Running Head: Investing Bullock Gold Mining

Researching and Analyze

Bullock Gold Mining

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**Topic 1.3: BULLOCK GOLD MINING**

Seth Bullock is the CEO for Bullock Gold Mining, Dan Dority is geologist for the company, and Alma Garrett is the CFO for the company. If the company opens today, it will cost $750 million and the cash outflow will be $75 million in nine years later. The cash flow of Bullock Gold Mining and required return is 12 percent, using this information and data to do the calculation in Microsoft Excel 2010 to find the mean, median, mode, variances, standard deviation, Sharpe ratio, payback period, internal rate of return, modified internal rate of return, and net present value. Using all the financial formulas, theories, statistics and analysis techniques to apply with the data; therefore, it will shows some values if this company is a good investment or not.

The data of Bullock Gold Mining:

|  |  |  |
| --- | --- | --- |
| **Year** | **Cash Flow** |  |
| 0 | -750,000,000 | **Initial Investment** |
| 1 | 130,000,000 |  |
| 2 | 180,000,000 |  |
| 3 | 190,000,000 |  |
| 4 | 245,000,000 |  |
| 5 | 205,000,000 |  |
| 6 | 155,000,000 |  |
| 7 | 135,000,000 |  |
| 8 | 95,000,000 |  |
| 9 | -75,000,000 | **Cash Outflow** |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | **Calculation** |
| **Overall Cash** | 1,260,000,000 |  | = SUM(B3:B11) |
| **Total Ending Cash** | 510,000,000 |  | = B14 - B2 |
| **Gain or Loss Profit** | -240,000,000 |  | = B2 + B15 |

The data projected it will increases the cash flow, but after year 4, it will declines. At year 4, the company made the highest profit. However, in year 1 to year 9, the company made $1,260,000,000 in total and minus the ending cash of investment is $510,000,000. Since the initial investment was $750,000,000, $750,000,000 minus $510,000,000 is $240,000,000. The company made loss profit. As a result, it does not seem like is a good time to invest in this company or opening Bullock Gold Mining. However, looking at the cash flow data, it shows more positive outflow than negative outflow. The positive number of cash flow means more money is flowing into the company than flowing out, which is increases the company’s assets. Yet, there is one negative number in the cash flow data. The negative value means the company is servicing debt. Also, it might mean the company is retiring debt or making dividend payments and stock repurchases. Doing more researching, calculating, analyzing and manipulating the data, it came out a better results and conclusions.

The chart of the data Cash Flow:

This chart shows with initial investment and the last year of cash outflow.

This chart shows all the positive cash outflow.

Two of the charts show a bell curve and is a platykurtic (flat); on the other hand, the second chart shows a better picture and results of a bell curve. The first chart is platykurtic because it has negative value and the large variations within observations. Also, this chart makes the investment less risky. The second graph is a bell curve and is normal distributions or Gaussian distribution. It shows the average value of the data. When the charts show a mean and median, you can calculate the variance, standard deviation, and Sharpe ratio. Using the original data of Bullock Gold Mining to find the mean, variance, standard deviation, and Sharpe ratio, the values is:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | **Calculation:** |  |
| **Mean** | 140,000,000 |  | **Mean** | = AVERAGE(A2:A10) |
| **Median** | 155,000,000 |  | **Median** | = MEDIAN(A2:A10) |
| **Mode** | #N/A |  | **Mode** | = MODE.SNGL(A2:A10) |
| **Variance** | 8.49375E+15 |  | **Variance** | = VAR(A2:A10) |
| **Standard Deviation** | 92,161,543 |  | **Standard Deviation** | = STDEV(A1:A10) |
| **Sharpe Ratio** | 1.52 |  | **Sharpe Ratio** | = D2/D4 |

