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Corporate investment in artificial intelligence: The role of GDP, ICT exports, and patents

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Abstract

Aim/purpose – Despite the widespread use of artificial intelligence (AI) in fields as diverse as finance, healthcare, and education, little is known about the factors motivating its financing. This study investigates the drivers influencing corporate investment in AI using global data from 2013 to 2022, focusing on the relationship between GDP growth, ICT goods exports, AI patent applications (AIPA), and regulatory quality with corporate AI investments.

Design/methodology/approach – Descriptive statistics and the ordinary least squares method were employed to analyze aggregated global data, identifying patterns and relationships among the factors influencing corporate AI investment.

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Findings – The findings reveal a significant positive relationship between GDP growth, ICT goods exports, AIPA, and corporate AI investments. Conversely, the relationship between corporate AI investment and regulatory quality was negative but not statistically significant. Thus, the key findings of our study suggest that economic growth, AI patents, and technological advancements are key drivers of corporate AI investment.
Research implications – The study suggests policymakers should prioritize national economic growth, enhance the IT ecosystem by promoting ICT goods exports, and encourage innovation through AI patents. Collaboration with legislators is essential to develop balanced AI regulations that minimize negative impacts on corporate AI financing. By strategically aligning AI investments with favorable economic conditions, businesses can drive sustainable growth, respond to evolving market demands effectively, and secure long-term financial stability.
Originality/value/contribution – The existing literature contains information about the current state and the potential of corporate AI investment for the economic development of the world and a specific nation. This study tries to explore the key determinants influencing corporate AI investment to obtain a comprehensive understanding of this industry for economic growth.

Keywords: artificial intelligence, AI, corporate AI investment, GDP, ICT, regulatory quality.
JEL Classification: F30, F62, F63, F65.

1. Introduction

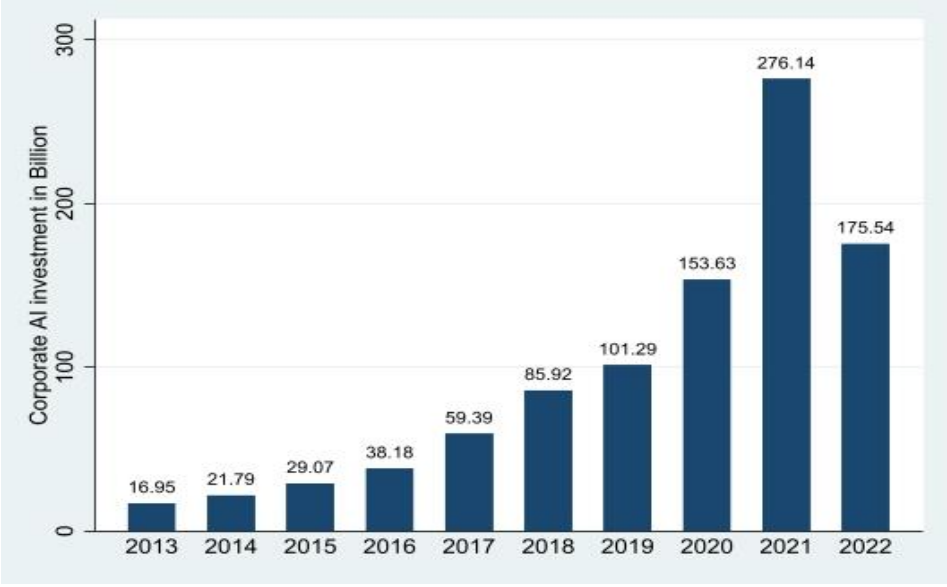
Artificial intelligence (AI) is the general term for machines built to think and learn like humans, simulating human intelligence and capable of activities that generally require human intelligence, such as decision-making (Al-Amin et al., 2024; Slimi, 2023). AI has recently emerged as a revolutionary force in the rapidly evolving fields of business and technology. It has transformed investment processes, questioned traditional knowledge, and enabled firms to reach unprecedented levels (Cao, 2023; Deloitte, 2019). AI has become one of the leading forces behind the 21st century's economic expansion, and it can increase labor productivity, reduce costs, create new employment, and enhance a nation's overall competitiveness (Gondauri & Batiashvili, 2023). According to a report by Thormundsson (2024), the global AI market is experiencing rapid growth, and it is projected to be over USD 200 billion as of 2023. It is expected to proliferate, reaching over USD 1.8 trillion by 2030, and corporate entities provide the bulk of this substantial investment.

Corporate AI investment describes the financial resources businesses designate apart for developing, adopting, and applying AI technology. Corporations' investment in AI has experienced significant expansion in the last decade (Montanaro et al., 2024). This upward trend is represented by the bar graph below in Figure 1.

In the graph, the *y*-axis corresponds to the amount of billion US dollars corporations invested in AI. Meanwhile, the *x*-axis contains the years spanning from 2013 to 2022, showing the progression of corporate AI investments over time.

