AI Usage and Financial Performance

Shaonan Feng, Magdalena Piszczatowska, Xinyi Tang

Analysis of AI usage and acceptance across industries in the USA between 2023 and 2025 and its influence on the financial performance.

Background and Aim

The integration and perception of Artificial Intelligence in recent years varies across industries. Some sectors such as finance or logistics appear to embrace AI as a driver of efficiency and innovation. Other sectors however, particularly within creative industries, seem to view AI with more skepticism or resistance due to concerns over job displacement and ethical implications. This project aims to analyse whether the adoption and acceptance of AI across different industries actually correlate with measurable differences in financial performance - profitability, growth, efficiency by analysing AI-related survey data from the US Census Bureau and financial indicators of S&P500 companies.

Research question: Does AI usage correlate with financial performance across industries?

Methodology

Data preprocessing focused on cleaning data and creating a common Sector column in order to join the datasets. A key step involved calculating a two-year average for AI usage and acceptance rates. In order to answer the research question, main methods of analysis used in this study included descriptive statistics, data visualization as well as correlation analysis, a linear regression model and PCA.

Results

A strong, statistically significant relationship was found between a firm's financial performance and its rate of AI implementation. In the correlation analysis the average AI usage rate showed the strongest positive correlations with financial performance metrics such as Market Value, Revenue Growth and P/e Multiple. The linear regression model created was overall a good fit and showed a positive effect of Revenue Growth on AI usage. In Principal Component Regression, to create a comprehensive measure, a "financial strength" index was constructed based on Market Value, Sales Growth, P/E multiple, and R&D Expense. The PCR analysis confirmed that the there is a strong positive relationship between "financial strength" and AI usage in a sector.

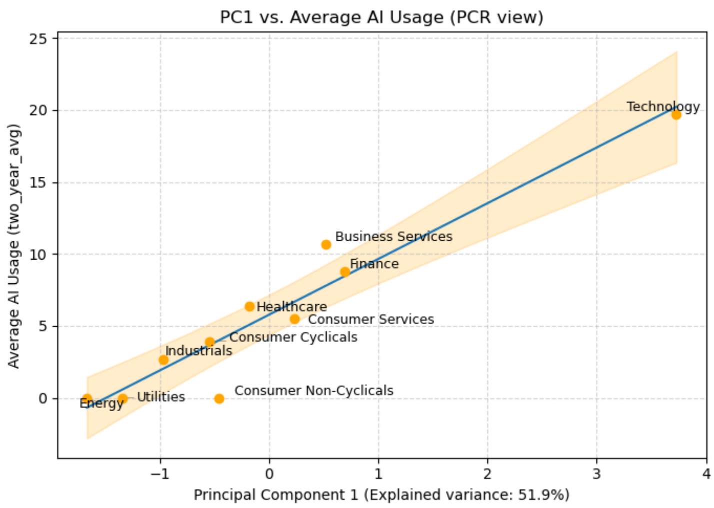

Figure 1: PC1 result

In conclusion: There is a positive relationship between AI usage and financial performance of a given sector.

Limitations Given that the sample size (number of sectors) is very small, the statistical significance of the results is limited. In correlation analysis and linear regression, there is a possibility of multicolinearity and overfitting and coefficients are uncertain. With a bigger sample size the relationship between more of the variables could perhaps be better established.

References

[1] OECD, The Adoption of Artificial Intelligence in Firms

Code

[1] Code Repository

Data

[1] BTOS Survey Data

[2] S&P 500 FactSet