The mean of this data is 140,000,000; however, the standard deviation is 92,161,543 and it shows annual rate of return of an investment in cash flow to measure the investment's volatility. The variance is the average of the squared differences from the mean and is measures the volatility from an average. The volatility is a measure of risk and the variance value can help investor to determine the risk to invest in this company or not. The value is 8.49375E+15 for variance and is far from the mean. Standard deviation is 92,161,543 and is almost close to the mean and is 43,838,457 apart. It is 65.83 percent apart; in addition, is close to 68.3 percent of the values of a normal random variable within plus or minus one standard deviation of its mean. The Sharpe ratio is asset return, risk-free return and standard deviation of return. Sharpe ratio is 1.52; as a result, it shows a good value with low risk and the performance is good.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time Period** | **Cash Flow** | **Yearly Return** | **Risk Free Rate** | **Excess Return** |
| 1 | 130,000,000 | 0.1733 | 0.05 | 0.1233 |
| 2 | 180,000,000 | 0.2400 | 0.05 | 0.1900 |
| 3 | 190,000,000 | 0.2533 | 0.05 | 0.2033 |
| 4 | 245,000,000 | 0.3267 | 0.05 | 0.2767 |
| 5 | 205,000,000 | 0.2733 | 0.05 | 0.2233 |
| 6 | 155,000,000 | 0.2067 | 0.05 | 0.1567 |
| 7 | 135,000,000 | 0.1800 | 0.05 | 0.1300 |
| 8 | 95,000,000 | 0.1267 | 0.05 | 0.0767 |
| 9 | -75,000,000 | -0.1000 | 0.05 | -0.1500 |
|  |  |  |  |  |
| **Mean** | 0.1367 |
| **Variance** | 0.0151 |
| **Standard Deviation** | 0.1229 |
| **Sharpe Ratio** | 1.11 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **Calculation:** |  | | **Mean** | = AVERAGE(E18:E26) | | **Variance** | = VAR(E13:E21) | | **Standard Deviation** | = STDEV(E18:E26) | | **Sharpe Ratio** | = B28/B29 | |
|  |
|  |
|  |

The standard deviation is 0.1229; therefore, is closes to the mean and the mean is 0.1367. The number applies as a low risk. The Sharpe ratio is 1.11. Since the value is above 1, the performance is considered good. The Sharpe ratio has a better value with low risk; it shows that risk-adjusted performance is good.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Cash Flow** | | | **Discounted Cash Flow** |
| 0 | -750,000,000 | | |  |
| 1 | 130,000,000 | | | $ 116,071,428.57 |
| 2 | 180,000,000 | | | $ 143,494,897.96 |
| 3 | 190,000,000 | | | $ 135,238,247.08 |
| 4 | 245,000,000 | | | $ 155,701,929.21 |
| 5 | 205,000,000 | | | $ 116,322,505.42 |
| 6 | 155,000,000 | | | $ 78,527,823.78 |
| 7 | 135,000,000 | | | $ 61,067,144.07 |
| 8 | 95,000,000 | | | $ 38,368,906.66 |
| 9 | -75,000,000 | | | $ (27,045,751.87) |
|  |  | | |  |
| **Percent Required Return** | | 12% |

|  |  |
| --- | --- |
| **NPV Formula** | Net Present Value (NPV) |
| **NPV Excel Formula** | **= NPV (C13,B3:B9) + B2** |
| **NPV** | **$ 67,747,130.88** |

The net present value is the present value of net cash inflows generated by a project and is measure in capital budgeting because is important calculation and reliable measurement. The NPV is $67,747,130.88; therefore, is positive and more than zero.

|  |  |
| --- | --- |
| **IRR Formula** | 0 = P0 + P1/(1+IRR) + P2/(1+IRR)2 + P3/(1+IRR)3 + . . . +Pn/(1+IRR)n |
| **IRR Excel Formula** | **= IRR (B2:B11)** |
| **IRR** | **15%** |

The internal rate of return (IRR) is the discount rate that makes the net present value of investment of all cash flow equals to zero. However, the target of required return is 12 percent and is less than 15 percent.

|  |  |
| --- | --- |
| **MIRR Formula** | http://i.investopedia.com/inv/dictionary/terms/MIRRFormula.gif |
| **MIRR Excel Formula** | **= MIRR (B2:B11,C13,C13)** |
| **MIRR** | **13%** |