The investment chart demonstrates a consistent upward trend from 2013 to 2017, with values increasing from 16.95 billion USD to 59.39 billion USD. During this period, corporations began acknowledging the potential of AI applications, which drove further investments.

Figure 1. Global corporate AI investment in billion US dollars



Source: Authors' own calculation based on data from AI Index Report 2023 (Stanford University, 2023).

The constant increase in annual figures reflects the corporate sector's expanding interest in and recognition of the significance of AI. The point of inflection is observed about 2017, beyond which the pace of growth experiences a substantial acceleration. In 2019, the total company investment in AI amounted to 101.29 billion USD. By 2020, the value of this investment had significantly increased, reaching a total of 153.63 billion USD. This expansion is attributable, in part, to developments in computer vision, natural language processing, and machine learning (Kelly et al., 2018; Martinelli et al., 2021). Businesses initiated the implementation of AI solutions in various fields, including customer service chatbots (Bernazzani Barron, 2023) and predictive analytics (Smutny & Schreiberova, 2020). In 2021, corporate AI investment reached its pinnacle point ever, surpassing all preceding years.

There are a number of reasons for this upsurge, including strategic imperatives: companies are emphasizing AI-driven innovation as a means to achieve a competitive edge. Sectors such as fintech, healthcare, and e-commerce spend a lot of money on AI to improve productivity and the consumer experience (Szczepański 2019). For Research and Development (R&D) purposes, firms invest heavily in AI research, which leads to groundbreaking discoveries. The remarkable spike was likely triggered by heightened interest in technological solutions during the peak of the COVID-19 epidemic (UNCTAD, 2021). In 2022, there was a decrease in investment levels compared to the previous year, with a 36 percent decline in both private and merger investments (Thormundsson, 2023). Moving ahead, the future will be shaped by ongoing investment and the proper use of AI.

AI has the potential to enhance the current workforce and resources while enhancing worker productivity, and almost all industries can benefit from AI's ability to foster innovation (He, 2019). Various corporations are focusing on adopting AI and spending a significant amount of money on this process. However, investors must consider the risk and reward dynamics before investing heavily in AI technologies (Geczy, 2023) because AI may replace human labor in the near future, which could raise social risk in many countries.

Major corporate firms have invested substantially in AI R&D, reflecting their commitment to advancing this transformative technology. For instance, Google has invested nearly 8.6 billion USD in AI acquisitions since 1998 (Krauth, 2018). This includes a significant investment of 2.6 billion USD in Anthropic in 2023 (CB Insights, 2024). In addition to acquisitions, Google has announced a 120 million USD global AI Opportunity Fund to support AI education and training worldwide (Ha, 2024). The company's strategic initiatives around generative AI, cybersecurity, and collaboration technologies further underscore its dedication to advancing AI technologies (Haranas, 2024).

Microsoft has also emerged as a major player in the AI landscape, committing to a 30 billion USD fund in partnership with BlackRock to develop AI infrastructure (Williams, 2024). This partnership, known as the Global AI Infrastructure Investment Partnership (GAIIP), aims to mobilize up to 100 billion USD in total investment potential, with an initial target of raising 30 billion USD in private equity capital (BlackRock, 2024). Additionally, Microsoft has made a notable 1 billion USD investment in OpenAI to support the development of artificial general intelligence (AGI) (Brockman, 2019). In 2024, the company continued to invest heavily in AI, mainly through strategic partnerships and infrastructure development, including a 1.5 billion USD investment in Abu Dhabi's G42 to accelerate AI development and global expansion (Microsoft Source, 2024).

Amazon's contributions to AI development are equally significant. The company has entered into a 25 million USD, 10 years of research collaboration with the University of Washington, the University of Tsukuba, and NVIDIA (Amazon Staff, 2024b). Moreover, Amazon has invested $4 billion in Anthropic to advance generative AI (Amazon Staff, 2024a) and has committed 230 million USD to support generative AI startups through its Amazon Web Services (AWS) Generative AI Accelerator program (Wiggers, 2024). These investments highlight Amazon's strategic focus on enhancing AI capabilities and fostering innovation within the AI ecosystem.

Furthermore, NVIDIA, a leader in AI hardware and software, allocated 8.675 billion USD to R&D in 2024 alone, representing an 18.2% increase compared to 2023 (Macrotrends, 2024). The company continues to invest through its venture capital arm, NVentures (Archibald, 2023). These substantial investments underscore the strategic importance of AI for these corporations, driving innovation and maintaining their competitive edge in the rapidly evolving technology landscape.

Moreover, apart from these major firms, several other companies have made significant investments in AI, contributing to the overall growth of the AI industry. For example, intel invested 1.5 billion USD in AI R&D, focusing on innovations in AI hardware and software (Zhukov, 2024). IBM committed 2 billion USD towards AI-driven solutions, mainly targeting the healthcare and financial services sector (Maslej et al., 2024). Oracle has also made a noteworthy investment of 1 billion USD to enhance its AI capabilities within its cloud services (Terzinski, 2024). Additionally, Salesforce allocated USD 750 million to integrate AI into its customer relationship management (CRM) platforms (Shalwa, 2024).

