

ECONOMIC CONSEQUENCES OF DIGITALIZATION IN COMPANIES

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Abstract. Digitalization has emerged as a significant force in reshaping the economic landscape of companies worldwide, while its benefits are not uniformly distributed across different firm sizes and regions. This paper investigates the economic consequences of digital transformation by using open-access datasets from the OECD, World Bank, and Eurostat. Using a streamlined, quantitative research design, we employ secondary data to examine key indicators such as ICT access and usage by businesses, ICT investment as a share of GDP, and ICT growth rates across countries. Data analysis is conducted using Excel and Python, enabling us to perform descriptive statistics, correlation assessments, and regression analyses to test the hypothesis of an inverted U-shaped relationship between digitalization intensity and firm performance.

Our findings indicate that higher digital adoption and increased ICT investment are generally associated with improved economic performance. However, knowing that variability exists: firms in regions with robust digital infrastructures tend to achieve superior outcomes, whereas those in areas with lower ICT growth risk falling behind, thus exacerbating economic inequalities. These results underscore the critical role of targeted policy interventions and strategic firm-level initiatives to ensure that the benefits of digitalization are equitably distributed.

Index Terms- economics, technology, firms, ict

Аннотация. Цифровизация стала значительной силой в изменении экономического ландшафта компаний по всему миру, в то время как ее преимущества неравномерно распределены между разными размерами компаний и регионами. В этой статье изучаются экономические последствия цифровой трансформации с использованием наборов данных с открытым доступом от OECD, Всемирного банка и Евростата. Используя оптимизированный количественный дизайн исследования, мы используем вторичные данные для изучения ключевых показателей, таких как доступ и использование ИКТ предприятиями, инвестиции в ИКТ как доля ВВП и темпы роста ИКТ в разных странах. Анализ данных проводится с использованием Excel и Python, что позволяет нам выполнять описательную статистику, оценки корреляции и регрессионный анализ для проверки гипотезы о перевернутой U-образной связи между интенсивностью цифровизации и эффективностью компаний.

Наши результаты показывают, что более высокое цифровое внедрение и увеличение инвестиций в ИКТ, как правило, связаны с улучшением экономических показателей. Однако, зная, что существует изменчивость: компании в регионах с надежной цифровой инфраструктурой, как правило, достигают превосходных результатов, тогда как компании в областях с более низким ростом ИКТ рискуют отстать, тем самым усугубляя экономическое неравенство. Эти результаты подчеркивают важную роль целенаправленных политических вмешательств и стратегических инициатив на уровне фирм для обеспечения справедливого распределения преимуществ цифровизации.

Ключевые слова: экономика, технологии, фирмы, ИКТ

INTRODUCTION

In the modern era, digitalization has become a main reason of economic and business transformation. Companies over the world are busy with integrating digital

technologies to enhance efficiency, improve decision making, and consequently remain competitive in the world of fast-paced evolution of IT. Starting from automation of basic processes to the AI-integration and cloud computing technologies evolved how business processes are defined in the modern era.

Digitalization impact is cannot be understated. It brings to business benefits such as a different level of productivity, reducing costs and growing revenue. Integration of artificial intelligence performs variety of operations by itself, minimizing manual human-involvement and minimizing extra costs. Businesses also may include digital platforms, leading to expansion into global markets and making possible to reach wider audience with lower budget constraints. Additionally, data analytic systems usage might help to make informed decisions, optimize production supply, and improve customer satisfaction. The involvement of innovative business models, for example fintech solutions, further contributes to financial growth and market competitiveness.

Despite high level of benefits, digitalization process contains several challenges for businesses. One of the primary complications is cybersecurity, as increased reliance on digital systems makes companies vulnerable to data hacks and cyberattacks. Furthermore, automation and AI-integrations may lead to job displacements, requiring employees to adapt by changing skill-range and upskilling. The starting investment in digital transformation can also be costly, especially for medium-sized enterprises and smaller ones (SMEs). Moreover, the need for regular update and upgrades of technologies in order to remain competitive, leads to ongoing maintenance and continues expenses. Regulatory and ethical concerns around data privacy, intellectual property, and compliance with digital laws adds another layer of difficulty to digitalization efforts.

