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VBA Final Project

Executive Summary: Testing the CAPM

CAPM is short for the *Capital Asset Pricing Model*, which is a theory of asset pricing that has held a prominent position in the world of financial economics for the last several decades. It constitutes a series of predictions concerning the equilibrium expected returns of risky assets that are based on a set of foundational assumptions about the nature of assets, investors, and asset markets. These powerful and intuitive predictions have informed investor thought about asset pricing for decades. Perhaps the best-known expression of the CAPM is the following:

Equation 1: $$\mathbf{E[r_i] - r_f = \beta_i(E[r_m] - r_f)}$$

This equation posits that the expected return to any asset beyond the risk-free rate ($E[r_i] - r_f$) should relate to the expected return to the market of all assets beyond the risk-free rate ($E[r_m] - r_f$) *only* by the coefficient β, a value unique to each asset.

One notable attribute of the CAPM is that its predictions can be checked using reasonably straightforward empirical tests and real-world data. For my VBA final project, I constructed an Excel workbook that replicates one of the earliest such empirical tests of the CAPM from the late 1960s. Of course, what took the attention of many researchers and massive computer mainframes back then can be greatly simplified with modern technology today. The workbook I have created is designed to automate as much of the empirical testing process as possible by assisting the user in selecting valid stocks for analysis, gathering and properly arranging the most recent price and returns data from the internet to fill approximately 4,000 cells, and performing the correct regression analysis and statistical inference to test whether or not the CAPM relationship holds. Without access to such an automating process, performing the same empirical test would likely take a researcher many hours to complete.

The motivation for this project was a term assignment I completed this semester to test the validity of the CAPM as part of my Financial Economics class (Econ 450). My project should benefit future students by giving them access to a tool that guides them through their term assignment, hopefully accelerating their learning and saving them valuable time. Writing the code also helped me gain a much deeper understanding of the CAPM. Finally, this project should make clear to future employers that I have a thorough grasp of financial economic concepts and the skills apply these concepts to develop user-friendly software solutions.

Implementation

The empirical test I have automated with Excel consists of running two sets of regressions on real-world stock, market, and risk-free returns data. As such, there are essentially two major tasks that I have automated VBA to perform: gathering data and performing regression analyses. I have tried to automate these processes in such a way that the end user sees very little of what is going on "under the hood," helping the workbook maintain a clean and professional appearance.

Gathering Data

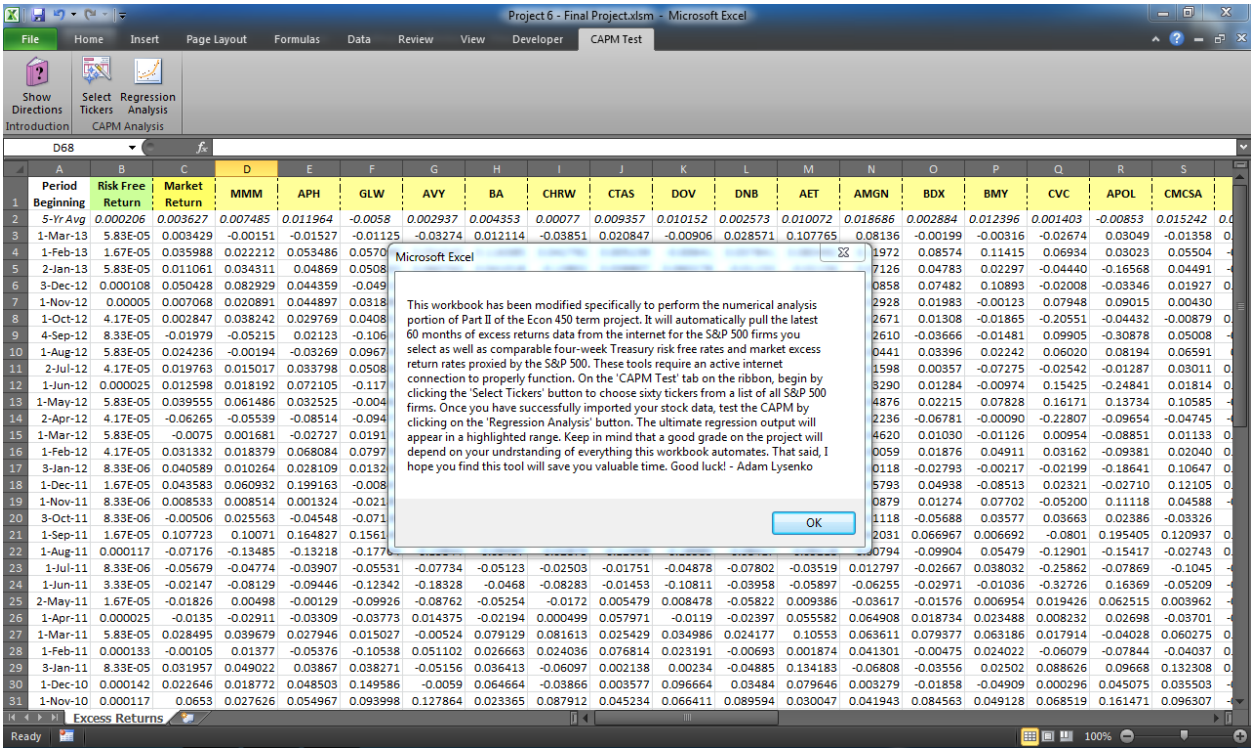
While the number of stocks used to test the CAPM need not be arbitrarily limited, the Econ 450 assignment that inspired this project explicitly called for five years of monthly returns data from sixty stocks to serve as the basis of my empirical analysis. Therefore, I have constructed my workbook to gather five years of monthly returns data for the stocks selected by the user. Additionally, the regression analysis portion of the workbook functions only when at least sixty stocks have been selected.