These combined investments from prominent companies highlight AI's essential role in influencing the future of technology and driving innovation across diverse sectors.

To the best of our knowledge, this is the first study to explore the drivers of corporate AI investment, aiming to shed light on the determinants of the emerging field of corporate AI investment. Investors, scholars, regulators, and corporate executives are vested in thoroughly understanding these factors. The study's findings can inform choices, policies, and tactics that encourage using and investing in AI, boosting economic development and technical progress. These findings can help policymakers create growth-and competitiveness-boosting economic policies. To stay competitive in the global market, companies may use this information to determine whether it is financially beneficial to invest in AI and then use that information to make educated investment decisions. Using these data to direct R&D, we can create an atmosphere that encourages new

ideas to flourish in AI. Those looking to invest in AI-related technologies would do well to familiarize themselves with the relationship between technical progress and AI investments. With this data, lawmakers can craft fair legislative regimes that promote AI use without jeopardizing public safety.

The remainder of the paper is presented as follows. Section 2 summarizes the existing literature. Section 3 shows the methodology. Results are discussed in Section 4, and concluding remarks with policy implications are in Section 5.

2. Literature review

The term AI first used by John McCarthy in 1956 (Anyoha, 2017), had been investigated in the 1890s by many renowned scientists, including Nikola Tesla (Ratner, 2016) and, in 1950 by Allan Turing (1950), is the idea that machines can think and use knowledge. However, the introduction of ChatGPT in November 2022 by American tech giant OpenAI marked the most significant advancement in AI, and there was a rapid reaction among people worldwide. Within five days of its launch, over 1 million people had signed up, and within three months, over 100 million (De Silva et al., 2024). According to Guleria et al. (2023), the development of AI has created numerous opportunities to make human labor less difficult, and there are AI applications for practically every aspect of our lives.

In the case of the financial sector, corporate AI investment is increasing day by day and strengthening the economics of the world as a whole; for instance, a report by Goldman Sachs (2024) predicted that, over ten years, the development of AI technologies might boost productivity growth by 1.5 percentage points and raise the world GDP by 7%, or about 7 trillion USD. Additionally, in their study, Cuntz et al. (2024) demonstrated a significant rise in corporate AI investment from USD 12.75 billion in 2015 to USD 91.9 billion in 2022, with an expectation that these expenditures will yield more profit in the near future and anticipated that the global AI market will grow twentyfold. Similarly, AI could increase global GDP by up to 14% by 2030, or an extra 15.7 trillion USD and China and North America are anticipated to benefit the most, with their GDPs expected to rise by up to 26% and 14%, respectively (Rao & Verweij, 2017). However, findings from a study by Lui et al. (2022) implied that most corporations' announcements of AI investments are viewed by investors as adverse news and decrease the value of the firm (Bose et al., 2011), which could ultimately reduce the total Gross Domestic Product (GDP) of a nation.

Additionally, Yoon (2019) investigated the effects of ICT goods export and import on the economic development of 13 Asia pacific countries and stated that exports of ICT goods have an insignificant but favorable impact on growth and

countries like China showing progress in exporting ICT goods in different parts of the world; however, specific rules must be followed to ensure the rights of their citizens (Luong et al., 2023). However, according to Rahman et al. (2021), who examined the impact of ICT investment and diffusion on Pakistan's economic development, these investments can speed up the export of ICT goods and increase a nation's economic growth. At the same time, many businesses believed that investing in AI could provide them a competitive advantage over their rivals (Horani et al., 2023).

Furthermore, technical innovation's future is being shaped by the convergence of AI investment and patent applications. However, businesses must carefully navigate this environment to protect their AI-related inventions. Igna and Venturini (2023) looked into the characteristics of European organizations that innovate in AI and the elements that promote productivity, and the results indicate that the patent productivity of AI companies has been higher for those with a more considerable research effort, as determined by the AI creative team. The study conducted by Gonzales (2023) concluded that patenting AI has a significant and favorable effect on average long-term economic growth and compared to other types of patents, ICT patents have a more substantial impact on economic growth (Nguyen & Doytch, 2022). AI patent applications (AIPA) are significantly impacted by the rise in corporate investment in AI as companies seek to safeguard their AI achievements and gain a competitive edge. However, an empirical analysis by Vijayakumar (2021) recommended that while developing economic policies, authorities should consider the effects of AI-related advances and investments both immediately and in years to come.

