ASSESSING THE EFFECT OF EMPLOYEE BENEFITS ON ORGANIZATIONAL PRODUCTIVITY USING SAS

1. Overview

Client:

A U.S.-based HR consulting firm advising mid-sized organizations on workforce optimization

Objective:

To model the relationship between employee benefit offerings and organizational productivity using SAS. The purpose was to help business clients quantify the value of benefit investments on measurable output.

2. Background

Many firms increase benefit spending to improve employee satisfaction, yet lack clarity on its impact on actual productivity. The client needed a transparent model using real-world HR data to demonstrate this link, inform HR policy changes, and support internal presentations to executive teams.

3. Data Summary

Dataset:

Panel dataset from 67 companies over 3 years (2019–2021), with firm-level HR and productivity metrics

Variables Used:

Variable	Type	Description
Productivity_Index	Continuous	Composite measure of revenue per employee – dependent variable
Avg_Healthcare_Expenditure	Continuous	Annual employer healthcare spend per employee
Paid_Leave_Days	Continuous	Average number of paid leave days provided
Training_Hours_Per_Employee	Continuous	Average annual training hours per employee
Workforce_Turnover_Rate	Continuous	% of employees voluntarily leaving each year

Industry_Type	Categorical	Services / Manufacturing / Tech (controlled via dummies)
Firm_Size	Continuous	Total number of full-time employees

4. Methodology

Software Used:

SAS 9.4

SAS Workflow:

1. **Data Cleaning and Encoding:**
    - Used DATA step and PROC FORMAT to encode categorical variables
    - Winsorized outliers for spending and turnover rate
    - Created dummy variables for industry
2. **Modeling Approach:**
    - PROC REG with stepwise selection
    - Dependent variable: Productivity_Index
    - Checked assumptions: linearity, normality, multicollinearity, homoscedasticity
3. **Diagnostics and Validation:**
    - Used VIF, Cook's D, and Durbin-Watson
    - Final model validated via adjusted R^2 and residual plots

5. Key Results

Predictor	**Coefficient (β)**	**p-value**	**Interpretation**
Avg_Healthcare_Expenditure	+0.37	<0.001	Greater healthcare spend linked to higher productivity
Paid_Leave_Days	+0.21	0.011	Each extra paid day adds to output per employee
Training_Hours_Per_Employee	+0.46	<0.001	Most significant positive predictor

Workforce_Turnover_Rate	–0.52	0.005	Higher turnover negatively affects productivity
Firm_Size	+0.09	0.021	Larger firms slightly more productive, likely due to scale

Model Fit:

- Adjusted R^2: 0.79
- All VIF < 2
- Residuals: No evidence of heteroskedasticity
- No influential outliers (Cook's D < 1 for all obs)

6. Visual Outputs (SAS)

- Scatterplot matrix of numeric variables
- Coefficient bar chart with confidence intervals
- Residual histogram and Q-Q plot
- Predicted vs. actual productivity plot

7. Deliverables

- Annotated .sas code for reproducibility and future updates
- Comprehensive regression report (18 pages), including:
    - Full statistical output and variable definitions
    - Industry-type adjusted results
    - Interpretations tailored to HR decision-makers
- 5-slide summary for boardroom presentation:
    - ROI from HR investments
    - Key takeaways per benefit
    - Strategic recommendations for reallocation

8. Client Outcome & Application

- Used to justify increased investment in training and healthcare
- Incorporated into proposal decks to secure internal HR budgets
- Quoted in the client's 2023 thought leadership report on HR analytics

9. Strategic Value Delivered

- Quantified the **ROI of specific HR benefits** using statistical rigor
- Delivered **clear evidence linking workforce policy to firm performance**
- Provided a **framework for ongoing internal HR analytics using SAS**