The primary goal of the paper is to examine the economic consequences of digitalization across diverse types of companies, with a special emphasis on whether digital renovation delivers uniform benefits or deepens economic gaps between large corporations and small and medium-sized enterprises (SMEs). Particularly, the study investigates whether the rapid adoption of new technologies an unfair playing field, enabling digital-first firms to secure a competitive position while leaving many SMEs struggling to keep pace. By overall insights from recent academic researches, industry reports, and policy analyses, this paper aims to bridge the gap in the literature regarding the relationship between digitalization and economic inequality among firms. Overall, our analyses seek to provide a deep understanding of the digital divide in the business landscape and offer innovative policy recommendations to foster a more inclusive digital economy.

LITERATURE REVIEW

The literature on digitalization reveals landscape where its economic benefits – such as enhanced productivity, cost reductions, and expected market reach – are frequently marked. Numerous OECD reports underscore how digital tools enable companies, specifically SMEs, to streamline operations and freely access global markets [1]ⁱ. These studies, however, also highlight significant problems: the high costs of advanced technologies, cybersecurity risks, and the continuous need for operational development. While digitalization can give efficient gains, it has inevitable issues together, and addressing them often requires a careful balance between investment and return.

A growing body of research has begun to explore the economic separation between large corporations and SMEs in the digital era. For instance, an article from El Pais documents how investments in artificial intelligence have widened the gap, with large firms substantially outpacing SMEs in adopting these technologies [2]ⁱⁱ. In

addition, studies such as “Digital driven success: digitalization effect on SME performance” reveal an inverted U-shaped relationship between digitalization and SME performance—showing that while initial investments in digitalization boost performance, over-digitalization may come with diminishing returns for budget-constrained firms [3]ⁱⁱⁱ. These studies suggest that the benefits of digitalization are not uniformly distributed, thereby deepening existing economic inequalities.

Further, the literature examines how digital transformation impacts carriage inward. Research focused on Chinese listed firms, for example, demonstrates that while digitalization may help narrow compensation gaps between management and non-management staff, simultaneously, it can widen the difference between high-skilled and low skilled workers [4]^{iv}. These researches combine with broader studies on digital inequality, which argue that the rewards of technologies advancement often increase to those with better access to capital and advanced skills [5]^v.

Theoretical frameworks such as the Resource-Based View (RBV) and the Technology-Organization-Environment (TOE) framework have been pivotal in analysis of these discussions. Addressing these gaps is ground to our study, which aims to contribute deep insights into the economic consequences of digitalization across different firm sizes.

METHODOLOGY

This study uses a streamlined, quantitative research design that leverages secondary, open-access datasets. Instead of conducting primary data collection from surveys or interviews, we rely on reliable public data sources—such as OECD, World Bank, and Eurostat—to provide comprehensive measures of digitalization intensity and economic performance across firms. These datasets include indicators such as digital investment ratios, technology adoption scores, sales revenue, and return on

investment, along with key control variables like firms' size, industry type, and geographical region.

Data analysis will be executed using accessible tools such as Excel and Python. Excel will be used for initial cleaning, descriptive statistics, and generating basic graphs, while Python (employing libraries like Pandas, Matplotlib, and Statsmodels) will provide more advanced statistical analyses.

A. Variables and Measurement

In our analysis, the dependent variable is economic performance, which we operationalize using indicators such as annual sales revenue, return on investment (ROI), profit margins, and market share. The independent variable, digitalization intensity, is measured by proxies such as the percentage of digital investments related to total revenue and technology factors available in the open datasets. Furthermore, we control variables—firm size, firm age, industry type, and geographical region—to isolate the effect of digitalization. However, in some cases, our datasets may not include measures for moderating factors like digital technology-business alignment or external social capital, we solve it by using available indices or derived metrics where possible.

B. Data Analysis Procedure

We begin by importing the open-access datasets into Excel and Python. We use Excel and Python's Pandas library to compute descriptive statistics (mean, median, standard deviation, and others) for all key variables. Basic graphs—including histograms and box plots—are generated using Excel and Python's Matplotlib/Seaborn libraries to visualize the distribution of digitalization intensity, economic performance indicators, and control variables.

This systematic procedure ensures that our analyses is both precise and transparent, providing clear insights into how digitalization impacts economic performance across firms.