Moreover, as per Chittipaka et al. (2023), the norms and guidelines created by governments to oversee and control the application of new technology are referred to as regulatory support. Government oversight and guidance are essential in governing the application and deployment of AI because it is an emerging technology (Nwafor, 2021). Pan et al. (2022) asserted that companies could perform better if local governments provided them with greater financial and technological assistance for their investments in the application of AI and growth. In another study, Chen et al. (2023) also found that the performance of AI adoption is strongly influenced by regulatory assistance. However, not all "deregulation" has the same effect on ICT investment; policies intended to increase ICT investment should instead focus on promoting service competition and eliminating the administrative burden on new businesses rather than undermining employment protection (Guerrieri et al., 2011). Finally, Bhuyan et al. (2021) suggested that various nations' governments must work together for their economic well--being because the downfall in one economy is affected by the other, as we experienced during the global financial crisis of 2008.

Additionally, Rani and Singh (2024) and Adeoye et al. (2024) noted that businesses increasingly integrate AI into financial management and sustainability efforts, driven by regulatory pressures and environmental activism. Furthermore, Devapitchai et al. (2024) observed that AI has transformed corporate investment planning by replacing traditional methods with advanced techniques like machine learning and deep learning. These AI tools are applied in areas such as risk management, portfolio optimization, and algorithmic trading, enhancing decision-making and driving technology-oriented decision-making. Moreover, Gounopoulos et al. (2024) underscored that AI is becoming central to corporate strategy, enabling companies to gain competitive advantages, improve efficiency, and adapt to market changes through data-driven decision-making and risk management, thereby emphasizing the need for investment in AI to continue this development across the globe and sectors.

However, as per Mou (2019), the expansion of AI in advanced and emerging economies and global AI investment has largely bypassed most emerging countries, except for China and India. This is due to inadequate infrastructure and underdeveloped industries in emerging markets. Apart from that, Luong et al. (2021) revealed that top global defense companies show limited investment in privately held AI firms, with corporate venture capital (CVC) fostering innovation in AI. U.S.-based AI companies arethe primary focus of these investments, reflecting the strategic importance of AI in defense and national security.

Overall, from an extensive review of existing literature, we explored that most contemporary studies contain information about the current state and the potential of corporate AI investment for the economic development of the world and a specific nation. Some other articles also tried to investigate the opportunities that lie in the export of ICT goods by investing heavily in AI technologies and the initiatives that the government of a nation must take to ensure that AI-related companies follow specific rules and regulations. However, a gap is also noticed as there is, thus far, no study in the global context about the determinants of corporate AI investment; more specifically, understanding the drivers that stimulate the financing pattern of corporate AI. Therefore, we wish to fill that gap by investigating the key determinants influencing corporate AI investment and developing the following hypothesis based on the above-discussed literature.

H1: GDP has a significant impact on corporate AI funding.

H2: ICT significantly affects corporate AI funding.

H3: AIPA have a significant impact on corporate AI funding.

H4: Regulatory quality significantly affects corporate AI funding.

This study is significant as it addresses a critical gap in understanding the determinants of corporate AI investment, which has been largely overlooked in the existing literature. By identifying the key drivers influencing financing patterns, the study provides valuable insights for policymakers, industry leaders, and investors to promote sustainable growth in AI-related businesses.

3. Methodology

The methodology section of this study presents the necessary facts and explanations to establish this study's validity. We employ the Ordinary Least Squares (OLS) method to determine how GDP, ICT goods export, AIPA, and regulatory quality affect corporate AI investment. The OLS model is used here since it is a fundamental technique in regression research, and we have aggregated global data on corporate AI investment from 2013 to 2022. OLS is easy to compute, has interpretability, is simple, and has optimal features. Its significance in statistical modeling has been further cemented by its vast development of diagnostic and extension procedures and its pervasive application.

3.1. Variables

For our investigation, we considered corporate AI investment and per capita corporate AI investment as dependent variables. Meanwhile, GDP, GDP per capita (GDPPC), ICT goods exports, AI patent application, and regulatory quality remain the independent variables. We selected these variables for our study due to their significant impact on corporate AI investment. First, corporate AI investment is the total amount of investment in the AI field by large corporate firms. Per capita corporate AI investment is companies' per capita investment in AI technology, which is important because it shows how AI is being invested in relation to countries' populations or workforce. This measurement might indicate how well resources are being used for technology. GDP might also be vital, as it indicates a nation's economic capacity, which might directly influence companies' ability to invest in sophisticated technologies like AI. A growing GDP signifies market demand and available financial resources, making it a key determinant in corporate AI investment. Besides, ICT goods exports might be significant as they could demonstrate a country's technological advancement and global competitiveness, which could drive demand for AI technologies. Moreover, AIPA might be an essential variable reflecting a nation's innovation and

technological development capacity. A higher volume of AI patents might indicate active R&D efforts, attracting further investment by showcasing the potential for new, cutting-edge AI technologies. Finally, regulatory quality might also play a critical role as it could impact the stability and predictability of the business environment. Strong regulatory frameworks could promote AI investments by offering stability and clarity. When regulations are clear, businesses might face fewer uncertainties. However, regulations that are too strict or unclear could raise compliance costs and discourage companies from investing. The list of variables, their description, and measurement scale are represented in Table 1 below.

