$ 500.00 | \$ 250.00 | | | |

The table lists the properties MLS ID, asking monthly rental price, City, State, Zip Code, number of bedrooms, bathrooms, square feet, and three different ratios for comparison. On the right a table listing exactly what the search was is generated and placed with a thick border. For some reason some of the listings don't tell square feet of the house so those rental price per square foot ratios display as “#DIV/0!”

- The “Get House Price Data” next to the “Get Rental Data” does almost the same exact thing; except for it produces a slightly different userform and returns a table with purchase prices rather than rental prices. The form produced looks like this:

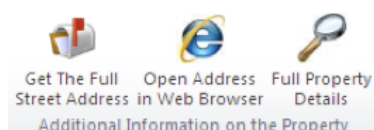
Instead of asking for the maximum rental price it asks for the maximum purchase price. Also, the form caption says “PURCHASE DATA” so the user can be sure which of the two buttons was pushed. When this query for “gilbert” homes listed at “100000” dollars the table that it returns looks like this:

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---------|----------------|---------|-------|----------|------|-------|-------------|---------|-------------|-----------------|---------------------|---------|
| 1 | MLS ID | Purchase Price | City | State | Zip Code | Beds | Baths | Square Feet | \$/Sqft | \$/Bedroom | \$/bed and bath | | |
| 2 | 4736535 | 99900 | Gilbert | AZ | 85233 | 3 | 2 | 1363 | \$73.29 | \$33,300.00 | \$ 19,980.00 | City Searched: | Gilbert |
| 3 | 4690829 | 79900 | Gilbert | AZ | 85233 | 3 | 2 | 1102 | \$72.50 | \$26,633.33 | \$ 15,980.00 | Max Price Searched: | 100000 |
| 4 | 4687653 | 40900 | Gilbert | AZ | 85233 | 2 | 1 | 990 | \$41.31 | \$20,450.00 | \$ 13,633.33 | | |
| 5 | | | | | | | | | | | | | |

Notice that when the ok button is pushed on this form the procedure creates a new sheet automatically and names it “Purchase in (city searched)#” and places that data in there. The result is very similar to the rental data button but with slight differences. Using either of these forms, if after the queries run and no results are found, then a message box displays and notifies the user that no results were found. (NOTE: FOR QUERIES THAT RETRIEVE A LOT OF DATA (300 OR SO ENTRIES) THE SPREADSHEET WILL ACT LIKE ITS NOT RESPONDING. IT IS STILL WORKING. JUST WAIT AND IT WILL BRING UP THE QUERIED DATA!)

- The next part I really enjoyed developing. The tools located on the ribbon in the group “Additional Information On the Property”

Because the tables shown above, that result from the web queries, have relatively little information more information can be retrieved with these buttons:

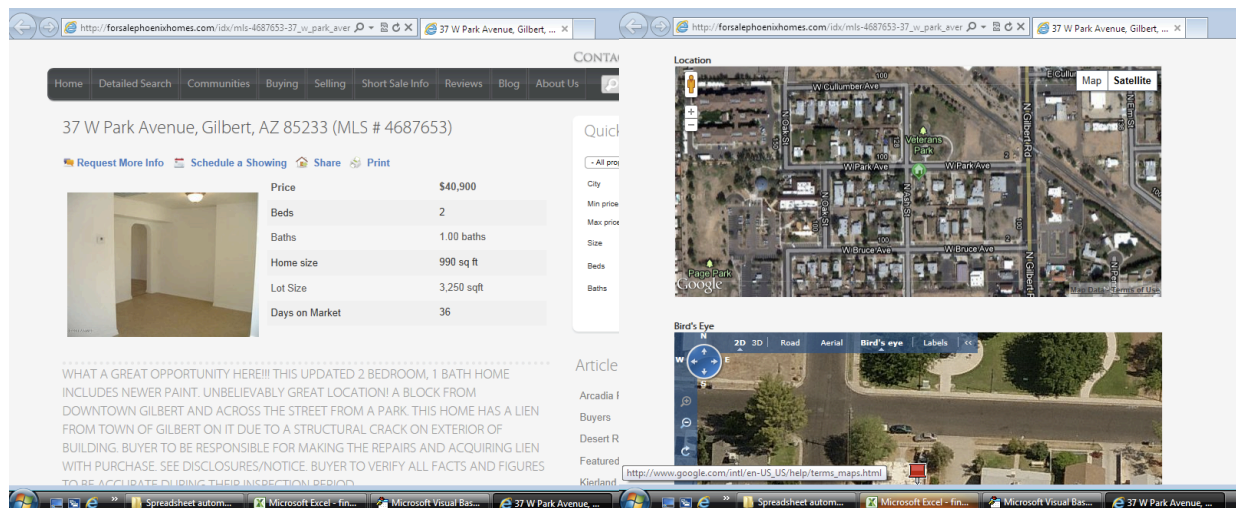


The first one is useful to obtain the full street address of the property. The website where the information on the tables above came from does not list full street addresses. So, if the user wants to know the full street address of the property they simply click on any cell in the row of that property listing and then click the “Get The Full Street Address” button. This button queries a different website using the listed MLS ID in the existing table. If a new column has not already been created then the sub procedure inserts a column in before column A and puts the full street address in that column in the row that corresponds to the cell activated by the user. A heading is placed on this column that says “Full Street Address.” The table then looks like this after clicking on that button:

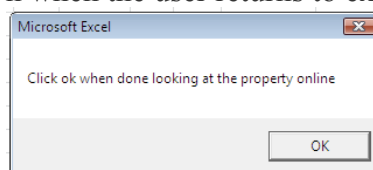
| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|-----------------------------------|---------|----------------|---------|-------|----------|------|-------|-------------|---------|-------------|----------------|---------------------|---------|
| 1 | Full Street Address | MLS ID | Purchase Price | City | State | Zip Code | Beds | Baths | Square Feet | \$/Sqft | \$/Bedroom | \$bed and bath | | |
| 2 | | 4736535 | 99900 | Gilbert | AZ | 85233 | 3 | 2 | 1363 | \$73.29 | \$33,300.00 | \$ 19,980.00 | City Searched: | Gilbert |
| 3 | | 4690829 | 79900 | Gilbert | AZ | 85233 | 3 | 2 | 1102 | \$72.50 | \$26,633.33 | \$ 15,980.00 | Max Price Searched: | 100000 |
| 4 | 37 W Park AvenueGilbert, AZ 85233 | 4687653 | 40900 | Gilbert | AZ | 85233 | 2 | 1 | 990 | \$41.31 | \$20,450.00 | \$ 13,633.33 | | |
| 5 | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |

This is all that that button does. The other two buttons build upon what this button has done.


If the user clicks on the “Open Address in Web Browser” button then the procedure will use the agent method and open up the property listing on yet another real estate website in internet explorer. This way the user can quickly see a map and many pictures of this property if so desired after analyzing the first table of information. When the user returns to excel a message box is on screen prompting the user to click when finished browsing the property on the web. Once the user clicks ok then Internet Explorer closes. This is what the screen looks like after the user activates any cell in the desired row of the table and clicks the “Open Address in Web Browser”:

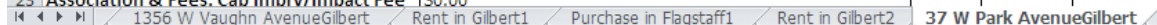


The message box shown when the user returns to excel is as follows:



After clicking OK Internet Explorer Closes.

- Now, the final button is discussed, the “Full Property Details”  button. After the user inspects certain properties and their limited details, it is likely that the user will want to get all the information possible on that property. Well as it turns out the website that the previous button opens in IE is actually an excellent source of information. The “Full Property Details” button creates a sheet in the workbook and names it after the street address of the property. For example the previous property’s sheet created would be named “37 W Park AvenueGilbert” and a whole lot of data about that property will be populated to that new sheet. Here is what the table looks like if you click on the “Full Property Details” button **after activating a cell in the row of the corresponding property listing:**

| | A | B | C | D | E |
|--|--|--|--------|------------|---|
| 1 | Price | \$40,900 | | | |
| 2 | Beds | 2 | | | |
| 3 | Baths | 1.00 baths | | | |
| 4 | Home size | 990 sq ft | | | |
| 5 | Lot Size | 3,250 sqft | | | |
| 6 | Days on Market | 36 | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | Last Updated | 4/9/2012 | Tract | Lacy Tract | |
| 11 | Year Built | 1943 | County | Maricopa | |
| 12 | Walk Score ® | 82 | | | |
| 13 | Schools | | | | |
| 14 | School District | Gilbert Unified District (041) | | | |
| 15 | Elementary School | Oak Tree | | | |
| 16 | Grade School | Gilbert Unified District (041) | | | |
| 17 | Jr. High School | Gilbert | | | |
| 18 | High School | Mesquite | | | |
| 19 | Additional Details | | | | |
| 20 | Additional Bedroom | Master Bdrm Dwnstrs, Master Bdrm Split, Mstr Bdr Walkin Clst, Othr Bdr Walkin Clst | | | |
| 21 | Architecture | Ranch | | | |
| 22 | Assoc Rules/Info | None | | | |
| 23 | Association & Fees: Cap Imprv/Impact Fee | \$0.00 | | | |
|  | | | | | |