ANALYSIS AND DISCUSSION

A. ICT Access and Usage by Businesses

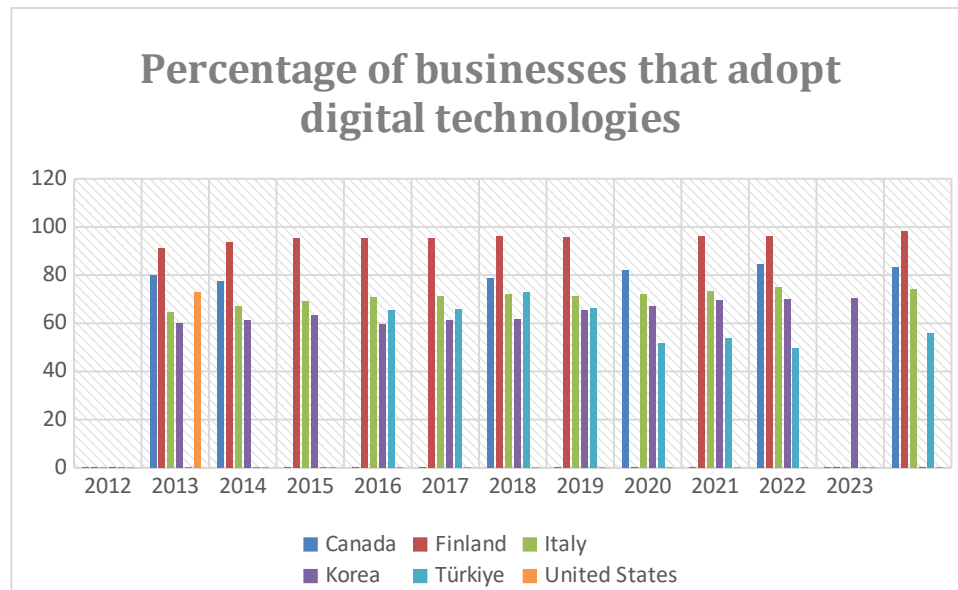


Figure 1: "Percentage of businesses that adopt digital technologies," source: OECD, 2023^{vi}

As given in the Figure 1, the percentage of businesses that adopt digital technologies varies significantly across different countries over the 2012-2023 period. Actually, Korea and Finland placed consistently higher rates of digital adoption, suggesting a more digital infrastructure and potentially greater institutional support. While, some countries such as Türkiye display relatively lower adoption rates, highlighting potential barriers such as skill gaps, regulatory challenges, or limited access to advanced digital tools and opportunities that lead to losses in effectiveness.

From a macroeconomic perspective, these differences in ICT usage can translate into uneven competitive advantages for specific firms which are based on highly

digitalized markets. Therefore, companies in nations with strong digital technologies adoption may experience faster productivity gains and more effective revenue growth, thus widening the economic difference between high and low-adoption regions.

