BSAN 775 - Homework Assignment

# National Employment and GDP

You have been tasked with understanding the relationship between employment and GDP in the United States. The dataset 'Employment\_GDP.xlsx' contains quarterly data on national employment and GDP over the past 20 years.

Run a regression model where quarterly GDP is predicted based on the employment in the previous quarter (lagged employment). Use this model to answer the following questions:

1. Residual Scatterplot: Create a scatterplot of the residuals against the lagged employment. Does the plot suggest that the residuals are homoscedastic? (

2. Residual Histogram: Create a histogram of the residuals and compare it to the normal distribution. Are the residuals approximately normally distributed? Why or why not?

3. Significance Test: At the .05 significance level, does employment in the previous quarter significantly influence GDP? Support your answer using the regression output.

4. Variation Explained: What percentage of the variation in GDP is explained by employment in the previous quarter?

5. Impact of Employment Increase: Estimate the change in quarterly GDP for a 1 million increase in employment.

# Tech Innovate (Smartwatch Pricing)

Your company, Tech Innovate, is planning to release a new line of smartwatches, and you have been assigned to analyze the market for pricing strategies. A dataset 'Smartwatch\_Pricing.xlsx' includes the price, battery life (in hours), display quality (1-5 scale), and water resistance level (in meters) for 20 competing smartwatch models. Tech Innovate expects their new product to have 20 hours of battery life, a display quality of 4, and 30 meters of water resistance.

1. Model Significance: Is the overall model significant at the 0.05 level? Explain your reasoning. (

2. Predicted Price: Use the model to predict the price of the new smartwatch

3. Significant Drivers: Based on the model, which factors are significant drivers of price? Are there any variables that seem counterintuitive?

4. Correlation Analysis: Check for multicollinearity by calculating the correlations between the drivers. Which pairs of variables show a strong correlation?

5. Revised Model: If necessary, remove any highly correlated drivers and rerun the regression. Has the model improved?