Table 1. Variable's description and measurement

Variables	Symbols	Description	Measurement scale
Corporate AI investment	CAII	Amount of money and other resources businesses allocate to research, implement, and incorporate AI technology into their operations	US dollar
Per capita corporate AI investment	CAIIPC	Companies' per capita investment in AI technology	US dollar
Gross domestic product	GDP	Monetary worth of all products and services produced inside the boundaries of a nation over a year	US dollar
Per capita gross domestic product	GDPPC	Per capita monetary worth of all products and services produced inside the boundaries of a nation over a year	US dollar
ICT goods export	ICT	Items for export from the information and communication technology industry	Percentage of GDP
AI patent application	AIPA	The number of formal requests for exclusive rights to an AI invention	Unit
Regulatory quality	RQ	Government's capacity to make and enforce sensible laws promoting private sector growth, economic prosperity, and social welfare	−2.5 to 2.5

Source: Authors' own compilation.

3.2. Econometric model

We use linear Equation (1) and Equation (2) to determine the drivers of corporate AI investment, where Equation (1) is our baseline model, and Equation (2) is used to check the robustness of this study.

$$CAII_t = \alpha_t + \beta_1 GDP_t + \beta_2 ICT_t + \beta_3 AIPA_t + \beta_4 RQ_t + \varepsilon_t \quad (1)$$

$$CAIIPC_t = \alpha_t + \beta_1 GDPPC_t + \beta_2 ICT_t + \beta_3 AIPA_t + \beta_4 RQ_t + \varepsilon_t \quad (2)$$

Here, α is a constant term, β is the coefficient of each independent variable, and t indicates years. CAII denotes corporate AI investment, defining our dependent variable. In contrast, GDP, GDPPC, ICT, AIPA, and RQ refer to GDP, GDPPC, ICT goods export, AI patent application, and regulatory quality, respectively, representing independent variables.

3.3. Data

This study employs aggregated global data from 2013 to 2022. We aim to analyze the crucial elements (variables) influencing corporate AI investment. The corporate AI investment data are taken from the AI Index Report 2023, from Stanford University (2023), and the rest of the variables' data (e.g., GDP, GDPPC, ICT goods export, AI patent application (AIPA), and regulatory quality (RQ) are derived from the World Development Indicators (WDI, 2024).

3.4. Descriptive statistics

Table 2 shows the standard deviation, commonly used to measure the dispersion of values around the sample mean (Andrade, 2020), the mean, and the minimum and maximum value of each variable used in our study.

Table 2. Summary of key variables

Variables	Obs	Mean	Std. Dev.	Min	Max
CAII (billion USD)	10	95.79	83.76	16.95	276.10
CAIIPC (USD)	10	12.321	10.514	2.344	35.007
lnCAII	10	24.914	0.945	23.553	26.344
lnCAIIPC	10	2.161	0.913	0.852	3.556
GDP (trillion USD)	10	80.25	6.165	70.79	89.75
GDPPC (USD)	10	10533.41	483.498	9791.488	11287.15
lnGDP	10	32.013	0.077	31.891	32.128
lnGDPPC	10	9.261	0.046	9.189	9.331
ICT (% of GDP)	9	12.284	0.674	11.326	13.383
AIPA (Unit)	8	4.794	4.256	0.784	11.966
RQ (−2.5 to 2.5)	10	−0.08	0.009	−-0.097	−0.064

Source: Authors' own computations.

First, corporate AI investment has a wide range of investment amounts with a high standard deviation (83.76 billion USD), indicating significant variation among the funding with a minimum value of 16.95 billion USD and a maximum value of 276.10 billion USD. The mean value is approximately USD 95.79 bil-

lion, demonstrating the average corporate investment in the AI sector. Next, corporate AI investment per capita, with a mean value of 12.321 USD, indicates the average amount of money invested in AI, highlighting the typical AI investment per person. However, the minimum value is 2.344 USD, the maximum value is 35.007 USD for this variable, and the standard deviation is 10.514 USD. It suggests a substantial variation in the per capita investment. Moreover, the mean value of USD 80.25 trillion for the GDP illustrates the studied economic activities and their size with a standard deviation of USD 6.165 trillion, which implies some variability in GDP. However, that is moderate compared to the mean. The smallest GDP in the dataset is USD 70.79 trillion, and the largest is USD 89.75 trillion, reflecting a significant but not extreme range of economic sizes within the sample. However, the GDPPC has a mean of USD 10533.41, while its maximum and minimum values are USD 11287.15 and 9791.488, respectively. Finally, ICT and AIPA show some variation, with AIPA having a higher relative standard deviation (4.256), indicating more spread of AIPA. In contrast, the low standard deviation of regulatory quality (0.009) suggests that the regulatory quality scores are very close to each other, with minimal variation. Information about other variables is presented in Table 2.