Given these constraints, I designed the workbook to gather the following data necessary to complete the empirical test called for in my Econ 450 assignment:

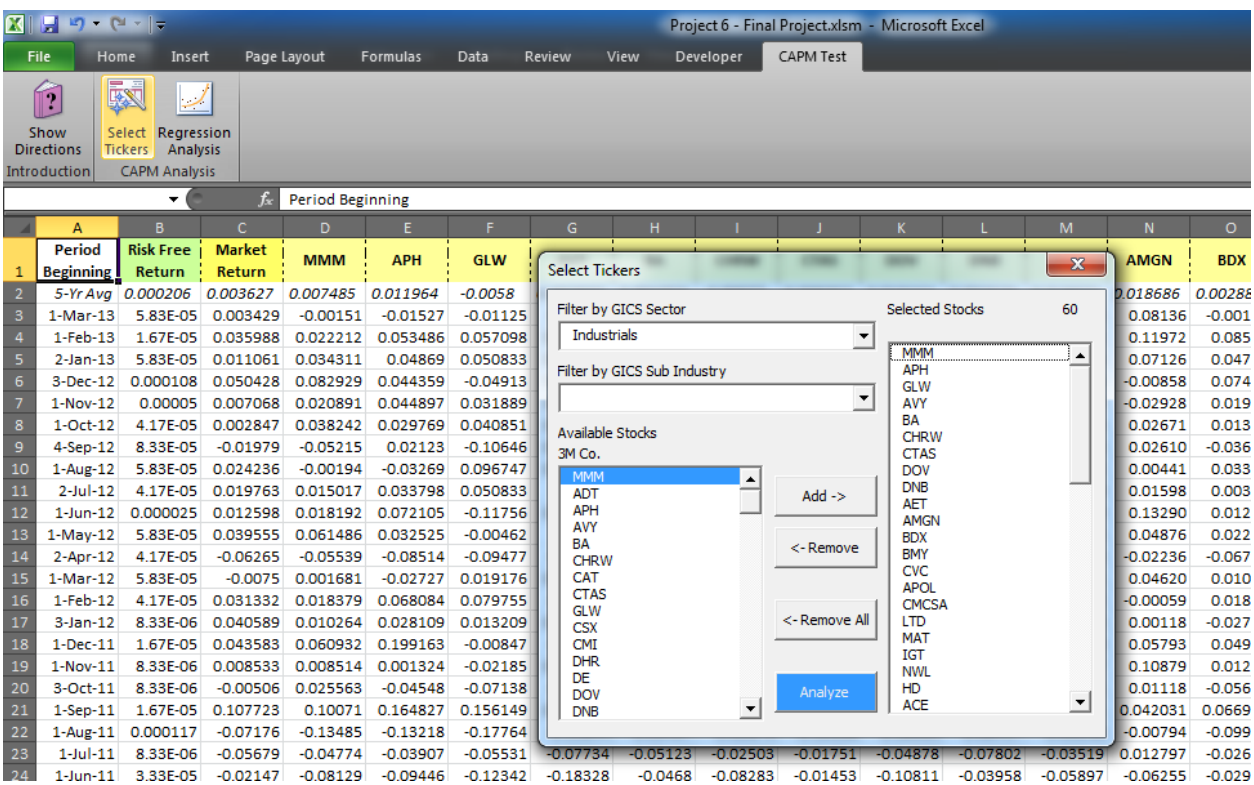
- The most recent sixty full months of excess returns to sixty stocks
- Excess returns over the same sixty months to a proxy market index
- Monthly risk-free rates of return over the same sixty months
- Five-year average returns to each of the items named above

The user can easily begin this process by following the instructions that display when they click on a button found on the custom "CAPM Test" tab in the ribbon. Screenshot 1 depicts what the user sees after opening the workbook, navigating to the "CAPM Test" ribbon tab, and clicking on the "Show Directions" button. The instructions that display in the message box direct the user to first click the "Select Tickers" ribbon button in order to update the list of stock tickers highlighted in light-yellow beginning in cell D1. The workbook by default loads with sixty valid stocks, but these selections will be replaced before any returns data are updated if the user elects to use a different set of stocks. When the "Select Tickers" ribbon button is selected, Excel launches the user form depicted in Screenshot 2 to guide the user through the selection of stocks.

Screenshot 1: Instructions Message Box



Screenshot 2: "Select Tickers" User From



Once the “Select Tickers” user form has launched, screen updating is turned off and on a new sheet invisible to the user Excel uses a web query to import a list of the names and associated tickers of all stocks currently listed on the S&P500 from a third-party website. This web query also imports sector and sub industry information for each of the S&P500 companies. The “Select Tickers” user form operates based primarily on the stock ticker information contained in this new invisible sheet. When this user form launches, the left-hand list box is populated with S&P500 tickers from the invisible worksheet and the right-hand list box is populated with all tickers currently listed in the first row of the “Excess Returns” sheet. To help the user, the full name of the company associated with the ticker highlighted in each list box is given in the label above each list box. This label updates when a new stock ticker is highlighted.

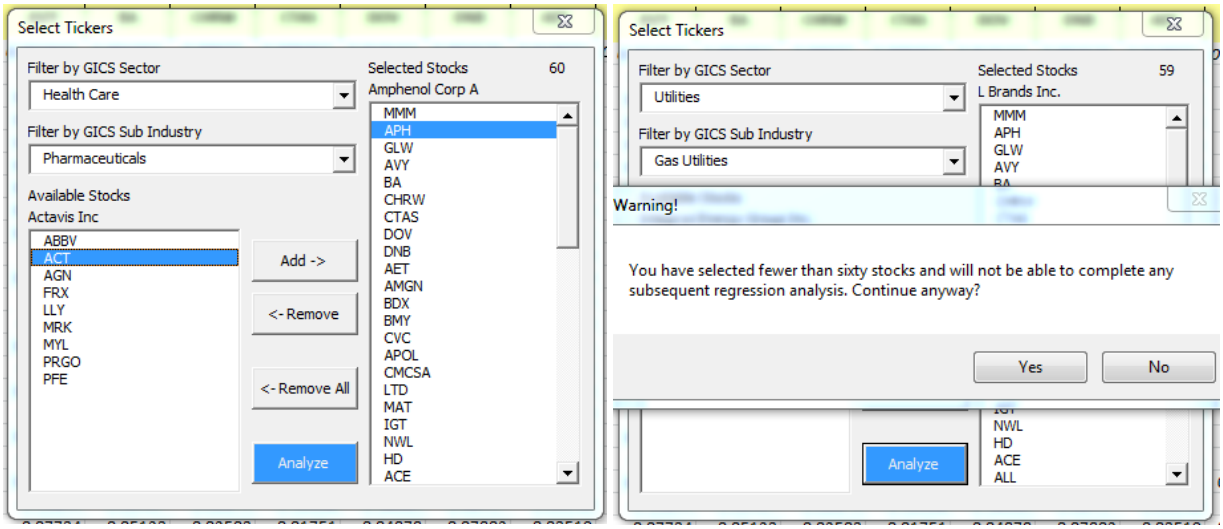
The two combo boxes on the top right of the user form allow the user to sort through the S&P500 stocks by larger sector and more specific sub industries. This is helpful to individuals who want to select stocks from different sectors of the economy to test or to users who are not familiar with many stock tickers. When one of the ten major sector categories is selected in the first combo box, the only sub industries available to select in the second combo box are those contained within that sector. Additionally, only stock tickers that belong to both the selected sector and sub industry (if any sub industry is selected) are contained in the left-hand list box of the user form. Whenever a new sector is selected, the sub industry combo box automatically reverts to no selection and all stocks belonging to that sector are listed. By default, the sector “Industrials” is selected when the user form launches and all stocks belonging to it are contained in the right-hand list box.

