**Assignment:** EFS-01: Strategy Building in Equity

**Assignment Discussion Date: 02/06/2021 – EFS-01 session**

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| Q1 | Test the crossover trading methodology as provided in the “XL\_FILE\_EFS 01\_Example\_Worksheet” as used in class. Please note that you should be modelling it for Exponential Moving Average (EMA) (definition is given below, please use that) as discussed in the class instead of Simple Moving Average. Please use the data provided on "Q1 Data" Sheet of the Excel file named “XL\_FILE\_EFS-01\_AssignmentData.xlsx” given along with this assignment. Find out the optimal value of SEMA (Short Term EMA) and LEMA (Long Term EMA) for the Maximum Total returns using data Table (as shown in class) and compute the following: |
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|  | *Definition of EMA: 5 day EMA = [(4\*(Previous day EMA) + Current day price)]/5. First value of EMA can be calculated using the Simple moving average. For the first EMA calculate Simple Moving Average* |
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| **S No.** | **Output to be computed** |
| 1 | CAGR (Compound Annual Growth Rate) |
| 2 | Hit Ratio or Success Ratio |
| 3 | Average Profit per trade |
| 4 | Average Loss per trade |
| 5 | Average Profit per Trade to Average Loss per Trade ratio |
| 6 | Maximum drawdown (with Leverage 1) |
| 7 | Equity Curves for the leverage of 1,2,3,4 |
| 8 | Calendar year-wise Returns for: |
| 8a. | Breakup of Profit from Long Trades per year |
| 8b. | Breakup of Profit from Short Trades per year |
| 8c. | Hit Ratio per year |
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**Important points to remember**

* **Make a data table and find out which is the best parameter. Please copy the data table and paste it as values only while submitting the assignment.**
* **The model should be dynamic in the sense, that if you change your input parameters the model's results should change accordingly**
* **Please make sure that the SEMA/LEMA is dynamic w.r.t user parameters**
* **For a long term EMA you can take any period of your choice and after that, you can check via the data table which is the long term EMA along with the short term EMA is giving you the maximum profit.**

**Answer.**

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| **S No.** | **Output to be computed** | **Answer** |
| 1 | CAGR (Compound Annual Growth Rate) | 18.02%  (Time period rounded off to 14.75 yrs) |
| 2 | Hit Ratio or Success Ratio | 34.72% |
| 3 | Average Profit per trade | 21.15% |
| 4 | Average Loss per trade | -3.37% |
| 5 | Average Profit per Trade to Average Loss per Trade ratio | 6.27 |
| 6 | Maximum drawdown (with Leverage 1) | 22.35% |
| 7 | Equity Curves for the leverage of 1,2,3,4 | Please refer EquityCurve tab |
| 8 | Calendar year-wise Returns for: |  |
| 8a. | Breakup of Profit from Long Trades per year | Yearly Returns table BUY Trades Return column |
| 8b. | Breakup of Profit from Short Trades per year | Yearly Returns table SELL Trades Return column |
| 8c. | Hit Ratio per year | Yearly Returns table Hit Ratio column |

**Note.**

1. For the different combinations of SEMA & LEMA used for the backtesting, SEMA=3, LEMA=50 was found to be the one which gives the maximum cumulative return
2. All values shown in above table use the above SEMA/LEMA combination
3. Max leverage values of 1, 2, 3, 4 can be entered in cell W3 which will recalculate Max Drawdown, Cumulative return and CAGR
4. CAGR uses 14.75 years as period the data has approximately 14 years and 9 months data
5. CAGR, Average profit/loss per trade, average profit per trade to average loss per trade in the above table are calculated using leverage 1. Same for Question 8.
6. Columns K, L, M, N calculate equity curve for 1, 2, 3, 4 leverages respectively.
7. Columns O, P use the leverage entered in W3 to calculate Max Drawdown by referencing one of the four columns K, L, M, N