B. ICT Investment as a Share of GDP

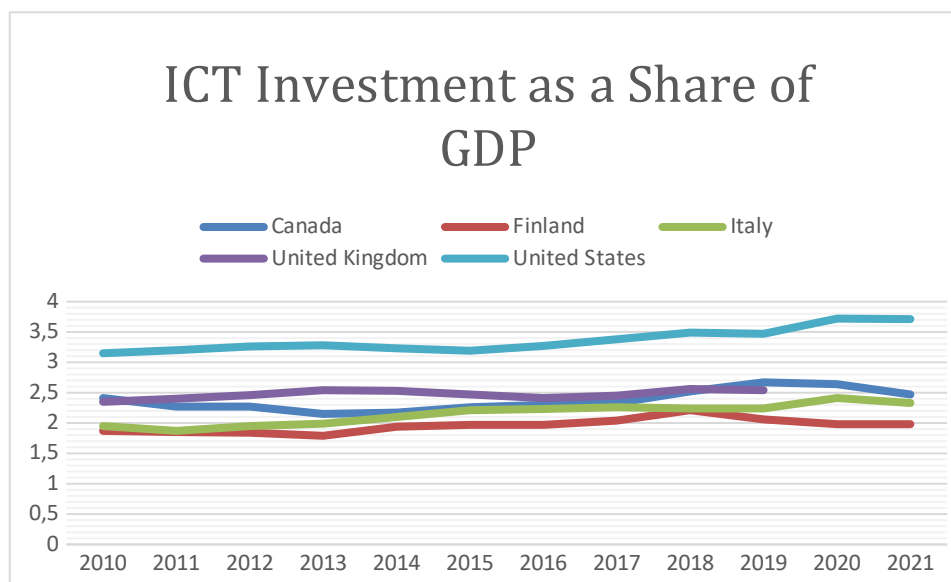


Figure 2: "ICT Investment as a Share of GDP," source: World Bank, 2022^{vii}

Figure 2 shows the trend in ICT investment as a percentage of GDP from 2010 to 2021 for selected countries, including **Canada, Finland, Italy, United Kingdom, and United States**. In this period, we can observe an overall upward change in ICT investment for most of these economies, although the rate of increase differs substantially. As example, Canada and the United Kingdom can be used to show a more pronounced rise, suggesting a strong policy emphasis on technological infrastructure and innovation.

The greater investment is, the more it correlates with enhanced digital infrastructure, which can make possible for firm to automate processes – easier, engage in e-commerce – more comfortable, and integrate advanced analytics – more informative. This macro-level investment context sets the stage for businesses—particularly SMEs—to leverage digital tools more efficiently. While, insufficient and

declining ICT investment in the national level may hinder firms from keeping up with technological advancements.