Using the “Add,” “Remove,” and “Remove All” buttons allows the user to build their list of selected stocks in the right-hand list box that will be used later to test the CAPM. They can keep track of the number of stocks they have selected by watching the number in the top right-hand corner of the user form, which updates to reflect the number of tickers in the right-hand list box. When the user clicks on the “Add” button, the currently highlighted ticker in the left-hand list box is added to the right-hand list box. If the selected ticker is already contained in the right-hand list box, then a message box alerts the user and the ticker is not duplicated. Likewise, clicking the “Remove” button removes the highlighted ticker in the right-hand list box. Clicking the “Remove All” button clears all tickers from the right-hand list box. If the user at any time clicks on the red close button, then the invisible sheet is deleted and the user form unloads without initiating any changes to the workbook.

Once the user has selected the list of stocks they would like to analyze, they may press the “Analyze” button found at the bottom of the user form. If the user has selected less than sixty stocks for analysis, then a message box informs them that without choosing more stocks they will be unable to complete the regression analysis later. If the user chooses not to continue with the analysis, then they are returned to the user form where they may add more stocks to their list. Otherwise, the analysis proceeds

and Excel begins importing the data for the selected stocks. Screenshot 3 depicts various aspects of the user form below.

Screenshot 3: User Form Manipulation



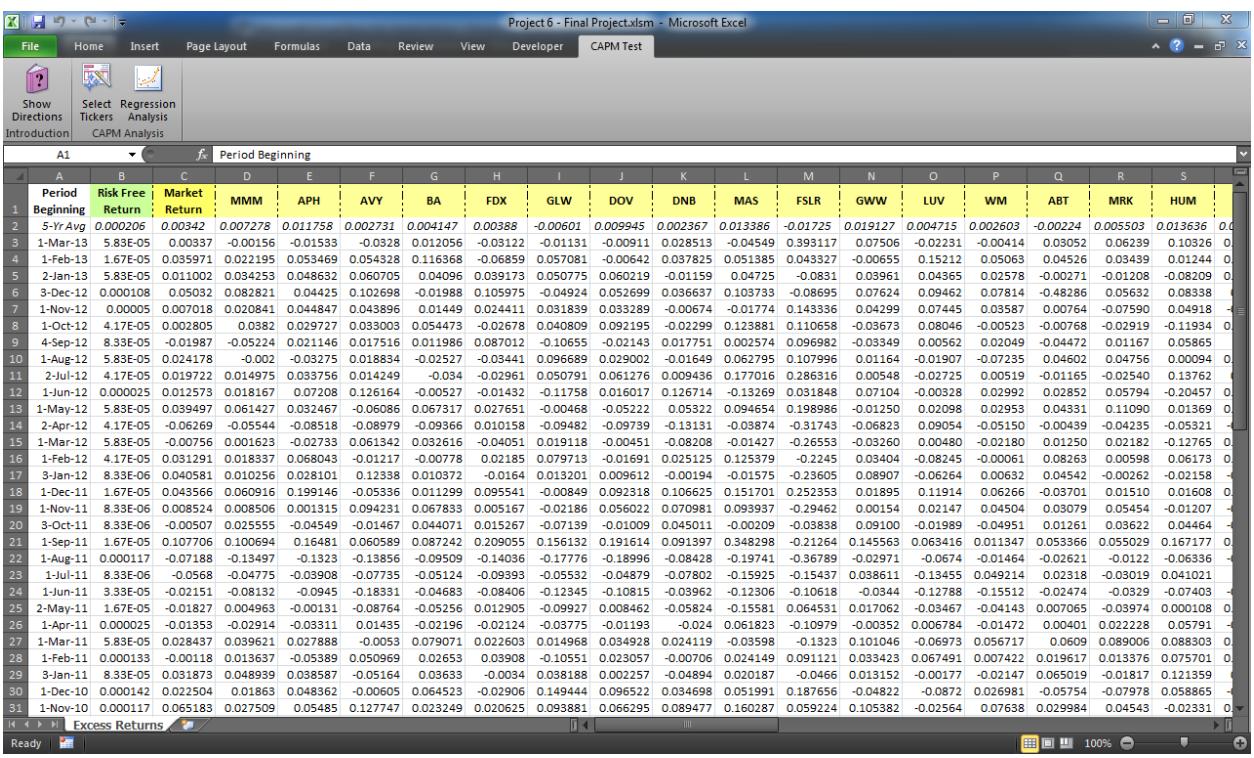
Once the stock analysis has been initiated, Excel first imports returns data for a market proxy index. I chose to use the S&P500 as this market proxy because all of the stocks my workbook analyzes are from the S&P500. Again, screen updating is turned off and Excel performs a web query on a sheet unseen by the user that imports the index value of the S&P500 for the most recent sixty months. Excel is able to pull the most recent sixty months of price data from the web thanks to the agreeable syntax of finance.yahoo.com URLs. Using VBA to insert the appropriate date range based on the current date into the web query syntax results in finance.yahoo.com returning the most recent data for both the S&P500 market index and the individual stocks that are imported later. A rate of return to the S&P 500 is calculated between each month, and each of these values is copied to the "Excess Returns" sheet. The beginning date of each month is also recorded on the "Excess Returns" sheet, because stock exchanges are closed on weekends and often the first day of trading each month does not fall on the 1st.

