Part 2: Interpreting Results (30 points, ≈ 15 minutes)

A celebrated Italian hedge-fund manager, Bernardo Madolfo, approaches you with a financial proposal. Madolfo guarantees that, if you invest with him, you will enjoy steady monthly returns that are almost uncorrelated with the broader market. To substantiate these claims, he promises you that his hedge fund meets two criteria:

(1) In months where the S&P 500 stock index has exactly zero return, his hedge fund makes a 1% return, on average. (Recall that the S&P 500 is an index of stocks that represents the aggregrate return of 500 large companies from many different sectors of the economy.)

(2) Less than 5% of the total variance in his hedge fund's monthly returns can be predicted in terms of variance in the returns of the S&P 500 index.

Since you are seeking steady returns and don't want to worry about how the ups and downs in the market affect your portfolio, this sounds pretty good.

To investigate these claims, you compile 84 months of past data. You decide to run a regression where your y variable is the quoted monthly return of Madolfo's hedge fund, and the x variable is the corresponding monthly return of the S&P 500 index. Below you see the results of your analysis. On the plots, the scale is 1 unit to one percentage point (1%) of monthly return. The raw data and least-squares fit are plotted in the top-left pane; the residuals are plotted against the S&P 500 returns in the top-right pane. The remaining four panes show bootstrapped estimates of the sampling distribution for four important quantities: $\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\sigma}$, and R^2.

Are Madolfo's two claims supported, or contradicted, by the evidence? Write a short explanation of your findings, no more than 2–3 paragraphs in length. Be concise.