

COMM394 Coding Literacy For Managers
Expected Rate of Return - Stock Application: User Manual
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I. The Expected Rate of Return - Stock Application

The Expected Rate of Return - Stock Application allows a user to calculate the expected rate of return on a stock's investment. The application utilizes the "Capital Asset Pricing Model" to determine the expected return of the asset. The formula requires three values: the risk-free rate, the stock's beta value, and the expected rate of return of the market. The risk-free rate represents the return from risk-free investments, while the expected market return represents the return on investment for a stock index. Lastly, the beta value is a measure of an investment's volatility.

In addition to calculating the expected rate of return for up to ten stock symbols, the application provides the user with sorting functionality to further sort the results by stock symbol, stock price, and/or expected return to more easily visualize and compare the expected returns among the various stocks.

The Expected Rate of Return - Stock Application is intended for investors that are looking to better understand what rate of return they should expect. All investments are subject to two types of risk: systematic and unsystematic risk. The latter refers to risks associated with an individual stock that is often mitigated through portfolio diversification. On the other hand, systematic risk refers to the general risks of investing that hinder many investors; since this type of risk cannot be mitigated in a similar manner to unsystematic risk. As a result, investors attempt to compensate for the risk of investing by calculating their expected rate of return. Understanding this key consideration when investing is the purpose this application serves.

The application's output provides an accurate rate of return which will assist the user in making more strategic investment decisions. One critical component of the application is the previously mentioned ability to sort and colour the results by the expected rate of return. Thus, this application is beneficial for investors that seek to maximize their expected return on investment given the systematic risk of investing. Alternatively, the application can be used as a tool to identify the strengths and weaknesses of an investor's current portfolio.

II. Input: Risk-Free Rate

The risk-free rate is the return from risk-free investments. The current yield on 10-year US treasury notes is the standard proxy for the risk-free rate assumption for US companies. This rate is a percentage value between 0% and 3%. The user should input this rate in cell *C7* in the *User Application* sheet as a decimal value, for example, 1.58, in which the application will interpret it as the corresponding percentage, 1.58%.

The user can obtain this value, from the link provided in cell *B7*, if the user is uncertain of the current risk-free rate. On the corresponding webpage, select *Daily Treasury Yield Curve Rates* and *Current Month* for the two dropdown menus and then proceed. The standard risk-free rate value is highlighted in the figure (as of 11/12/2021):

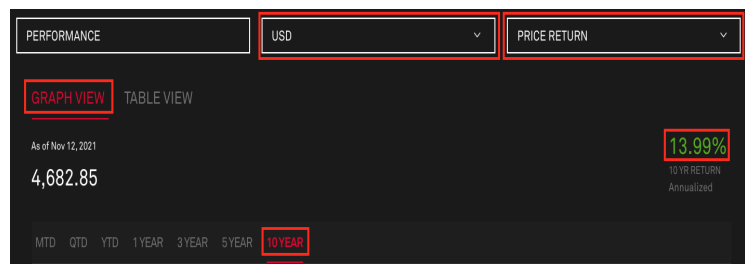
Select type of Interest Rate Data													
Daily Treasury Yield Curve Rates		Go											
Select Time Period													
Current Month		Go											
Date	1 Mo	2 Mo	3 Mo	6 Mo	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr	
11/01/21	0.05	0.09	0.05	0.06	0.15	0.50	0.79	1.20	1.46	1.58	2.01	1.98	
11/02/21	0.05	0.06	0.05	0.07	0.15	0.46	0.73	1.15	1.42	1.56	1.97	1.96	
11/03/21	0.05	0.07	0.05	0.07	0.17	0.47	0.77	1.19	1.46	1.60	2.01	2.00	
11/04/21	0.05	0.05	0.04	0.07	0.14	0.41	0.69	1.10	1.37	1.53	1.96	1.96	
11/05/21	0.05	0.06	0.05	0.07	0.14	0.39	0.66	1.04	1.30	1.45	1.88	1.87	
11/08/21	0.04	0.06	0.06	0.07	0.16	0.45	0.75	1.13	1.38	1.51	1.91	1.89	
11/09/21	0.04	0.05	0.04	0.06	0.14	0.41	0.71	1.08	1.32	1.46	1.86	1.83	
11/10/21	0.06	0.06	0.05	0.07	0.17	0.51	0.83	1.23	1.45	1.56	1.96	1.92	
11/12/21	0.05	0.05	0.05	0.07	0.17	0.53	0.85	1.24	1.47	1.58	1.99	1.95	