B. ICT Growth Rates Vary Markedly Across Countries

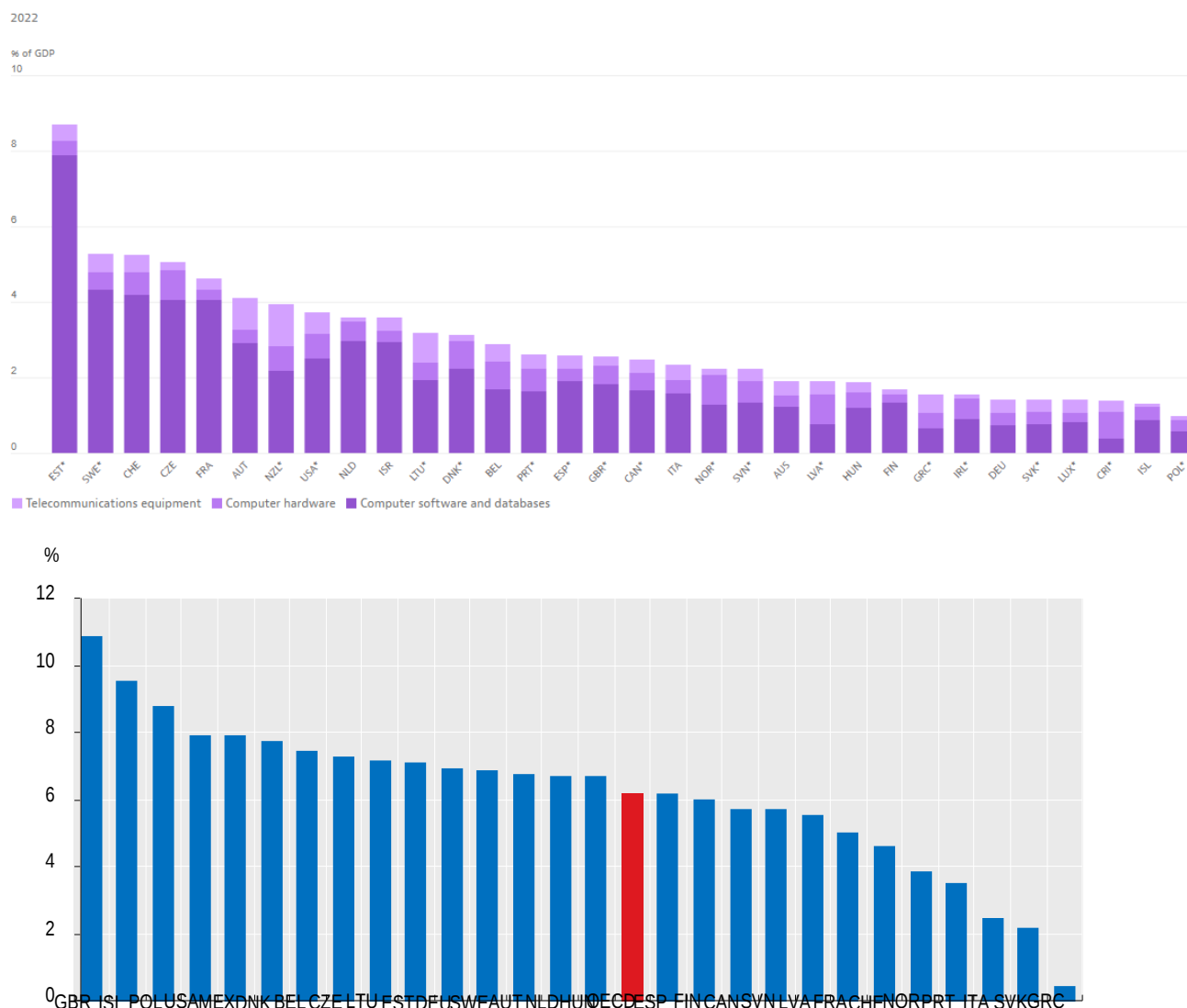


Figure 3: "ICT growth rates vary markedly across countries," source: Eurostat, 2023^{viii}

Finally, **Figure 3** demonstrates the variability in ICT growth rates across a broader set of countries. We see leading nations like **GBR (Great Britain)** and **ISL (Iceland)** at the higher end of ICT growth, while others such as **ITA** and **SVN** are positioned toward the lower end. This difference underscores that digitalization processes are far from uniform and that country-specific factors—such as policy

frameworks, workforce skills, and cultural acceptance of new technologies—play pivotal roles.

Such diversity can have significant implications for firms' economic performance during work. Businesses operating in high-growth ICT environments may benefit from a robust ecosystem of technology suppliers, skilled labor, and supportive regulations. Conversely, firms in slower-growth contexts might struggle to access cutting-edge tools, hampering their competitive potential. These the findings in the existing literature emphasize the importance of digital readiness at the national and regional levels for firm-level success.

D. Synthesis of Findings

Taken together all pieces, our three figures illustrate key aspects of our central argument: while digitalization can drive substantial economic benefits for firms, it also presents challenges and inequalities. Meanwhile, high ICT adoption rates and investment shares appear closely linked to improved performance results, however, many firms—especially those in regions with lower digital growth—risk being left behind. This phenomenon aligns with our earlier theoretical framework, suggesting a possible non-linear (inverted U-shaped) relationship between digitalization and performance when considering constraints like skill gaps, resource limitations, or uneven policy support.

CONCLUSION

This study was to explore the economic consequences of digitalization in companies, paying special attention to how varying levels of ICT investment and adoption can widen or reduce the gap between different types of businesses and regions. Drawing on open-access datasets from OECD, World Bank, and Eurostat, our analysis revealed that higher levels of digital adoption and investment typically correlate with improved firm performance. At the same time, the findings show that these benefits are not distributed uniformly, creating a risk of deepening divides both

between countries and between large corporations and SMEs.

In particular, companies in regions with robust ICT infrastructure and strong policy support appear better positioned to leverage digital tools for competitive advantage. Conversely, firms in lower-growth ICT environments or those facing limited resources—often SMEs—risk being left behind, reinforcing existing economic inequalities. These outcomes align with prior literature, which suggests that while digitalization can lead to substantial productivity gains, it can also worsen structural barriers for businesses lacking the necessary capital, skills, or institutional support.

From a policy standpoint, the evidence highlights the importance of targeted interventions. Governments and international organizations may need to provide incentives, training programs, or subsidized digital services to help SMEs and less digitally mature regions catch up. At the firm level, strategic collaboration with technology providers, upskilling employees, and carefully pacing digital investments can mitigate some of the risks of under- or over-investment in new technologies.

Overall, this research reaffirms that digital transformation is both a significant driver of economic growth and a potential source of inequality. Future studies could delve deeper into firm-level data, explore moderating factors such as workforce capabilities, or compare sector-specific outcomes. By continuing to refine our understanding of digitalization's multifaceted impacts, policymakers and business leaders can develop strategies that foster inclusive and sustainable digital growth.

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