Next, a proxy for the monthly risk-free rate of return is pulled from the internet via another web query. Again, Excel creates an unseen sheet that holds the annualized yields of 4-week Treasury Bills reported daily. Excel matches the date of issue of the appropriate T-bill with the first trading day of each month listed on the "Excess Returns" sheet and then converts the annualized yields from the internet into monthly yields comparable to the returns calculated for the S&P500. These values are copied to the appropriate cells in the "Excess Returns" sheet. Raw monthly S&P500 market returns are then converted to excess returns by subtracting off the risk-free rate from each month's S&P500 return. Average monthly

returns for both the risk-free four-week Treasury Bill and the S&P500 market index are calculated and recorded in cells B2 and B3.

Monthly excess returns for each individual stock are found in much the same way. A web query for each ticker on an unseen sheet pulls the most recent stock price data from finance.yahoo.com. The data is trimmed of any dividend payment records so that monthly returns may be easily calculated. If Excel finds any cases of the stock splitting, then the analysis is halted, a message box warns the user that they must choose another ticker in order to complete the analysis, and the "Select Tickers" user form remains open so that the user may choose another stock. If no stock splits are found, monthly returns are calculated and recorded on the "Excess Returns" sheet and then converted into excess returns by subtracting off the risk-free return in each month. If the stock is found to have less than sixty months of data, then the analysis is halted similar to the case of a stock split and the user is told to choose another stock ticker from the "Select Tickers" user form. If there are no problems with the stock, the average return over the sixty months is calculated and recorded in row 2. If each of the stocks selected for analysis are valid and have at least sixty months of data, then all necessary cells on the "Excess Returns" sheet are filled and the user form unloads from memory automatically. All hidden worksheets are deleted and the user sees an updated dataset on the "Excess Returns" sheet similar to Screenshot 4.

Screenshot 4: Data Updated on the "Excess Returns" Sheet



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Period Beginning	Risk Free Return	Market Return	MMM	APH	AVY	BA	FDX	GLW	DOV	DNB	MAS	FSLR	GWW	LUV	WM	ABT	MRK	HUM
2	*5-Yr Avg*	*0.000206*	*0.00342*	*0.007278*	*0.011758*	*0.002731*	*0.004147*	*0.00388*	*-0.00601*	*0.009945*	*0.002367*	*0.013386*	*-0.01725*	*0.019127*	*0.004715*	*0.002603*	*-0.00224*	*0.005503*	*0.013636*
3	1-Mar-13	5.83E-05	0.00337	-0.00156	-0.01533	-0.0328	0.012056	-0.03122	-0.01131	-0.00911	0.028513	-0.04549	0.393117	0.07506	-0.02231	-0.00414	0.03052	0.06239	0.10326
4	1-Feb-13	1.67E-05	0.035971	0.022195	0.053469	0.054328	0.116368	-0.06859	0.057081	-0.00642	0.037825	0.051385	0.043327	-0.00655	0.15212	0.05063	0.04526	0.03439	0.01244
5	2-Jan-13	5.83E-05	0.011002	0.034253	0.048632	0.060705	0.04096	0.039173	0.050775	0.060219	-0.01159	0.04725	-0.0831	0.03961	0.04365	0.02578	-0.00271	-0.01208	-0.08209
6	3-Dec-12	0.000108	0.05032	0.082821	0.04425	0.102698	-0.01988	0.105975	-0.04924	0.052699	0.036637	0.103733	-0.08695	0.07624	0.09462	0.07814	-0.48286	0.05632	0.08338
7	1-Nov-12	0.00005	0.007018	0.020841	0.044847	0.043896	0.01449	0.024411	0.031839	0.033289	-0.00674	-0.01774	0.143336	0.04299	0.07445	0.03587	0.00764	-0.07590	0.04918
8	1-Oct-12	4.17E-05	0.002805	0.0382	0.029727	0.033003	0.054473	-0.02678	0.040809	0.092195	-0.02299	0.123881	0.110658	-0.03673	0.08046	-0.00523	-0.00768	-0.02919	-0.11934
9	4-Sep-12	8.33E-05	-0.01987	-0.05224	0.021146	0.017516	0.011986	0.087012	-0.10655	-0.02143	0.017751	0.002574	0.096982	-0.03349	0.00562	0.02049	-0.04472	0.01167	0.05865
