

Artificial Intelligence Usage by Chinese Listed Companies: Evidence from Large Language Model-based Text Analysis

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Abstract

Artificial intelligence (AI) holds substantial commercial potential, yet evidence on its actual adoption at the firm level remains limited. This study, drawing on the theory of absorptive capacity, classifies the depth of AI usage into four levels—none, low, medium, and high—and fine-tunes the pre-trained large language model (LLM) ERNIE 3.0 using 59,467 annual reports of Chinese listed firms to capture the semantic mapping between textual content and varying levels of AI usage, thereby measuring firm-level usage patterns from 2007 to 2024. The analysis yields four stylized facts: (i) larger firms are more likely to use AI at higher levels; (ii) the effect of firm age varies by size, with younger small firms and older large firms exhibiting higher AI usage rates and stronger tendencies toward advanced use; (iii) firms in knowledge-intensive industries display greater and deeper AI usage compared to those in labor-intensive and capital-intensive sectors; and (iv) firms in eastern China show higher AI usage rates, with advanced use concentrated in the Beijing–Tianjin–Hebei, Yangtze River Delta, and Pearl River Delta regions. Moreover, AI usage enhances productivity and increases the share of employees with a university degree or higher, but such effects become significant only when AI usage reaches medium to high levels. The primary contribution of this study lies in developing a firm-level measurement approach to AI usage based on LLM-driven text analysis, thus providing a solid data foundation for future research.

Keywords: Artificial Intelligence; Large Language Model; Text Analysis; Productivity; Employment