Understanding Business Survivability in the UK: Identifying Key Factors and Predicting SME Insolvency

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1. Background:

- During the early 1990s recession, 24,000 firms went bankruptcy. Specifically, 9,500 firms have closed in the downturn of the early 1980s.[1]
- In 2008/09 economic recession, 51 companies have been forced to shut down each day, resulting in a total of nearly 27,000 closures since the start of the economic crisis.[1]
- The overall count of company insolvencies recorded in England and Wales reached 22,109 in 2022 which is 57% higher compared to 2021.[2]

2. Research Questions :

- How do macroeconomic factors (e.g., GDP, inflation) affect CCJ at the national level?
- What are the key factors influencing SME bankruptcy in the UK, and how to predict business failures?

3. *How do macroeconomic factors (e.g., GDP, inflation) affect CCJ at the national level?* [3]

- Linear Regression:
- $CCJ\ Amount = \beta_0 + \beta_1 GDP\ per\ capita + \beta_2 GDP\ growth + \beta_3 Unemployment\ rate + \beta_4 Inflation + \beta_5 Personal\ remittance\ received + \varepsilon$
- **Significant results**: Consumer CCJ (200,858,458) has a positive relationship with unemployment rate. Consumer (663,252,210; 693,223,430), Corporate CCJ (81,206,133; 693,223,430) has a positive relationship with GDP and Personal remittance.[5]

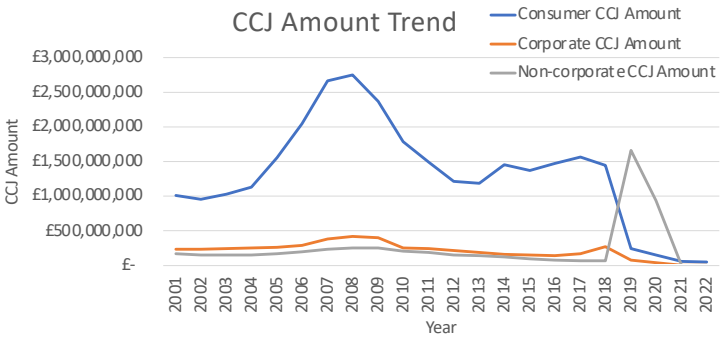

Figure 1: Consumer CCJ, Corporate CCJ and Non-corporate CCJ

5. Conclusion

- Macroeconomic factors have a more significant impact on consumer CCJ than on corporate and non-corporate CCJ.
- Liquidity ratios and profitability ratios are important metrics for modelling and predicting SME business insolvency.

4. *What are the key factors influencing SME bankruptcy in the UK, and how to predict business failures?*[4]

- **Liquidity Ratios**: Current ratio, Liquid assets to total assets, Quick ratio, Cash ratio
- **Leverage Ratios**: Retained Earnings/Total Assets, D/E ratio
- **Efficiency Ratios**: Inventory turnover ratio
- **Profitability Ratios**: ROA ratio, Returns to capital employed, Trade debtors to total assets, Trade creditors to total liabilities
- **Growth Ratio**: Real turnover growth, Real shareholder funds growth, Employment growth
- **Others**: GDP growth, GDP deflator, Industry weight of evidence, Indicator of being audited, Late filing days, Age in years

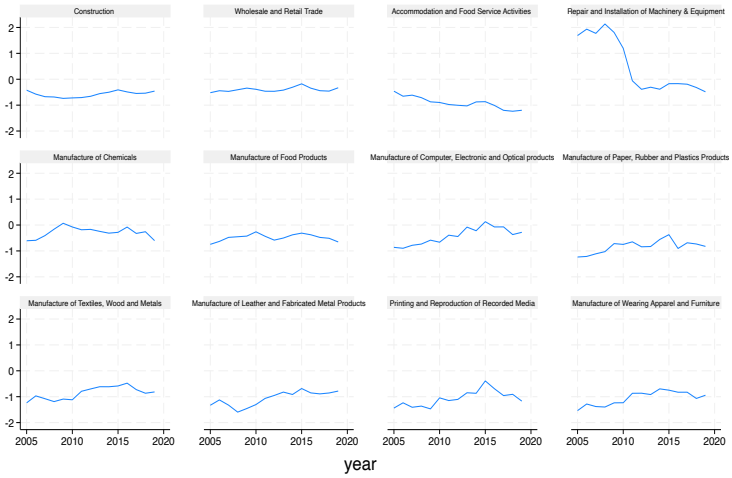

Figure 2: Average Industry weight of evidence 2005-2019

4.1 Modelling Result: Logistic Regression & Random Forest

Table 1: Top 5 most important features from logistic regression and random forest models

Feature Importance Rank	Logistic Regression(parameters)	Random Forest
1	Industry weight of evidence (-0.90)	Cash ratio
2	Cash ratio (-0.62)	ROA ratio
3	Employment growth (-0.53)	Trade creditors to total liabilities
4	Trade debtors to total assets (0.48)	Quick ratio
5	ROA ratio (-0.45)	Current ratio

Table 2: Modelling results from logistic regression and random forest models

Modelling and Prediction	Accuracy	F1 Score	FN%
Logistic Regression	0.66	0.57	0.11
Random Forest	0.76	0.59	0.16

Table 3: Out-of-sample prediction from logistic regression and random forest models

Out-of-sample Prediction	Accuracy	F1 Score	FN%
Logistic Regression	0.60	0.53	0.09
Random Forest	0.74	0.58	0.14

References:

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3. Data source : World Bank (economic indicators) and the Registry Trust (CCJ data) :2001-2022
4. Data source: The Credit Management Research Centre (CMRC) at the University of Leeds: 2005-2019
5. Davies S, Finney A, Collard S and Trend L. 2019. Borrowing Behaviour. [Online][Accessed 16 July 2023]. Available from: http://www.bristol.ac.uk/media-library/sites/geography/pfrc/pfrc1901-borrowing.pdf