10	1-Aug-12	5.83E-05	0.024178	-0.002	-0.03275	0.018834	-0.02527	-0.03441	0.096689	0.029002	-0.01649	0.062795	0.107996	0.01164	-0.01907	-0.07235	0.04602	0.04756	0.00094
11	2-Jul-12	4.17E-05	0.019722	0.014975	0.033756	0.014249	-0.034	-0.02961	0.050791	0.061276	0.009436	0.177016	0.286316	0.00548	-0.02725	0.00519	-0.01165	-0.02540	0.13762
12	1-Jun-12	0.000025	0.012573	0.018167	0.07208	0.126164	-0.00527	-0.01432	-0.11758	0.016017	0.126714	-0.13269	0.031848	0.07104	-0.00328	0.02992	0.02852	0.05794	-0.20457
13	1-May-12	5.83E-05	0.039497	0.061427	0.032467	-0.06086	0.067317	0.027651	-0.00468	-0.05222	0.05322	0.094654	0.198986	-0.01250	0.02098	0.02953	0.04331	0.11090	0.01369
14	2-Apr-12	4.17E-05	-0.06269	-0.05544	-0.08518	-0.08979	-0.09366	0.010158	-0.09482	-0.09739	-0.13131	-0.03874	-0.31743	-0.06823	0.09054	-0.05150	-0.00439	-0.04235	-0.05321
15	1-Mar-12	5.83E-05	-0.00756	0.001623	-0.02733	0.061342	0.032616	-0.04051	0.019118	-0.00451	-0.08208	-0.01427	-0.26553	-0.03260	0.00480	-0.02180	0.01250	0.02182	-0.12765
16	1-Feb-12	4.17E-05	0.031291	0.018337	0.068043	-0.01217	-0.00778	0.02185	0.079713	-0.01691	0.025125	0.125379	-0.2245	0.03404	-0.08245	-0.00061	0.08263	0.00598	0.06173
17	3-Jan-12	8.33E-06	0.040581	0.010256	0.028101	0.12338	0.010372	-0.0164	0.013201	0.009612	-0.00194	-0.01575	-0.23605	0.08907	-0.06264	0.00632	0.04542	-0.00262	-0.02158
18	1-Dec-11	1.67E-05	0.043566	0.060916	0.199146	-0.05336	0.011299	0.095541	-0.00849	0.092318	0.106625	0.151701	0.252353	0.01895	0.11914	0.06266	-0.03701	0.01510	0.01608
19	1-Nov-11	8.33E-06	0.008524	0.008506	0.001315	0.094231	0.067833	0.005167	-0.02186	0.056022	0.070981	0.093937	-0.29462	0.00154	0.02147	0.04504	0.03079	0.05454	-0.01207
20	3-Oct-11	8.33E-06	-0.00507	0.025555	-0.04549	-0.01467	0.044071	0.015267	-0.07139	-0.01009	0.045011	-0.00209	-0.03838	0.09100	-0.01989	-0.04951	0.01261	0.03622	0.04464
21	1-Sep-11	1.67E-05	0.107706	0.100694	0.16481	0.060589	0.087242	0.209055	0.156132	0.191614	0.091397	0.348298	-0.21264	0.145563	0.063416	0.011347	0.053366	0.055029	0.167177
22	1-Aug-11	0.000117	-0.07188	-0.13497	-0.1323	-0.13856	-0.09509	-0.14036	-0.17776	-0.18996	-0.08428	-0.19741	-0.36789	-0.02971	-0.0674	-0.01464	-0.02621	-0.0122	-0.06336
23	1-Jul-11	8.33E-06	-0.0568	-0.04775	-0.03908	-0.07735	-0.05124	-0.09393	-0.05532	-0.04879	-0.07802	-0.15925	-0.15437	0.038611	-0.13455	0.049214	0.02318	-0.03019	0.041021
24	1-Jun-11	3.33E-05	-0.02151	-0.08132	-0.0945	-0.18331	-0.04683	-0.08406	-0.12345	-0.10815	-0.03962	-0.12306	-0.10618	-0.0344	-0.12788	-0.15512	-0.02474	-0.0329	-0.07403
25	2-May-11	1.67E-05	-0.01827	0.004963	-0.00131	-0.08764	-0.05256	0.012905	-0.09927	0.008462	-0.05824	-0.15581	0.064531	0.017062	-0.03467	-0.04143	0.007065	-0.03974	0.000108
26	1-Apr-11	0.000025	-0.01353	-0.02914	-0.03311	0.01435	-0.02196	-0.02124	-0.03775	-0.01193	-0.024	0.061823	-0.10979	-0.00352	0.006784	-0.01472	0.00401	0.022228	0.05791
27	1-Mar-11	5.83E-05	0.028437	0.039621	0.027888	-0.0053	0.079071	0.022603	0.014968	0.034928	0.024119	-0.03598	-0.1323	0.101046	-0.06973	0.056717	0.0609	0.089006	0.088303
28	1-Feb-11	0.000133	-0.00118	0.013637	-0.05389	0.050969	0.02653	0.03908	-0.10551	0.023057	-0.00706	0.024149	0.091121	0.033423	0.067491	0.007422	0.019617	0.013376	0.075701
29	3-Jan-11	8.33E-05	0.031873	0.048939	0.038587	-0.05164	0.03633	-0.0034	0.038188	0.002257	-0.04894	0.020187	-0.0466	0.013152	-0.00177	-0.02147	0.065019	-0.01817	0.121359
30	1-Dec-10	0.000142	0.022504	0.01863	0.048362	-0.00605	0.064523	-0.02906	0.149444	0.096522	0.034698	0.051991	0.187656	-0.04822	-0.0872	0.026981	-0.05754	-0.07978	0.058865
31	1-Nov-10	0.000117	0.065183	0.027509	0.05485	0.127747	0.023249	0.020625	0.093881	0.066295	0.089477	0.160287	0.059224	0.105382	-0.02564	0.07638	0.029984	0.04543	-0.02331

