

## ABSTRACTS OF THE ARTICLES

### ARTIFICIAL INTELLIGENCE FOR CREDIT RISK MODELS, OR HOW DO MACHINE LEARNING ALGORITHMS COMPARE TO TRADITIONAL MODELS?

*László Rajka – Zoltán Pollák*

A new generation of credit risk management models has surfaced as a result of the technology revolution marked with artificial intelligence, which in short is a term for models based on machine learning. Expert systems represented the past in the development of credit risk models over some decades, while traditional statistical models, e.g., logistic regression are the present and machine learning methods are expected to be the future. The objective of this study is to describe and empirically analyse the classification algorithm XGBoost, one of the most promising examples of the latter machine learning models to reveal the degree of increase in efficiency machine learning algorithms can achieve compared to the traditional modelling methods currently regarded to be industrial best practice. In our study, both Artificial Neural Network (ANN) and XGBoost, models relying on artificial intelligence, have surpassed logistic regression in terms of efficiency of classification. Although machine learning methods have an excellent capability of prediction, the interpretation of decision-making models they offer is quite cumbersome compared to their traditional peers, which is a disadvantage. Because of the “black box nature” of machine learning methods based on artificial intelligence, banks are currently limited regarding their application. Therefore, the authors propose the current rules and guidelines corresponding to the traditional models should be reviewed so as to give way to banks for the application of machine learning models and, as a result, to improve the efficiency of their credit risk management.

*JEL codes:* C13, C25, C51, C53, C58, G21

*Keywords:* artificial intelligence, machine learning, application scoring, XGBoost, logistic regression, probability of default

## COMPARISON OF BOOSTING AND RANDOM FOREST MODELS IN FORECASTING BANK FAILURES

### *Revisiting the 2008 financial crisis from a supervisory perspective*

*Safa Sen*

This research paper delivers an exhaustive analysis of predictive models for bank failures, a subject of paramount importance for economic stability. Using a dataset from the Federal Deposit Insurance Corporation (FDIC), the study examines 950 banking institutions, including 60 that succumbed to the 2008 financial crisis. The paper employs binary classification analysis using 26 CAMEL ratios and compares boosting algorithms with the Random Forest model family. In classifying non-failed banks, Random Forest variations notably outperform boosting algorithms, achieving a 97% accuracy rate in correctly classified instances, with the Regularized Random Forest model showing exceptional precision with a rate of 0.988. In the context of predicting failed banks, the Random Forest models, particularly the regularized variant, demonstrate a strong capability for accurately identifying true failures. These findings corroborate the efficacy of Random Forest models in predicting bank failures precisely and reliably, highlighting their critical role in reducing false positives and negatives, which is essential for robust forecasting in the banking sector.

*JEL codes:* C45, C53, G12, G17

*Keywords:* machine learning models, banking failure, off-site monitoring, CSForest, XGBoost

## DIGITAL READINESS AND ECONOMIC GROWTH

### *Analyzing the Impact of DESI Scores on GDP in European Countries*

*Sara Almeida de Figueiredo*

This study investigates the relationship between digital readiness and economic growth within the European Union, employing the Digital Economy and Society Index (DESI) as a comprehensive metric to evaluate the impact of digital integration on economic indicators. Through a detailed analysis incorporating factors such as human capital, connectivity, digital technology integration, and digital public services, alongside control variables including industrial production, employment, inflation, and investment, the research offers a nuanced understanding of how digital readiness influences GDP growth across 22 European countries over a six-years period. The findings highlight the significant role of human

capital and technology integration in driving economic development, suggesting that investments in digital skills and business adoption of digital technologies are crucial for enhancing productivity and fostering innovation. Contrarily, digital public services showed a marginal negative association with GDP growth, indicating the need for optimization to fully realize their economic benefits. The results underscore the importance of strategic investments in digital readiness to leverage digitalization for sustainable economic growth, urging policymakers to consider both digital and traditional economic factors in their strategies. This research enriches the discourse on digital transformation's economic implications, offering insights for policymakers, economists, and business leaders to foster economic resilience and prosperity in the digital age. Nevertheless, it acknowledges limitations due to the recent inception of DESI scores since 2017, and the potential for delayed effects of digital public services investments on economic growth, highlighting the need for future studies with more extensive data to fully understand the long-term implications of digital readiness on economic development.

*JEL codes:* O30, C18, F63

*Keywords:* composite indicators, digital transformation, DESI, economic growth, sensitivity analysis

## **INSTITUTIONAL ISOMORPHISM IN ACCOUNTING INNOVATIONS**

### ***Experience in the public and corporate sectors***

*Balázs Tóth – Edit Lippai-Makra*

Accounting regulations and systems are subject to constant change. The evolution of accounting practices can be described as the outcome of different key factors. In this study, the authors examine two distinct areas of accounting, that of public sector accounting and of the corporate sector accounting using a neo institutional approach. The objective of the study is to present that, despite the differences of accounting in the two sectors, they can be examined within the same theoretical framework, and that different types of accounting innovation can be explained with institutional isomorphism. The research based on the relevant international and Hungarian literature indicates that certain groups of isomorphism can be observed in the diffusion of accounting practices. The normative one has proved to be the weakest and the coercive the strongest. It can also be concluded that in both public and corporate sector accounting innovations, the normative isomorphism emerges first, followed by the mimetic and finally the coercive one. As far as the authors are aware, this paper is the first of its kind

in Hungary inasmuch as it reviews the two accounting subsystems within a uniform theoretical framework.

*JEL codes:* M40, M48

*Keywords:* isomorphism, public sector, public management, non-financial reporting

### **BOOK REVIEW**

Györffy, Dóra – Benczes, István – Rosta, Miklós (eds.) (2024): *Economics and Economic Policy. Studies to celebrate Csaba, László's 70th birthday*. Budapest: Akadémiai Kiadó, 262. p. (Mária Dunavölgyi)