AI Usage and Financial Performance

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

Background

Artificial Intelligence (AI) integration and perception have varied widely across industries in recent years. While sectors such as finance and logistics appear to embrace AI for efficiency and innovation, creative industries exhibit more skepticism, reflecting concerns about job loss, intellectual property risks, and ethical concerns. Prior research identifies technological capability and organizational factors as key to successful AI implementation. This project examines whether cross-industry patterns of AI adoption and acceptance correlate with differences in firm performance, profitability, growth, and efficiency, combining U.S. Census Bureau AI survey data with S&P 500 financial indicators. Preliminary results indicate that financial strength, proxied by firm size and recent growth is positively associated with a firm's likelihood of deploying AI in production.

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

Results

A strong, positive relationship was found between a sector's financial performance and its rate of AI implementation. Firstly, correlation analysis was used to explore the relationship between the average AI usage rate and financial performance metrics. The strongest positive correlations were observed with metrics such as Market Value, Revenue Growth and P/E Multiple. Secondly, a linear regression model was developed, which demonstrated a good overall fit and revealed a positive effect of Revenue Growth on AI usage. However, the sample size was very small and the model risked overfitting, so the results should only be viewed as exploratory. In Principal Component Regression, to create a comprehensive measure, an index representing "financial strength" was constructed based on Market Value, Sales Growth, P/E multiple, and R&D Expense. This composite index was designed to reduce multicollinearity and capture the underlying variance structure in the data. The PCR confirmed that the there is a strong positive relationship between "financial strength" and AI usage in a sector.

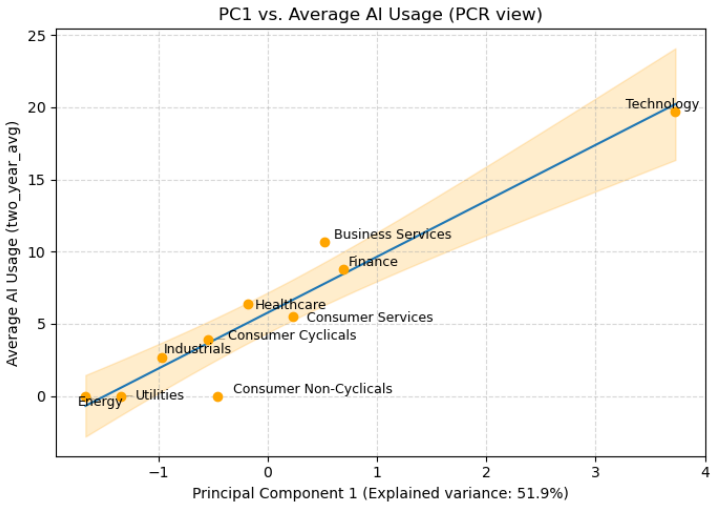

Figure 1: PC1 result

$$PC1 = 0.59(MarketValue) + 0.53(RevenueGrowth) + 0.47(R\&DIntensity) + 0.39(P/EMultiple) \quad (1)$$

The first principal component explained a large share of the variance across the financial variables (51,9%), as seen on Figure 1, suggesting that overall financial capacity and investment intensity are key enablers of AI adoption. 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 linear regression, there is a possibility of multicollinearity and overfitting and coefficients are statistically insignificant. In order to strengthen the statistical power of the study, the sample size should be expanded and causality should be further investigated using other methods in order to eliminate causal inference.

References

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[2] Merhi, M. I. (2023). An evaluation of the critical success factors impacting artificial intelligence implementation. International Journal of Information Management, 69, 102545. Retrieved October 2025

[3] McKinsey & Company (2018) Notes from the AI Frontier: Insights from Hundreds of Use Cases. Retrieved October 2025

Code

[1] Code Repository

Data

[1] U.S. Census Bureau. (2025). Business Trends and Outlook Survey (BTOS). Retrieved September 2025

[2] FactSet. (2025). Financial data for selected firms and industries. FactSet Research Systems Inc. Retrieved September 2025

Figures

[1] Two-Year Average AI Usage by Sector

[2] Market Value, EBITDA Margin, and Sales Growth by Sector (Ordered by AI Usage)

[3] AI Usage Rate vs Market Value by Sector

[4] ROE, P/E Ratio, and R&D Intensity by Sector

[5] AI Usage Rate vs Growth Rate by Sector