Regression Analysis

The methodology of this section assumes the reader has a basic understanding of econometrics and the CAPM. After successfully updating the data necessary to test the CAPM, the user may simply press the "Regression Analysis" ribbon button to proceed with and complete the analysis. When this button is selected, Excel creates a new sheet and automatically runs two series of regressions. The "first-pass regressions" are performed using the excess returns data from each individual stock recorded earlier in the "Excess Returns" sheet. An otherwise unobservable β value for each stock is estimated and recorded according to the following regression specification:

$$(r_i - r_f)_t = \alpha + \beta(r_{S\&P} - r_f)_t + \varepsilon_i$$

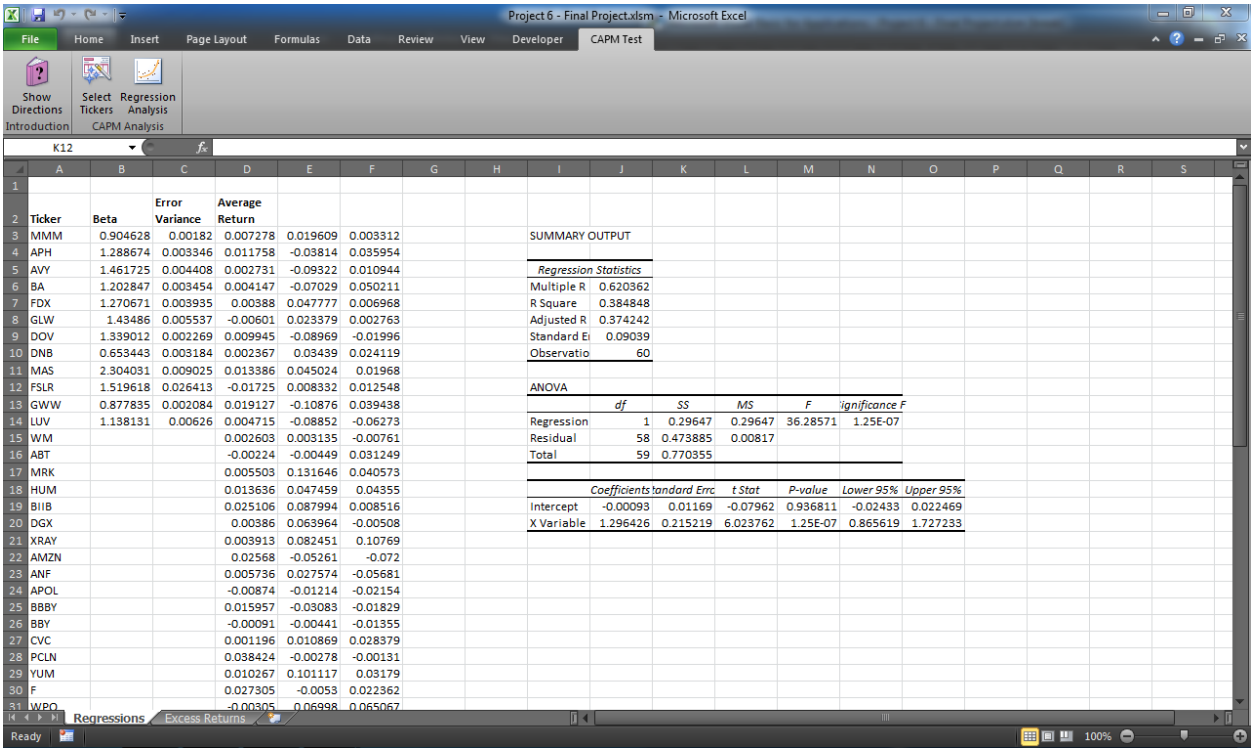
With beta and idiosyncratic risk values estimated for each of the sixty stocks, Excel then proceeds with a "second-pass regression" that uses the output from the first-pass regressions as its own inputs. This second-pass regression tests the predictions of the CAPM using the following specification:

$$(r_i - r_f)_t^{AVG} = \gamma_0 + \gamma_1\beta_i + \gamma_2\sigma^2_{\varepsilon i} + \eta_i$$

In this linear regression, if the posited relationship $E[r_i] - r_f = \beta(E[r_m] - r_f)$ is true, then the coefficient γ_1 should equal $(r_{S\&P} - r_f)_t^{AVG}$, and the coefficients γ_0 and γ_2 should equal zero.

These predictions are checked by using statistical tests to check whether the estimated coefficients γ_0, γ_1, and γ_2 can confidently be said to significantly deviate from their predicted values according to accepted statistical standards. Excel produces a summary table of this information and displays it for the user. Some of this summary information is produced automatically by the regression capabilities of Excel; other vital parts are supplied by my VBA code. For example, the joint-probability F-statistic reported in this table is calculated using custom VBA code. As long as the user has a basic understanding of the fundamentals of statistical inference, then the output table displayed on the "Regressions" sheet has all of the information necessary for them to determine whether or not the test of the CAPM has rejected or failed to reject the validity of the CAPM predictions. Screenshots 5 and 6 depict the first-pass regression analysis in progress and the final regression output display respectively.

Screenshot 5: First-Pass Regression Analysis in Progress



Ticker	Beta	Error Variance	Average Return		
MMM	0.904628	0.00182	0.007278	0.019609	0.003312
APH	1.288674	0.003346	0.011758	-0.03814	0.035954
AVY	1.461725	0.004408	0.002731	-0.09322	0.010944
BA	1.202847	0.003454	0.004147	-0.07029	0.050211
FDX	1.270671	0.003935	0.00388	0.047777	0.006968
GLW	1.43486	0.005537	-0.00601	0.023379	0.002763
DOV	1.339012	0.002269	0.009945	-0.08969	-0.01996
DNB	0.653443	0.003184	0.002367	0.03439	0.024119
MAS	2.304031	0.009025	0.013386	0.045024	0.01968
FSLR	1.519618	0.026413	-0.01725	0.008332	0.012548
GWW	0.877835	0.002084	0.019127	-0.10876	0.039438
LUV	1.138131	0.00626	0.004715	-0.08852	-0.06273
WM			0.002603	0.003135	-0.00761
ABT			-0.00224	-0.00449	0.031249
MRK			0.005503	0.131646	0.040573
HUM			0.013636	0.047459	0.04355
BIIB			0.025106	0.087994	0.008516
DGX			0.00386	0.063964	-0.00508
XRAY			0.003913	0.082451	0.10769
AMZN			0.02568	-0.05261	-0.072
ANF			0.005736	0.027574	-0.05681
APOL			-0.00874	-0.01214	-0.02154
BBBY			0.015957	-0.03083	-0.01829
BBY			-0.00091	-0.00441	-0.01355
CVC			0.001196	0.010869	0.028379
PCLN			0.038424	-0.00278	-0.00131
YUM			0.010267	0.101117	0.03179
F			0.027305	-0.0053	0.022362
WPO			-0.00305	0.06998	0.065067