Table 3. Normality test for selected variables

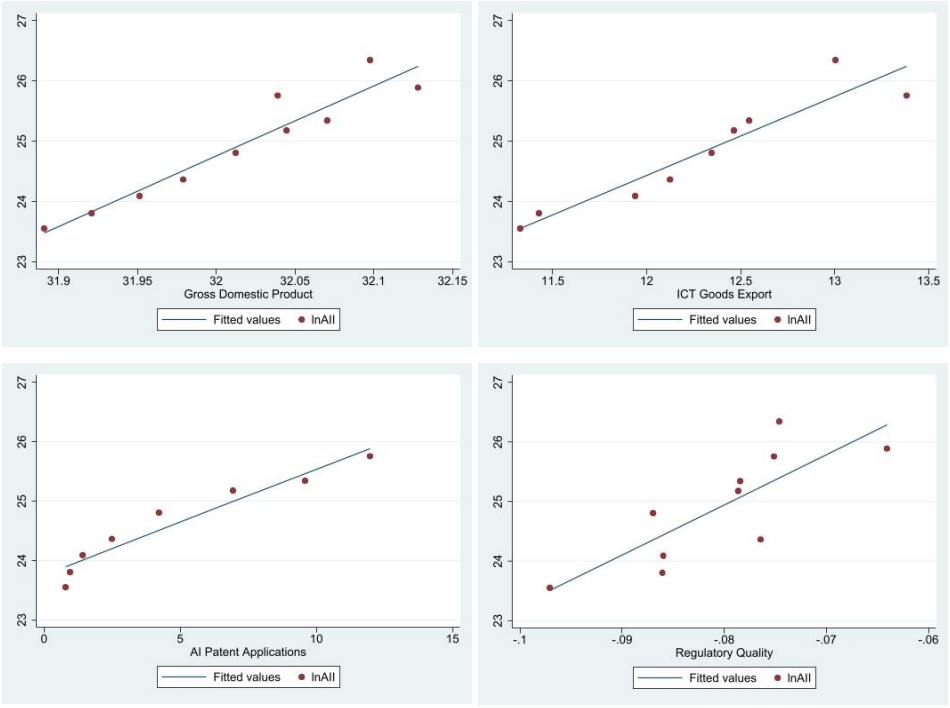
Variables	Obs	Pr(skewness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
lnCAII	10	0.993	0.270	1.39	0.500
lnCAIIPC	10	0.994	0.278	1.34	0.512
lnGDP	10	0.790	0.474	0.61	0.737
lnGDPPC	10	0.900	0.477	0.54	0.765
ICT	9	0.900	0.831	0.06	0.970
AIPA	8	0.293	0.586	1.62	0.445
RQ	10	0.858	0.473	0.57	0.753

Source: Authors' own computations.

We conducted a normality test to determine whether the sample data for our study came from a normally distributed population. The results of the normality tests are shown in Table 3, where the required variables have been transformed into natural logarithms. A substantial *p*-value (> 0.05) of all variables suggests that our variables are normally distributed and that the data does not vary significantly from the normality (Bhuyan et al., 2021).

The scatter diagrams in Figure 2 depict the two-way linear relationship between global corporate investment in AI and our independent variables, including GDP, export of ICT goods, AIPA, and regulatory quality. The independent variables are represented along the *x*-axis, whereas global corporate AI investments are denoted along the *y*-axis.

Figure 2. Scatter plots of global corporate AI investment with the study variables



Source: Authors' own calculation.

Each increment in the independent variables indicates an upward trend in corporate investments in AI, as depicted in Figure 2. Alternatively, increased corporate investment in AI correlates with higher values of ICT goods export, GDP, AIPA, and regulatory quality.

4. Results and discussions

This section shows and examines the regression results, highlighting major discoveries and their consequences. Table 4 summarizes the findings from two regression analyses, where the first one is our baseline model, and the second is used to test the robustness or sensitivity of our results. In the first model, we used corporate AI investment (lnCAII) as the dependent variable. In contrast, we used per capita corporate AI investment (lnCAIIPC) as the dependent variable in the second model. In both cases, the export of ICT goods (ICT), AIPA, and regulatory quality (RQ) were used as independent variables. Besides, GDP (lnGDP) and GDPPC (lnGDPPC) were also used as independent variables, where the former was used in the first model, and the latter was used for the second model.

In Table 4, we estimated each variable's coefficient value. Besides, the Variance Inflation Factor (VIF) examines the relationship between two or more explanatory (predictor) variables and whether they are correlated. High multicollinearity, indicated by a VIF greater than 10, can demonstrate that the variables strongly correlate with another variable, which could impact the stability and interpretability of the regression results (Akinwande et al., 2015). However, we did not find any noteworthy collinearity among the variables used in our study as the individual VIF value for each variable, and the mean VIF is less than 10. Therefore, we can assume that no significant collinearity exists among the independent variables used in our study.