Modified internal rate of return (MIRR) is better version of internal rate of return that has better approach to capital budgeting decisions. MIRR shows more realistic number than IRR. MIRR is 13 percent and is more than 12 percent.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Cash Flow** | **Cumulative Cash Flow** | **Discounted Cash Flow** | | **Cumulative Discounted Cash Flow** |
| 0 | $ (750,000,000) | $ (750,000,000.00) | $ (750,000,000.00) | | $ (750,000,000.00) |
| 1 | $ 130,000,000 | $ (620,000,000.00) | $ 116,071,428.57 | | $ (633,928,571.43) |
| 2 | $ 180,000,000 | $ (440,000,000.00) | $ 143,494,897.96 | | $ (490,433,673.47) |
| 3 | $ 190,000,000 | $ (250,000,000.00) | $ 135,238,247.08 | | $ (355,195,426.38) |
| 4 | $ 245,000,000 | $ (5,000,000.00) | $ 155,701,929.21 | | $ (199,493,497.18) |
| 5 | $ 205,000,000 | $ 200,000,000.00 | $ 116,322,505.42 | | $ (83,170,991.75) |
| 6 | $ 155,000,000 | $ 355,000,000.00 | $ 78,527,823.78 | | $ (4,643,167.97) |
| 7 | $ 135,000,000 | $ 490,000,000.00 | $ 61,067,144.07 | | $ 56,423,976.10 |
| 8 | $ 95,000,000 | $ 585,000,000.00 | $ 38,368,906.66 | | $ 94,792,882.76 |
| 9 | $ (75,000,000) | $ 510,000,000.00 | $ (27,045,751.87) | | $ 67,747,130.88 |
|  |  |  |  | |  |
| **Payback Period Formula** | | **Initial Investment / Cash Inflow per Period** | | | |
| **Payback Excel Formula** | | **= 4 +(ABS(C6)/B7)** |  |  | |
| **Payback Period** | | **4.02** |  |  | |
|  |  |  |  |  | |
| **Discounted Payback Period Formula** | | **Actual Cash Inflow / (1 + i) ^n** | |  | |
| **Discounted Payback Excel Formula** | | **= 6 + (ABS(E8)/D9)** |  |  | |
| **Discounted Payback Period** | | **6.08** |  |  | |

The payback period is the time of the initial cash outflow of an investment that required time to recover. The payback for this company is 4.02 years and is less than 8 years. The discounted payback period is to calculate the profitability of a project and it accounts for time value of money by discounting the cash inflows of the project. Since the project does not have negative net present value, the project can be discounted pay period.

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Cash Flow** | **Rates** | **Future Value** |
| 1 | 130,000,000 | 2.4760 | $ 321,875,212.92 |
| 2 | 180,000,000 | 2.2107 | $ 397,922,653.33 |
| 3 | 190,000,000 | 1.9738 | $ 375,026,310.18 |
| 4 | 245,000,000 | 1.7623 | $ 431,773,712.38 |
| 5 | 205,000,000 | 1.5735 | $ 322,571,468.80 |
| 6 | 155,000,000 | 1.4049 | $ 217,763,840.00 |
| 7 | 135,000,000 | 1.2544 | $ 169,344,000.00 |
| 8 | 95,000,000 | 1.1200 | $ 106,400,000.00 |
|  |  |  |  |
| **Discount CF0** | $ 750,000,000.00 |  |  |
| **Discount CF9** | $ 48,682,353.37 |  |  |
| **Total Discount** | $ 798,682,353.37 |  |  |

Bullock Gold Mining is a good company to invest in because the original data the Sharpe ratio is 1.52. Also, using the second data, the standard deviation is 0.1229 and the Sharpe ratio is 1.11. The Sharpe ratio is above 1 in both data and the standard deviation has a low risk; as a result, it shows that risk-adjusted performance is good with low risk. Doing all the research and analyzing the company, it passes all the five analysis method tests. It passes payback period, discounted period, net present value, internal rate of return, and modified internal rate of return. The payback period is 4.02 years and discounted payback period is 6.08 years; therefore, both of them are less than 8 years. The net present value is $67,747,130.88; as a result, it shows a positive dollar value and is more than zero. The internal rate of return is 15 percent and modified internal rate of return is 13 percent, so they both are more than 12 percent. In the end, it passes the entire test. This company is good to invest for long term.

