ASSESSING FINANCIAL DISTRESS IN UK SMES USING ALTMAN Z-SCORE AND PANEL DATA REGRESSION

Background:

Small and medium-sized enterprises (SMEs) represent over 99% of all businesses in the UK but remain financially vulnerable due to limited liquidity, weak access to capital, and sensitivity to market shocks. Early prediction of financial distress is vital for business survival, policy intervention, and lending decisions.

Objectives:

- To assess financial distress risk among UK SMEs using Altman's Z-score model.
- To examine the influence of liquidity, solvency, and profitability indicators on financial health using panel regression.
- To offer predictive insights for business support services, investors, and policymakers.

Research Questions:

1. Can Altman's Z-score effectively predict financial distress in UK SMEs using available financial ratios?
2. What financial variables significantly impact SME solvency over time?
3. How do firm-specific and sector-specific effects influence financial distress probability?

Hypotheses:

- **H1:** SMEs with lower liquidity and profitability ratios have a significantly lower Z-score, indicating higher distress risk.
- **H2:** Altman's model accurately classifies distressed SMEs with over 70% accuracy.
- **H3:** Firm-level fixed effects improve the explanatory power of financial distress prediction models.

Methodology:

- **Research Design:** Quantitative, panel data analysis (2018–2022)

- **Sample:** 100 SMEs across five sectors (hospitality, retail, manufacturing, tech, construction)
- **Data Source:** Companies House filings, FAME database (financial statements)
- **Variables:**
    - **Dependent:** Altman Z-score (modified for private firms)
    - **Independent:** Current ratio, debt-to-equity ratio, ROA, asset turnover, retained earnings to total assets
    - **Controls:** Sector dummies, year fixed effects
- **Software & Analysis Tools:**
    - **Stata** for panel regression (FE and RE models)
    - **Excel** for Altman Z-score calculations
    - **Hausman Test** for model selection
    - **VIF** and residual diagnostics for multicollinearity and model fit

Results and Interpretations (Simulated):

- **Descriptive Findings:** 37% of SMEs had a Z-score below the safe threshold (1.8), suggesting financial vulnerability. Construction and hospitality sectors had the highest distress prevalence.
- **Regression Output:**
    - Current ratio ($\beta = 0.23$, $p < 0.01$) and ROA ($\beta = 0.35$, $p < 0.01$) were positively associated with higher Z-scores.
    - Debt-to-equity had a significant negative impact on Z-score ($\beta = -0.29$, $p < 0.05$).
    - Fixed effects model was preferred (Hausman $p < 0.05$), indicating firm-specific variance matters.
- **Model Fit:**
    - Adjusted $R^2 = 0.63$
    - Classification accuracy (distressed vs non-distressed): 73.4% using Altman thresholds

Conclusion and Managerial Implications:

The study validates the relevance of Altman's Z-score and panel regression techniques for predicting SME distress in the UK. Firm-specific financial indicators such as profitability and liquidity are critical warning signals. SME owners, investors, and lending institutions should continuously monitor these metrics to make informed financial decisions and avoid insolvency.

Future Research Scope:

- Expand dataset to micro-enterprises and regional comparisons
- Integrate qualitative data (e.g., management capability, market reputation) into hybrid prediction models
- Apply machine learning classifiers (e.g., random forest, SVM) for comparison with traditional regression
- Conduct post-pandemic cohort analysis (2020–2022) to study recovery dynamics

Academic and Corporate Relevance:

- **Academic:** Ideal for dissertations in Finance, Accounting, or Business Risk Analysis, focusing on applied econometrics.
- **Corporate:** Applicable for accountants, SME consultants, and fintech firms building financial risk monitoring tools.