This table contains approximately 65 distinguishing features pertaining to this property. Both the “Open Address in Web Browser” and the “Full Property Details” buttons rely on the full street address of the property being in column A. If the user does not acquire the full street address by first pressing the “Get The Full Street Address” button that is OK. Both the “Open Address in Web Browser” and “Full Property Details” buttons will both first acquire and insert the full property street address and insert a new column if necessary and then go on to perform their different functions. If a column has already been inserted for the full street addresses, none of these buttons will insert another column, they will simply put the full street address in the corresponding blank cell in column A. That is the last button and tool that I created for this project pertaining to this workbook.

- To wrap up this part of the paper, I designed the tools this way because they follow the process in which I would want to go about looking for an investment property. I would like to have some broad market data from which I can derive various statistics. Then I would like to investigate the properties that (either rental listings or purchase listings) stick out for any particular reason. I would want to be able to dig deeper and deeper on individual properties rather than just importing a mountain of data from the beginning. That is why I have designed this workbook in this manner.

2.4 Learning and Conceptual difficulties

I feel that each step of making this workbook was extremely difficult functionally. At first I could not get the agent class to work no matter what I tried. Then after trying the web query wizard I found that it was not responding as I had expected it to. The whole thing was looking like it was going to be impossible to automate, especially the initial data queries of rental data and purchase data. The concepts employed in this project were not difficult for me to grasp, but getting the concepts to work was extremely difficult and time consuming.

Each process no matter how simple had many complicating attributes. One thing that I found especially difficult was creating a new sheet with a unique name. This one task though simple to manually do was very difficult to automate. In the end, I constructed a complicated code using do loops, for loops, if statements, and message display setting statements to complete this task. The code I wrote do this task is shown below:

```

For Each er In Worksheets
    If er.Name = Replace(Left(address, InStr(1, address, ",", vbTextCompare)), ",", "") Then
        quit = True
        MsgBox ("This property already has a sheet generated!")
        Exit Sub
    End If
Next

For Each sheet In Worksheets
    If sheet.Name = "data" Then
        sheetexist = True
    Exit For
    End If
Next

If sheetexist = False Then
    Worksheets.Add
    ActiveSheet.Name = "data"
    setupWebquery2 (url)
End If

```

Another problem I had early on was that querying, parsing, and organizing data for rental properties and purchase properties required two unique processes, instead of one in the same. I copied lots of the code from the rental query, which I wrote first, and pasted it into a separate

module to use if for the purchase data query. This created all kinds of problems because all of the variables in the two separate procedures had the exact same names. This didn't create problems for the computer because all variables were local sub procedure variables, but this created a huge problem for human errors. I was making them left and right.

To cover each and every difficulty I faced I would have to recreate the project and make note of each one. I'm sure that if I were to write each difficulty down this section of the paper would dwarf the initial section of the paper.

One concept that I really learned from this project was the usefulness of user defined functions, and passing variables to sub procedures; e.g., sub getData (url as string). This became very useful. I mastered these practices somewhere half way through the project. Had I had a firm understanding of these concepts at the beginning I could have written a whole lot less code than I did.

Finally, I learned how complicated it is to produce a robust automated procedure. There are so many different ways to approach a sub procedure, or call a line of code with a button. Figuring out a way to handle ALL approaches and then still perform the procedure is very difficult and VERY time consuming. In the end I thoroughly enjoyed creating this project. I feel that I have learned immense amounts about VBA and feel that I am a much better VBA programmer having completed this project.

2.5 Assistance:

I did not receive any substantial assistance from anyone, or any assistance at all for that matter. I "googled" a lot, when I needed to know how a certain object behaved, or how to perform a specific task in VBA.