**Creating Custom VBA Function (Payback Function)**

Function PaybackPeriod(Years As Range, CashFlow As Range) As Variant

Dim i As Long

Dim Total As Double

PaybackPeriod = CVErr(xlErrNA)

With Years

For i = 1 To .Cells.Count

Total = Total + CashFlow.Cells(i)

If Total > 0 Then

PaybackPeriod = .Cells(i).Value - Total / CashFlow(i) \* (.Cells(i).Value - .Cells(i - 1).Value)

Exit Function

End If

Next i

End With

End Function

# I used “With…End With Statement”, “For…Next” and “If…Then…Else Statement” to create this function

***Example***:

Function…

Dim [ WithEvents ] variablelist

With objectExpression

For… [ As datatype ] = start To end [ Step step ]

If… Then

Exit Function

End if

Next…

End With

End Function

**Terms of VBA Statements**

#Function – Declares the names and arguments for a Function to work

#Dim – Declares variables and their data type

#Long – 64-bit (8-byte) integers ranging in value from -9,223,372,036,854,775,808 through 9,223,372,036,854,775,807

#Double – 8 bytes and provides the largest and smallest possible magnitudes for a number

#Integer – 2 bytes and takes 32,768 to 32,767

#xlErrNA - (= 2042) returns a #N/A error

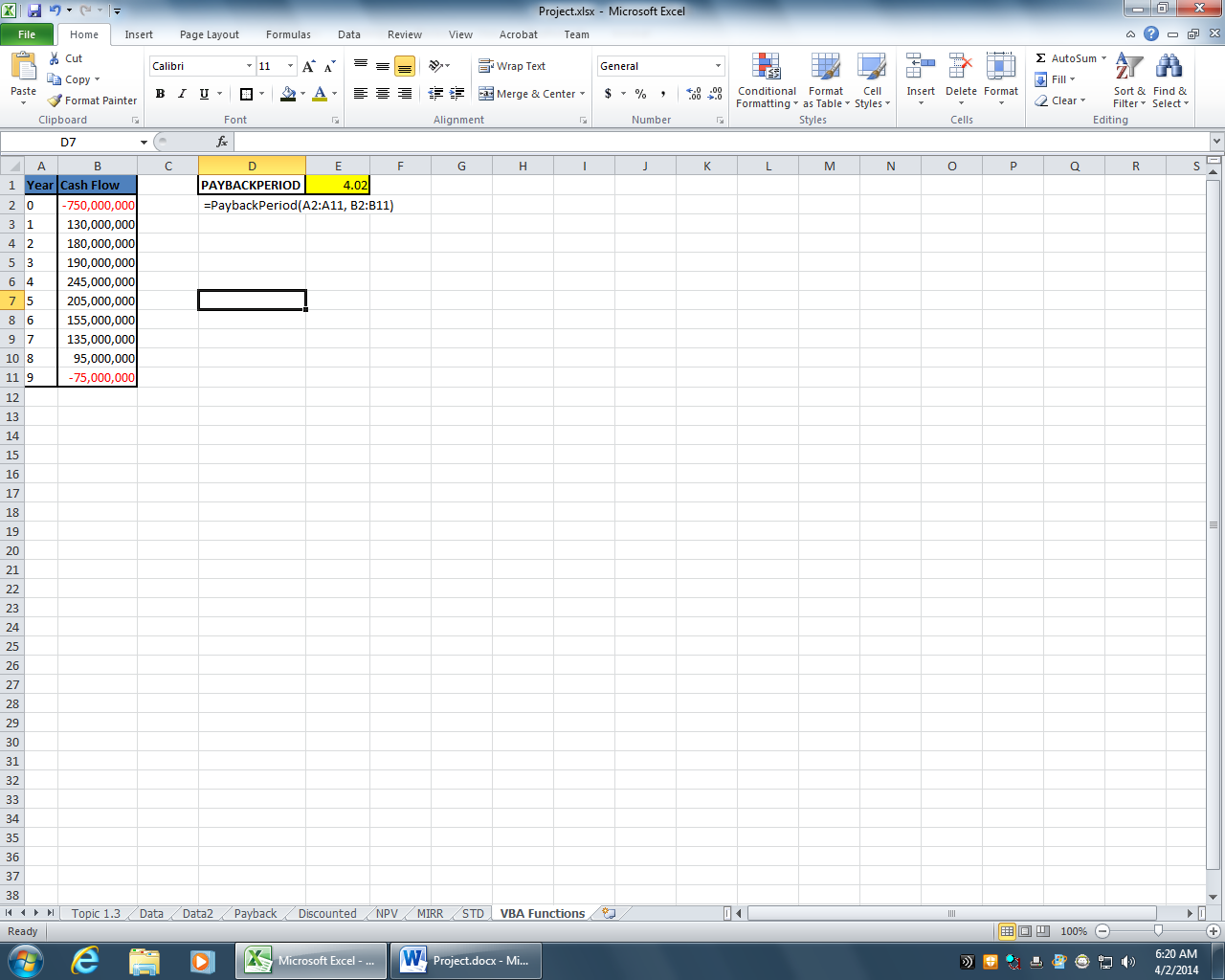
#CVErr –  *errornumber* argument is any valid error number.