Table 4. The regression results of the determinants of corporate AI and Per capita corporate AI investment

Indep. var	VIF	Baseline results: Dep var: lnCAII	VIF	Extended results: Dep var: lnCAIIPC
		Coef.		Coef.
lnGDP	8.99	4.87** (1.074)	–	–
lnGDPPC	–	–	2.99	5.762** (1.385)
ICT	8.51	0.45** (0.133)	8.93	0.521** (0.138)
AIPA	5.47	0.052* (0.02)	7.94	0.058* (0.020)
RQ	3.06	−2.591 (6.993)	2.97	−1.558 (7.154)
Constant	–	−137.11** (34.441)	–	−58.171** (13.215)
Mean VIF	6.51	–	5.71	–
Diagnostic test				
Test name		x^2		x^2
Breusch–Pagan/Cook Weisberg test		0.02		0.00
Breusch–Godfrey LM test		2.033		1.863
Jarque–Bera normality test		0.681		0.794

Notes: Significance level: ***1%, **5%, and *10%. Figures in () represent std. error.

Source: Authors' own computations.

The results of our baseline model show that the coefficient value of 4.87 indicates a positive relationship between GDP growth and corporate AI investment. When a nation's GDP increases by 1 percent, the corporate AI investment could increase by approximately 4.87%, holding other factors constant. The reason for such an increase may result from the increase in profit or revenues, and the financial resources available to a company enable it to invest heavily in AI technology (Vijayakumar, 2021). In addition, higher demand for AI solutions across various sectors can result from growth in GDP for improving productivity and enhancing customer experience (Gonzales, 2023). Moreover, increasing GDP may enable governments and businesses to work together to promote tech-

nical improvements through more public-private partnerships in AI development (Vijayakumar, 2021). Thus, when GDP rises, there is a positive chance for further innovation, productivity gains, and economic well-being.

Additionally, ICT goods export has a positive relationship with corporate AI investment, and a 1% increase in ICT goods export can increase corporate AI investment by nearly 0.45%. This is because when the export of ICT goods increases, a nation's economy experiences a boom (Yoon, 2019), and people become habituated to using technology, ultimately leading to an increase in investment in AI technology. Apart from that, the boost in ICT products does not violate employment protections and increase productivity (Guerrieri et al., 2011), so investment in the ICT sector for adopting AI is increasing. Thus, the export of ICT goods can significantly affect corporate AI investment. It can promote technology adoption, international collaboration, skills development, and the emergence of governmental priorities that support AI innovation and deployments.

Furthermore, AIPA positively and significantly relates to corporate AI investment. When AIPA increases by 1%, corporate AI investment increases by almost 0.052%. With patents, businesses can keep the exclusive rights to their inventions, prohibiting unauthorized use, production, or sale of the patented technology. By guaranteeing that companies can profit from their ideas, this protection incentivizes corporations to invest in AI (Igna & Venturini, 2023). Similarly, the rapid growth of AI patents is an obvious sign of the technology's increasing impact. It boosts a company's R&D efforts (Vijayakumar, 2021), which may help it differentiate its products and services from others in the marketplace. Moreover, patents encourage continuous R&D for new products by ensuring inventors are on the right track (Gonzales, 2023), and companies invest in patentable technologies to develop a virtuous circle of innovation and investment. Therefore, a rise in AIPA anticipates a dynamic and shifting corporate AI investment landscape marked by increased rivalry, incentives for innovation, chances for collaboration, challenges with the law, and prospects for market growth.

Finally, the relationship between corporate AI investment and regulatory quality is negative but not statistically significant. Regulatory quality might affect corporate AI investment negatively because strict regulation enforced by the government might act as a barrier to technological progress and innovation (Guerrieri et al., 2011), which could reduce the intention of corporate firms to invest in AI projects. At the same time, excessive concentration on policies to ensure the government's privacy and security might also negatively influence the adaptation of AI (Horani et al., 2023). Most importantly, various regulations initiated by the government might increase the cost of integrating AI in different sectors, which is a considerable concern for investors (Cuntz et al., 2024). These

costs might also create uncertainties that inhibit financial commitments, and this issue is particularly evident in emerging markets. Inconsistent or poorly developed regulations lead to a cautious attitude among investors (Mou, 2019). Gounopoulos et al. (2024) note that stringent regulatory environments create barriers to AI investment. These barriers include legal uncertainties and the risk of regulatory changes that threaten AI projects. Consequently, firms may hesitate to invest in regions with high regulatory demands (Luong et al., 2021). As a result, investors might face increased risk aversion and limited innovation, which hampers overall investment in AI initiatives.

However, when we used per capita corporate AI investment as our dependent variable instead of corporate AI investment, the extended result is also similar to the baseline result. The relationship between per capita corporate AI investment, GDPPC, ICT goods export, and AI patent application is statistically significant at various levels.