SUMMARY OUTPUT

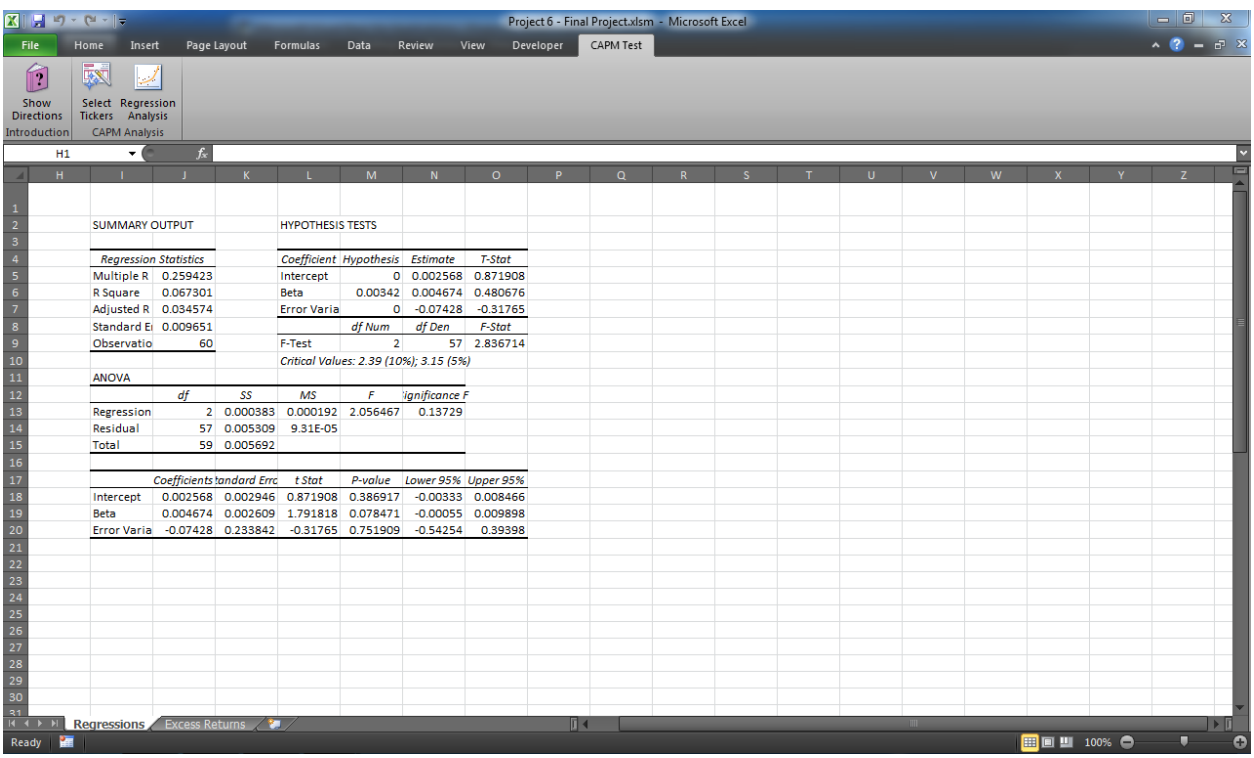
Regression Statistics	
Multiple R	0.620362
R Square	0.384848
Adjusted R	0.374242
Standard Ei	0.09039
Observatio	60

ANOVA

	df	SS	MS	F	ignificance F
Regression	1	0.29647	0.29647	36.28571	1.25E-07
Residual	58	0.473885	0.00817		
Total	59	0.770355			

	Coefficients	tandard Erro	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-0.00093	0.01169	-0.07962	0.936811	-0.02433	0.022469
X Variable	1.296426	0.215219	6.023762	1.25E-07	0.865619	1.727233

Screenshot 6: Second-Pass Regression Output with Statistical Tests



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.259423
R Square	0.067301
Adjusted R	0.034574
Standard Ei	0.009651
Observatio	60

ANOVA

	df	SS	MS	F	ignificance F
Regression	2	0.000383	0.000192	2.056467	0.13729
Residual	57	0.005309	9.31E-05		
Total	59	0.005692			

	Coefficients	tandard Erro	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.002568	0.002946	0.871908	0.386917	-0.00333	0.008466
Beta	0.004674	0.002609	1.791818	0.078471	-0.00055	0.009898
Error Varia	-0.07428	0.233842	-0.31765	0.751909	-0.54254	0.39398

HYPOTHESIS TESTS

Coefficient	Hypothesis	Estimate	T-Stat
Intercept	0	0.002568	0.871908
Beta	0.00342	0.004674	0.480676
Error Varia	0	-0.07428	-0.31765

	df Num	df Den	F-Stat
F-Test	2	57	2.836714

Critical Values: 2.39 (10%); 3.15 (5%)

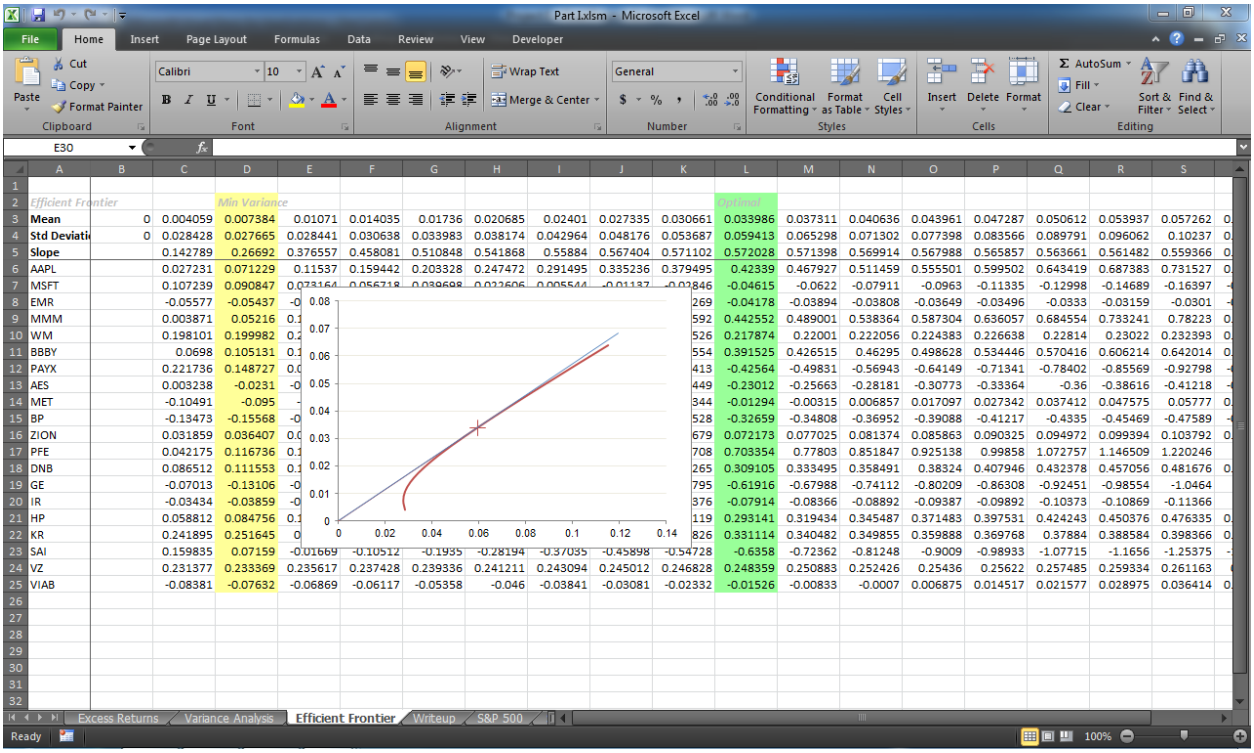
Learning and Conceptual Difficulties

This project challenged by VBA abilities in multiple ways, and I definitely learned a lot as I sought solutions to the problems I faced. For one, learning to manipulate Excel's regression capabilities with VBA was challenging, especially since this skill was not taught in class. Other of my technical VBA skills were stretched as I sought to solve problems like assuring that my web queries to finance.yahoo.com brought only the most recent sixty months of stock prices. This required teaching myself how to use the "datepart" function to string together a long and complex URL that returned what I needed.