# objectExpression – is a variable and you can name your variables

#With – runs objects or variable

#Exit Function – Exit the function but it has to be used inside function only.

#End Functions – Exist the functions (is complete)



**Topic 2.1: Financial analysis of a proposed capital investment project.**

Technology is getting faster, better, and smarter each day. Today, the stock market is changing and laws or rules are changing. Each day, people are coming up with new ideas to beat the market or make profit in the stock market. Some people are using old or new methods to gain the leverage or the edge of the stock market. However, more people are trading or investing in stocks, options, and futures. People that depending on fundamental or technical analyzing, and it does not work anymore like in the 90’s. Therefore, people are using super computer and coding to beat the stock market. People are not trading against other people; therefore, people are trading against the computers. This generation, people need to come up with a new idea and faster way to analyze a company or particular stock. If people want to analyze better in the finance investment, they can use excel and coding to do the work. People need to use mathematic, statistics, physics, machine learning, algorithm, time series analysis, and computer coding to beat stock market. Also, people need to come up with new strategies for trading to beat the market and go against the computer. Since it takes longer for people to do research or find the particular stock to invest in, they can have computer to do all the work in seconds or less than a second. People should be an investor and a trader if they want to be successful.

In USA, there are one famous investor named Warren Buffett; on the other hand, we got one famous quantitative trader named Jim Harris Simon. We can learn a lot and use their knowledge from these two geniuses people who into the stock market and made billions of dollars in the stock market. Warren Buffett, who use fundamental strategy in his investment and is a billionaire and well-known investor in the 20th century, is an American business magnate, investor, and philanthropist. Buffett is known "Sage" or "Oracle" of Omaha and the greatest investor in the history (Loth). However, James Harris Simons is an American hedge fund manager, mathematician, and philanthropist *(Wikipedia)*. Simons is known as “Quant King” and he supports high frequency trading (Corkery).

In my experience in trading and investing, I learned is better to do both because you never know what can happen. Also, you will reduce more risk and gain more profit. You might lose or win in either situation. If you focus on investing only or trading only, your account could be wipe out. For instance, in September 16, 2008, the stock market crash because the failures of massive financial institutions in the United States. People that concentrate only on investing only, people lost more than half in investing only. Then people have to wait for a long time for their stock to go back up or the company they invest might become bankrupt. However, if you spread out your different method style in trading and investing, you have a lower chances of losing money and you will more likely to make money. This situation is similar to put all your money in one basket or the coin flip. If you have more knowledge in trading and investing, you will lower your risk in losing money. In my online course, I have taken “Computational investing, Part 1,” I learned about the coin flip experience. The experiment I am going to explain, you have two choices to bet. You thinking about betting on the outcome of the coin and is the same as taking a position to trade. Let assume you have all the information, and you have proof that the probability (*p*) it will come out heads and is *p*(head) = 0.51. The uncertainty for the outcome of the coin flip is a model of beta, and the coin bias is a representation of alpha. You have a 2% advantage in each coin flip. When you are making a bet, you put a chip on the table, representing the amount you are [betting](http://noelusion.com/etc/notes/ci1-coursera/notes06.html). If you get a heads, you gain 100% with doubling your bet. If is a tail, you lose all your money entirely, which is negative 100%. Which one will you choose: 1 bet for $1000 or 1000 bets for $1?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Coin Bets** | **Expected Gain or Return** | **Risk** | **Standard Deviation** | **Risk/Reward** |
| $1000 for 1 bet | E(gain) = 0.51 \* 1000 + .49 \*- 1000 = **20** | *p*(outcome=−1000)=**0.49** | *You cannot do standard deviation for one event such as $1000 for 1 bet.* We change the bet $1000 bet to be 999 bets of $0.  *σ*(1000,0,0,0,…,0) = **31.62.** | **0.63** |
| 1$ for 1000 bets | E(gain) = 1000(0.51×1+0.49×−1) = **20** | *p*(outcome=−1000)= | *σ*(1,−1,1,1,−1,…,−1)=**1** | **20** |