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III. Input: Expected Market Return

The expected market return is the return on investing in a stock index. The application assumes the stock index to be the S&P 500 Index. Similar to the risk-free rate, this rate is a percentage value between 0% and 100%. The user should input this rate in cell *C8* in the *User Application* sheet as a decimal value, for example, 13.99, in which the application will interpret it as the corresponding percentage, 13.99%.

The user can obtain this value, from the link provided in cell *B8*, if the user is uncertain of the current expected market return. On the corresponding webpage, select *USD* and *Price Return* for the two dropdown menus and then proceed to the *10 Year Graph View*. The standard expected market return value is highlighted in the figure (as of 11/12/2021).



IV. Input: Stock Exchanges

The cells *M7:M11* optionally allow the user to specify up to five stock exchanges that the application can support. The default stock exchanges are set to five common North American stock exchanges: Canadian National Stock Exchange (*XCNQ*), Nasdaq Stock Market (*XNAS*), New York Stock Exchange (*XNYS*), Toronto Stock Exchange (*XTSE*), and TSX Venture Exchange (*XTSX*).

The user can view a list of all stock exchanges supported by Excel and their corresponding market identifier code at the link provided in cell *M6*. Should the user choose to update the list of supported stock exchanges, the input should be a valid market identifier code. Note that this list dynamically creates and updates the data validation list used for the next input.

V. Input: Stock Symbols

Cells *E7:E16* in the *User Application* sheet is the designated area where the user can input up to ten stock symbols. Likewise, the user should input each stock symbol's corresponding stock exchange in the adjacent cells *F7:F16*. The user is expected to input at least one stock symbol (in cell *E7*) and its corresponding stock exchange (in cell *F7*) before proceeding. Should the user input more than one stock symbol, the values should be inputted from top to bottom, leaving no spaces in rows in between. The same applies to the corresponding stock exchanges.

The user can view a list of all the stocks in the S&P 500 Index, from the link provided in cell *E6*, if they are uncertain of a particular stock's symbol. Note that the application is not limited to only stocks from this index. After inputting the stock symbol, the user should select its corresponding stock exchange from the data validation list or simply enter the value in the cell directly to the right of the stock symbol. This step is required in order to eliminate ambiguity when the application tries to convert the inputted stock symbols to their stock data type.

At this point, the user is ready to select the first button: *VERIFY INFORMATION*. The application will proceed to format and verify all inputted information. More specifically, the risk-free rate (cell *C7*) and expected market return (cell *C8*) fields should not be left blank. Furthermore, at least one stock symbol and stock exchange should be entered (cells *E7:F7*). Note that the button will change from red to green when the user can proceed. Otherwise, the button will remain red and an error message will display, informing the user of the missing field.

VI. Output: Beta, Stock Price, and Expected Return

Only when the *VERIFY INFORMATION* button is green, the user should select the second button: *GET INFORMATION*. The application will convert each stock symbol and stock exchange to a stock data type, of the form *SYMBOL:EXCHANGE*, and then retrieve the stock's beta value and current stock price with the help of the secondary *INFO* sheet. The user should not interrupt the application during this step with any mouse clicks or keyboard pressing.