Planning for the user experience also proved to be more challenging than I anticipated. For example, it took me a lot of time to plan the code so that throughout the entire experience none of the several sheets created to import data from the internet were visible. I had to toy with a combination of manipulating screen updating and individual sheet visibility throughout the code to be successful. I also had to think about and plan for contingencies that I originally did not consider as the user interacted with my spreadsheet. For example, I found that if the user selected only one or no tickers to analyze my code would break down. I also found that several error-checks were necessary throughout the execution of my code to make sure that the regression analysis portion of my project would run smoothly.

I also found that time was a constraint. I spent a considerable amount of time on another related VBA project that I hoped to combine with this one before the end of the semester, but ran out of time. The Econ 450 project I have described above actually consisted of two parts. The test of the CAPM covered in this project was the second part, but the first part entailed importing stock data in a similar fashion as I have done in this VBA project and constructing an efficient frontier of risky asset portfolios like we did in class. I actually completed a workable version of this part of the Econ 450 project before the class period in which we discussed using Excel's solver to create an efficient frontier. I taught myself how to use the solver and wrote the code necessary to produce the output shown in Screenshot 7. If I had more time, I would have combined this with my VBA final project and had a workbook that automated the entire Econ 450 project. Still, I am pleased with what I have learned this semester and with my final project as it is presented. Throughout the entire process I worked alone and received no help other than simple web searches to help me understand code that I was unfamiliar with.

Screenshot 7: My Efficient Frontier VBA Project Output



Efficient Frontier			*Min Variance*								*Optimal*							
Mean	0	0.004059	0.007384	0.01071	0.014035	0.01736	0.020685	0.02401	0.027335	0.030661	0.033986	0.037311	0.040636	0.043961	0.047287	0.050612	0.053937	0.057262
Std Deviati	0	0.028428	0.027665	0.028441	0.030638	0.033983	0.038174	0.042964	0.048176	0.053687	0.059413	0.065298	0.071302	0.077398	0.083566	0.089791	0.096062	0.10237
Slope		0.142789	0.26692	0.376557	0.458081	0.510848	0.541868	0.55884	0.567404	0.571102	0.572028	0.571398	0.569914	0.567988	0.565857	0.563661	0.561482	0.559366
AAPL		0.027231	0.071229	0.11537	0.159442	0.203328	0.247472	0.291495	0.335236	0.379495	0.42339	0.467927	0.511459	0.555501	0.599502	0.643419	0.687383	0.731527
MSFT		0.107239	0.090847	0.073164	0.056718	0.039698	0.032606	0.005544	-0.01137	-0.02846	-0.04615	-0.0622	-0.07911	-0.0963	-0.11335	-0.12998	-0.14689	-0.16397
EMR		-0.05577	-0.05437	-0						269	-0.04178	-0.03894	-0.03808	-0.03649	-0.03496	-0.0333	-0.03159	-0.0301
MMM		0.003871	0.05216	0.1						592	0.442552	0.489001	0.538364	0.587304	0.636057	0.684554	0.733241	0.78223
WM		0.198101	0.199982	0.2						526	0.217874	0.22001	0.222056	0.224383	0.226638	0.22814	0.23022	0.232393
BBBY		0.0698	0.105131	0.1						554	0.391525	0.426515	0.46295	0.498628	0.534446	0.570416	0.606214	0.642014
PAYX		0.221736	0.148727	0.0						413	-0.42564	-0.49831	-0.56943	-0.64149	-0.71341	-0.78402	-0.85569	-0.92798
AES		0.003238	-0.0231	-0						449	-0.23012	-0.25663	-0.28181	-0.30773	-0.33364	-0.36	-0.38616	-0.41218
MET		-0.10491	-0.095	-						344	-0.01294	-0.00315	0.006857	0.017097	0.027342	0.037412	0.047575	0.05777
BP		-0.13473	-0.15568	-0						528	-0.32659	-0.34808	-0.36952	-0.39088	-0.41217	-0.4335	-0.45469	-0.47589
ZION		0.031859	0.036407	0.0						679	0.072173	0.077025	0.081374	0.085863	0.090325	0.094972	0.099394	0.103792
PFE		0.042175	0.116736	0.1						708	0.703354	0.77803	0.851847	0.925138	0.99858	1.072757	1.146509	1.220246
DNB		0.086512	0.111553	0.1						265	0.309105	0.333495	0.358491	0.38324	0.407946	0.432378	0.457056	0.481676
GE		-0.07013	-0.13106	-0						795	-0.61916	-0.67988	-0.74112	-0.80209	-0.86308	-0.92451	-0.98554	-1.0464
IR		-0.03434	-0.03859	-0						376	-0.07914	-0.08366	-0.08892	-0.09387	-0.09892	-0.10373	-0.10869	-0.11366
HP		0.058812	0.084756	0.1						119	0.293141	0.319434	0.345487	0.371483	0.397531	0.424243	0.450376	0.476335
KR		0.241895	0.251645	0						826	0.331114	0.340482	0.349855	0.359888	0.369768	0.37884	0.388584	0.398366
SAI		0.159835	0.07159	-0.01669	-0.10512	-0.1935	-0.28194	-0.37035	-0.45898	-0.54728	-0.6358	-0.72362	-0.81248	-0.9009	-0.98933	-1.07715	-1.1656	-1.25375
VZ		0.231377	0.233369	0.235617	0.237428	0.239336	0.241211	0.243094	0.245012	0.246828	0.248359	0.250883	0.252426	0.25436	0.25622	0.257485	0.259334	0.261163
VIAB		-0.08381	-0.07632	-0.06869	-0.06117	-0.05358	-0.046	-0.03841	-0.03081	-0.02332	-0.01526	-0.00833	-0.0007	0.006875	0.014517	0.021577	0.028975	0.036414