As a result, the multi-bet is better because it has lower risk and standard deviation. Also, it has higher Sharpe ratio. Although, they have the same expected return, the multi-bet is better in the end. However, the Sharpe ratio for multi-bet and single bet has the same values. The formula for Sharpe ratio is the formula. = 19.92 ≈ 20. Since we know α is bias, the 2 % chance that the coin will like to come up heads and C is a constant coefficient. If I improve the alpha, I would improve the reward/risk ratio and make the coin more biased in investing because it makes better forecasts about individual stocks. Also, if I made more bets such as improving breadth of my strategy, I improve my reward risk ratio but slower through a square root function. Therefore, I would double the benefit of breadth and I have to quadruple the breadth. When you bet more or spread out your bets, you find more opportunities to lead lower alpha.

To invest in particular company, you can get the historical price from yahoo or google. Also, you can get data from <http://www.quandl.com>. Many traders get data from quandl site. If you want to get all the ticks from NYSE or NASDAQ, you can get it from <http://www.eoddata.com>. When you download the data on to excel, you can calculate the return and risk in daily, weekly, monthly, and yearly. Another way, you can get the data from <http://www.stockrageous.com/> if you want intraday data such as 1, 2, 5, 10, 15, and 30 minute. Since technologies are evolving, people are using data that are seconds. In my experience, yahoo has a better data and you scrape data from yahoo. Also, people need a supercomputer and a super-fast internet. Now they have a technology is faster than fiber-optic cable and is called laser beam. They can trade in nanoseconds or billionths of a second. The trader are using laser beam for trading to beat people that are using fiber-optic cable (Patterson). If you can do computer coding such as C++, R, MATLAB, or Python language, you can scrape intra data from yahoo or other site. Also, you can get all the statements such as income, balance, and cash flow from Security Exchange Commission website. Python is the most common using for trading and is easier computer language compare to R.

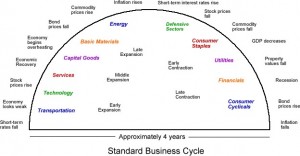
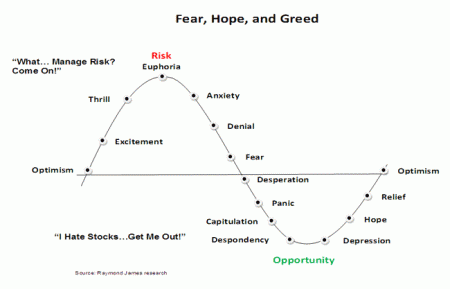
In excel, you can find simple return, continuously compounded return, annualized simple return, annualized continuously compounded return, portfolio weight, simple portfolio return, continuous compound return, variances, covariance, standard deviation, Sharpe ratio, value of portfolio, and value at risk. You can use the data to find linear regression. Also, I used excel a lot for coding such as VBA. Many people that trades or invest in stock use excel too.

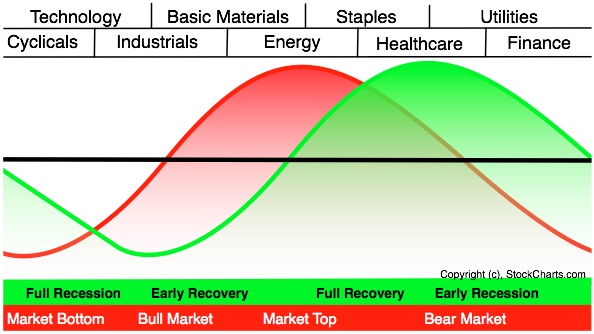
With the data, you can use it to backtesting in excel or computer coding. “Backtesting is a process of testing a trading strategy on prior time periods. Instead of applying a strategy for the time period forward, which could take years, a trader can do a simulation of his or her trading strategy on relevant past data in order to gauge the its effectiveness.  
Most technical-analysis strategies are tested with this approach” (investopedia). In my experience, backtesting does not work for predicting the future and rarely works. Backtesting is similar to forecasting. When you run your code for backtesting, it shows the past, it does not mean it will happen in the future. Forecasting has always failed. However, you use your backtesting to test out your strategies to see if it works. You should always backtesting your codes first and paper trade to see if it works. When your codes work on backtesting and paper trade, you can run your codes in live trading. Therefore, that where computer codes come in, you can write a codes that can tell which direction the stock will go. The code can take a long position or short position. For instance, my friend James, who is a proprietary trader, professional traders, and my mentor, writes his own coding. He runs his code and it cans simulations 1000 times. Therefore, his codes estimate how many times the strategy will work and compare that with stock price historical data. This is called time series movement or also known as machine learning.