Once the application returns to the *User Application* sheet and the resulting output is displayed in columns *G* and *I* of the dashboard, the user should select the third button: *CALCULATE CAPM*. The application will display the resulting expected rate of return for each inputted stock in column *H* of the dashboard. Additionally, each expected return value in column *H* is coloured on a red-yellow-green scale to highlight the stock's expected rate of return in relation to the expected market return. Expected returns greater than the expected market return indicate an undervalued stock which will be coloured green whereas overvalued stocks will be coloured red. An example of the application's output for ten different stock symbols is shown below:

ASSUMPTIONS						
RISK FREE RATE	1.58%	STOCK SYMBOL	STOCK EXCHANGE	BETA	EXPECTED RETURN	STOCK PRICE
MARKET RETURN	13.99%	AAPL	XNAS	1.22	16.74%	\$ 149.99
		ABX	XTSE	0.08	2.55%	\$ 26.06
		BBD.A	XTSE	2.85	36.89%	\$ 1.97
		ENB	XNYS	0.92	12.98%	\$ 40.41
		EOG	XTSX	2.31	30.27%	\$ 0.39
		GOOGL	XNAS	1.06	14.74%	\$ 2,973.56
		MCD	XNYS	0.58	8.77%	\$ 250.64
		MCD	XNYS	0.58	8.77%	\$ 250.64
		SHOP	XNYS	1.45	19.61%	\$ 1,666.02
		TSLA	XNAS	2.04	26.92%	\$ 1,033.42

VERIFY INFORMATION

GET INFORMATION

CALCULATE CAPM

CLEAR SHEET

VII. Sorting Results

The sorting menu in cells *M14:M16* optionally allows the user to sort the dashboard from three possible criteria: stock symbol, stock price, expected return. Note that each of these respective sort methods is a button which the user only needs to select. The dashboard will update the output to reflect the selected criteria in ascending order. Note that sorting by ascending expected return will display the stocks from most overvalued to most undervalued (red to green on the colour scale).

SORT RESULTS BY	
STOCK SYMBOL	
STOCK PRICE	
EXPECTED RETURN	

VIII. Clear Sheet

Once the user is finished using the application, or should the user want to use the application again, it is advised that the fourth button: *CLEAR SHEET*, is selected. The application will clear the contents from the *INFO* sheet, the dashboard, and the assumption fields, after which the user is free to close the application or return to *Step II* of the User Manual.

IX. Troubleshooting Tips

All of the designated cells that accept user input have been equipped with data validation to minimize the potential for user error and to increase the robustness of the application. In *Steps II* through *V*, the user will encounter pop-up error messages if the user inputs an invalid value or leaves a required field blank. As mentioned earlier, the risk-free rate is expected to be a decimal value between 0 and 3. Similarly, the expected market return is expected to be a decimal value between 0 and 100. Moreover, all of the cells in columns *E* and *F* of the dashboard expect a valid string for the stock symbol and a valid entry from the corresponding drop-down list for the stock exchange. The user should not try to overwrite any of the data validation methods in place as this will cause the application to not behave as intended.

Note that in the event of an error message, the user should select “*Cancel*” rather than “*Retry*” to properly proceed. These pop-ups may occur from invalid inputs in cells *C7:C8* and *E7:F16*. When testing the application, selecting “*Retry*” and then proceeding to input another value leads to unexpected behaviour that may defy the data validation methods for a given field.

In addition to input cells, the processing that takes place on the *INFO* sheet utilizes Excel’s built-in error checking to handle cases where a cell may display a *#FIELD!* error. Note that not every stock has a *Beta* field, in which Excel will throw a *#FIELD!* error when trying to access the value of beta for these particular stocks (for example, Pinterest Inc. (*XNYS:PINS*)). Under such circumstances, the application will return *N/A* for beta and *N/A* for the expected return with no conditional format colouring. Another reason the application may return a value of *N/A* is if the user inputted stock symbol and stock exchange combination does not exist or is not recognized by Excel’s stock data type.

Lastly, there are instances where the buttons may not immediately appear, or perhaps may disappear when the user changes an input cell. To resolve this, simply resize the screen (zoom in or out on the Excel file) and the buttons should then be visible.