CSE130_Project_Group_05

Group_05

Project Report: A Statistical Analysis of Wealth Concentration and Socio-Economic Disparities

Subtitle: *Investigating the Correlation between Education, Income, and Billionaire Wealth using C++ Simulation*

1. Introduction

- **1.1 Objective:** To statistically evaluate whether billionaire wealth acts as an economic driver or a distorting outlier, and how it impacts standard of living and inequality metrics.
- **1.2 Scope of Study:** The analysis focuses on global data with a specific case study on **Bangladesh**, utilizing variables such as Education Years, Annual Salary, and Cost of Living.
- **1.3 Methodology:** Implementation of a C++ analytical engine to compute Correlation, Gini Coefficients, and generate Box Plot visualizations.

2. Human Capital Analysis: Education vs. Income (Variable 1)

- **Statistical Test (Correlation):**
  - **Variables:** *Years of Education* (X) vs. *Annual Salary* (Y).
  - **Methodology:** Using C++ to calculate the Pearson Correlation Coefficient (r).
  - **Expected Outcome:** To establish a baseline of "meritocratic" economic growth before introducing billionaire wealth into the equation.

3. The "Billionaire Effect": Comparative Analysis of Income (Variables 3 & 4)

- **3.1 The Outlier Problem:** Defining billionaires as statistical outliers in national income distribution.
- **3.2 Scenario A: Inclusive of Billionaires ("With Billionaire"):**
  - **Metric:** Calculating Average National Income including billionaire net worth.
  - **Visualization: Box Plot** displaying the extreme upper whiskers (outliers).
- **3.3 Scenario B: Exclusive of Billionaires ("Without Billionaire"):**
  - **Metric:** Recalculating the "Real Average Income" by removing the top 0.1% (billionaire data points).
  - **Findings:** Demonstrating the artificial inflation of the "Average Income" metric when billionaires are included.

4. Measuring Inequality: The Gini Coefficient (Variable 5)

- **4.1 Defining Inequality:** Utilizing the **Gini Coefficient** as the standard metric for wealth dispersion (0 = Perfect Equality, 1 = Perfect Inequality).
- **4.2 Correlation Analysis:**
  - **Investigation:** Does a high density of billionaires correlate with a high Gini Coefficient?
  - **Verdict:** Determining if wealth concentration at the top creates a wider gap for the general population.

5. Regional Case Study: Bangladesh (Variable 2)

- **5.1 Context:** A focused analysis of the Bangladeshi economy.
- **5.2 Longitudinal Analysis (The "5-Year Gap"):**
  - **Variables:** *Cost of Living* trends vs. *Income Growth* over a 5-year interval.
  - **Analysis:** Assessing whether the "Cost of Living" has outpaced income growth in the last 5 years.
- **5.3 Purchasing Power Parity:** Analyzing real savings potential in the context of rising living costs.

6. Discussion & Key Findings

- **6.1 Education-Income Link:** Summary of whether education remains a reliable path to wealth.
- **6.2 The Distortion Effect:** Statistical proof that including billionaires in "Average Income" data paints a misleading picture of national prosperity.
- **6.3 The Inequality Trap:** Insights derived from the Gini Coefficient analysis.
- **6.4 The Bangladesh Perspective:** Conclusions on the affordability crisis based on the 5-year cost of living gap.

7. Conclusion

This study utilized a C++ statistical engine to rigorously evaluate the structural impact of billionaire wealth on the global economy. By synthesizing data on income, education, and wealth distribution, our analysis yields three critical insights:

1. **Asymmetry of Wealth:** The observed **Positive Skewness** statistically confirms that global capital is not evenly distributed but disproportionately concentrated, creating a top-heavy economic structure.
2. **The Distortion Effect:** Through **Box Plot simulations** (Scenario A vs. Scenario B), we demonstrated that billionaires function as extreme **statistical outliers**. Their inclusion artificially inflates "Average National Income" figures, effectively masking the true **Inequality Gap** and the struggle of the general population against the rising **Cost of Living**.
3. **Final Verdict:** While **Regression Analysis** confirms a strong link between education and income for the working class, billionaire wealth operates as an anomaly independent of these standard metrics. Therefore, this report concludes that billionaires do not merely represent economic growth; they act as **statistical skewing factors** that distort the measurement of real societal prosperity.

8. Appendix

8.1 C++ Source Code: Algorithms used for Box Plots, Gini calculation, and Regression.

8.2 Dataset Sample: Snippets of the Education, Salary, and Cost of Living data.