If you make 10 or more trades per day, you should become a prop trader because you can get more information and data for each company at the firm. Also, you will not need to pay retail price and is less than a penny for each trade. For example, if you a retail trader, you will be paying $7 to $15 per trade and depends which broker you use. Therefore, if you retail trader, you will have to make least 400 dollars a day if you make 10 trades or less. My friend James, who is a quantitative trader, is a prop trader. Also, he writes his own codes and have computer to do trading for him on live. Since he got a license, he works with a firm name Goldman Sachs. He gets all the information and data of any companies because he works in a firm. James makes each trade $0.004 for 100 shares and is cheaper than retail prices. Also, James gets the data and the news first because he is a prop trader. On the other hand, I get the data and the news after him. Therefore, James wins because he gets all the information and data first. When you get the data later, you lose money or win less money compare to prop trader or the firm. In the end, you should become a prop trader if you want to make money.

If people want to write codes for algorithms, they need to have different type of strategies such as: momentum, mean reversion, valuation, seasonality, sentiment, fundamental, and technical. Momentum is a market trend that moves in one direction on high volume; as a result, trend is your best friend. Mean reversion is a strategy that shows the stock is above average; therefore, the stock will go down. Then people can short it. Valuation strategy is a fundamental analysis and it identify the stocks trading at a discount or premium and buy or sell; for that reason, it determine the value of the stock and compare to its market price. Seasonality is a strategy that tells stock which time of year it goes up or down the most. For instance, in January, December, and summer time, the stocks have high returns. However, in April, May, October and September, stocks have low return. Most people will use buy and hold method during April, May, October and September. Others people will sell it or short it. Sentiment is a strategy predicts investors and traders emotions or reactions to stocks. This strategy monitors the rumors such as blogs, forums, twitter, media, and other sites. Thus, you buy the rumors and sell the news because stock went up before the news was release. Fundamental and technical investing is common for investor or traders to use. For fundamental analysis, you read or have coding to read financial, balance, and cash flow statements. Also, you use this to find intrinsic value of the company and to see how the companies are doing well in the long term. The last strategies, trader use the most is technical analysis to examines the past market for changes in the stocks’ price and volume. They use the charts to find trends and patterns in the data to predict the future price movements.

The way stock moves up, down or sideway is because of the price. However, the price of the stock depends on human emotions. The stock markets act the way people act such as: fear, hope, and greed. The first chart shows “Fear, Hope, and Greed.” It shows the stock market acts similar to human emotions.





The second chart is a standard business cycle. This chart explains or show which sector is outperforms or underperforms. Also, it can helpful and effective on someone investment portfolio. The last chart shows the economy and markets flow the same way. When the economy is in full recession and the market is in the bottom. Then the economy and the market is a bullish. After that, the economy make a full recovery, the market is at the top. However, when the economy is in the early recession, the market is a bearish. These charts are good example of showing how human reacts in the stock markets. We cannot depend on our emotions or instinct in investing or trading. Since humans have emotions, we can use coding to do our trading. When people write codes to do their trading, it has no emotions. Therefore, the computer coding is all about logic and not psychology.

If you can have two genius minds of Warren Buffett and James Harris Simons, you would be a super genius in investing and a quantitative trader. Warren Buffett is the best in reading accountant statement and is the best finding a company that is valuable. On the other hand, James Harris is good in mathematics and is expert in financial signals processes. There a saying, “More knowledge, more power.” If you want a good bright future and relax with no worrying about money, you should spend more time in learning investing, trading, and coding. Since more people are struggling to find good paying jobs and their retirement plans, they should start investing and trading now.

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