Table 4 also displays the outcomes of several diagnostic tests run on two regression models. These tests are essential for confirming the fundamental hypotheses of regression analysis and guaranteeing that the models generate accurate and interpretable results. The initial purpose of the Breusch–Pagan test is to identify hidden heterogeneities in the error terms (Hahn & Shi, 2021) and look for heteroscedasticity, which happens when the residuals' variance is not constant. From the Breusch–Pagan/Cook–Weisberg test (BP), we find both models' test statistics are insignificant at a 5% level, indicating no sign of heteroscedasticity in our study. In the same way, we conducted the Breusch–Godfrey LM test to determine if there is any serial correlation between the regression residuals. Here, the insignificant x^2 value suggests no autocorrelation in our models. Finally, we conducted the Jarque–Bera normality test to assess whether our dataset follows a normal distribution. The insignificant x^2 value of the Jarque–Bera normality test implies that the data of our study is normally distributed. The three diagnostic tests reveal that our data set is free from heteroscedasticity and autocorrelation, and it is normally distributed. These findings support the robustness and dependability of the study's regression models.

5. Conclusions, policy implications, and further research scope

AI is becoming a topic of discussion in global economic development and business operations. This new technology has recently witnessed remarkable popularity and can do things that require human intelligence. Corporations across the globe perceive this magnificent technology as an opportunity to accel-

erate their economic growth. They are investing heavily in AI technology to take advantage of it in the marketplace. Thus, this study aims to identify and analyze the key factors that impact corporations' decisions to invest in AI technology by exploring the determinants of corporate AI investment using aggregated global data from 2013 to 2022. The findings reveal a noteworthy correlation between the variables under investigation, highlighting the crucial roles of GDP, ICT goods export, AIPA, and regulatory quality in shaping corporate AI investment patterns. The critical findings of the study recognize that GDP growth is the main factor driving AI investment since it gives businesses the money they need and creates demand in the market for new technologies, consistent with Aghion et al. (2017) and Liu et al. (2023). The findings of this study suggest that policymakers should focus on fostering GDP growth through targeted incentives, as this directly stimulates corporate AI investment by providing necessary resources and market demand. Enhancing infrastructural support will encourage broader AI adoption across industries, driving sustainable economic development.

Similarly, when the export of ICT goods is on the upward trend in a nation, it also increases investment in AI tools to remain competitive. Governments should implement policies promoting ICT goods exports to boost corporate AI investment. This will strengthen the intellectual property (IP) framework to enhance patent quality, thereby incentivizing technological innovation. Furthermore, fostering collaboration between industry and research institutions can accelerate the development and commercialization of AI technologies, ensuring sustained competitiveness in the global market. Additionally, Corporate investment in AI is further encouraged by the quantity of AIPA, as raising the quality of patents stimulates investment in developing new technologies (Williams, 2017). Moreover, the amount of AIPA indicates a nation's technical innovation and advancement capacity. Overall, the study's findings highlight the significance of a comprehensive strategy in which economic, technological, and AI patent-related issues influence corporate AI investment decisions.

The domain of corporate AI investment determinants is relatively new, and our findings indicate a noteworthy correlation among the determined factors, highlighting the complex character of AI investment. These elements should be taken into account by company executives and policymakers to build ecosystems that promote AI investment and adoption. First, policymakers should strive to make a balanced regulatory framework that is stable, consistent, and transparent and protects public interests so businesses can confidently strategize long-term investments in AI. Second, corporations should work closely with policymakers to navigate regulatory landscapes. Third, companies should leverage AI investment's positive link with ICT exports. Integrating AI into their production pro-

cesses can boost the quality and competitiveness of their ICT goods, making them more desirable globally. Additionally, policymakers should encourage ICT exports through international collaboration and trade agreements and lowering trade barriers. Besides, protecting IP rights can incentivize firms to invest in AI innovation. Policymakers should foster AI investment, and governments should simplify the patent application process and provide incentives for high-quality patent submissions. Lastly, governments should establish a dedicated task force comprising industry stakeholders to effectively balance regulatory quality with promoting AI investment to facilitate ongoing dialogue. This collaboration will ensure that regulations remain adaptive to technological advancements while addressing public interest. Implementing a framework for regulation sandboxes would enable companies to test AI innovations in a controlled environment, fostering experimentation while protecting the public interest. Furthermore, governments should prioritize funding AI R&D initiatives to stimulate innovation. This approach will create a regulatory landscape that encourages investment while ensuring the responsible advancement of AI technologies.

The main pitfall of this study is the limited data. Our study is based on the aggregated global data collected from 2013 to 2022. Future research could concentrate on the determinants of AI by considering more extensive panel data to know the overall impact and analysis globally and from the individual country to understand the specific country's impact. Future studies should investigate these connections, including a wider variety of variables and analyzing their effects in different industries and geographical areas to offer a deeper understanding of the factors influencing corporate AI investment.

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