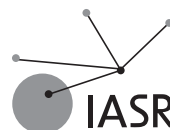




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Article

Artificial Intelligence Development and Sovereign Bond Ratings

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Abstract

Our research studies how Artificial Intelligence (AI) affects sovereign bond ratings. We expect that AI development has positive influences on domestic economic conditions, government effectiveness, and perceptions of government stability, resulting in higher bond ratings. Using sovereign bond ratings of 101 countries from 2020–2023, and including standard explanatory variables and controls for possible endogeneity, we discover that AI development supports higher bond ratings. Additionally, we incorporate robustness checks and use mediation analysis to identify the mechanisms connecting AI development and ratings. Our findings have important implications for understanding how AI development can influence capital costs for economies and governments now and in the future.

Keywords

Artificial intelligence, Artificial intelligence development, Bond ratings, Economic conditions, Government effectiveness

Introduction

Recently, government leaders and researchers have highlighted how Artificial Intelligence (AI) development can impact economies and governments. Prime Minister Keir Starmer of the United Kingdom (UK) noted that based on International Monetary Fund (IMF) forecasts, AI development could boost national productivity by up to 1.5 % points a year, worth approximately £47 billion annually (UK Government, 2025). Similarly, Rachel Reeves, UK Chancellor of the Exchequer remarked that: “AI is a powerful tool that will help grow our economy, make our

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public services more efficient, and open up new opportunities to help improve living standards” (UK Government, 2025). From a cross-national standpoint, in examining 30 European countries between 2000 and 2021, Kalai et al. (2024, p. 28) concurred, finding that:

Indeed, artificial intelligence has a significant impact on economic growth, as it is able to enhance productivity through the automation of routine and repetitive tasks, allowing workers to focus on more complex and useful tasks, and leading to increased productivity and output. In addition, this technology can increase efficiency by quickly and accurately analyzing large amounts of data, helping companies make better decisions and optimize their operations, resulting in increased efficiency, cost savings, and greater profits.

While AI development has received ample attention from government leaders and researchers, no empirical studies have examined how AI development might impact the cost of acquiring capital. Obtaining low-cost investment is important for countries to support financial expansion (Markusen & Venables, 1999). An important means to collect such capital is via the issuance of sovereign bonds and their assessments by credit ratings agencies (CRAs) (Sinclair, 2005). Countries seek higher ratings from the CRAs to reduce capital costs.

This study investigates how AI development affects bond ratings. We contend that AI development should lead to higher bond ratings due to AI’s positive effects on domestic economic conditions, government effectiveness, and perceptions of government stability. Regarding economic conditions, we maintain that AI development can increase the income of private firms and individuals by enhancing productivity, assisting in completing tasks, bolstering automation, lowering production costs, and enhancing innovation and large-scale data analysis. We also assert that AI development improves the perceived stability of governments by increasing private sector income, government revenue, and the effectiveness of government processes, all of which should correspond with higher bond ratings.

The research makes an important contribution to the literature. Scholarship has yet to investigate the relationship between AI and bond ratings. Given the potential economic efficiencies and advances that AI could foster, analyzing the connections is useful for sovereign bond issuers and the holders of bonds. Second, the expansion of AI and issuing of bonds indicate the relevance of the research. Third, our research speaks to studies showing how capital access can positively impact states’ economic functioning (Gordon, 2018). Given the high requirement for investment via the issuances of bonds, and the CRAs’ part in rating bonds, our study suggests the possible benefits of AI for lowering capital costs and hopefully advancing economic growth and development.

AI Development Operationalization/Uses and Bond Ratings Determinants

Operationalization/Uses of AI Development

Although many AI definitions exist, based on prior research, we define AI as “the tangible real-world capability of non-human machines or artificial entities to perform, task solve, communicate, interact, and act logically as it occurs with biological humans” (Gil de Zúñiga et al., 2024, p. 317). We conceptualize AI development as the level and sophistication of programs, technology, and infrastructure related to AI (Hankins et al., 2023; Samoilu et al., 2020) and how AI programs and infrastructure support AI development.

AI development consists of three main elements: AI governance, technology, and data

and infrastructure. AI governance is the rules, regulations, and environments that support the incorporation and development of AI technology. The technological element is the degree of sophistication of technology that can support AI development and allow AI programs to be incorporated into society. Data and infrastructure are the quality and type of data and infrastructure that back AI development and the efficient functioning of AI technology. Each element of AI development combines to produce an overall picture of AI development within states that indicate the level and sophistication of AI technology and supporting infrastructure surrounding AI.¹

The potential uses of AI are extensive particularly in the economic and governance realm. While we develop AI's possible benefits more fully in the paper's theoretical section, scholarship has linked AI with better economic growth and higher corporate and private income within states (Besiroglu et al., 2024; Butt, 2024), enhancing government tax collections. Studies have also tied AI to increased government effectiveness and reduced public service costs related to infrastructure and governance (Sahni et al., 2023). The upshot is that AI has the potential to impact countries' economic conditions.

Determinants of Sovereign Bond Ratings

Beyond AI, countries' economic conditions can also impact capital flows, and states often issue bonds to acquire investment and support economic development (Markusen & Venables, 1999). However, neither the bond issuer nor the bondholder determines the bond's interest rates that affect capital costs. This is where the CRAs enter. In addition to their many other functions (see Hanusch & Vaaler, 2013), CRAs assess the likelihood that sovereign issuers will repay their bond debts, with higher interest rates signifying greater risk of default (Kaminsky & Schmukler, 2001). Bond issuers and bondholders depend on the CRAs, who tend to use proprietary information and methods to issue outlooks and letter grades in the ratings process (Gaillard, 2011).

Given the lack of transparency and the impact of ratings, much work has investigated economic and political factors to explain bond rating determinants. Economic factors including inflation, unemployment, gross domestic product (GDP) growth, GDP per capita, current account balance, and financial reserves are key macroeconomic indicators, as they affect debt repayment probability. Countries that have a reputation for repaying debts, have ample natural resources, or promote trade opening are also important economic factors that may influence default risk (Rowland, 2005; Tomz, 2007).

The literature also showcases the relevance of political factors on bond ratings. Studies consider regime type, arguing that democracies constrain fiscal spending (Beaulieu et al., 2012), or hold greater adherence for the rule of law (Biglaiser & Staats, 2012), while others find little connection between regime type and bond ratings (Archer et al., 2007; Hansen, 2022; Saiegh, 2005). The benefits of foreign bank influence (Grittersová, 2020), executive constraints (Cox & Saiegh, 2018) and central bank independence for promoting fiscal restraint (Bodea & Hicks, 2018) also receive scholarly attention, as does the effects of host-government ideology (Barta & Johnston, 2018, 2023).²

Theory of AI Development and Sovereign Bond Ratings

AI Development and Economic Conditions

The discussion of AI development operationalization/uses and bond rating determinants leads us to develop a theory linking AI development with bond ratings. We argue that when

states incorporate AI into societies to a greater extent, AI can potentially bolster economic growth (Besiroglu et al., 2024; Butt, 2024) and enhance corporate and private income within states in several ways, which supports increased debt repayment likelihood and higher bond ratings. First, AI can increase economic productivity across industries. Previous research finds that AI incorporation and AI adoption increase economic development (Gao & Feng, 2023; Gonzales, 2023; Mahadik et al., 2024). One of the most significant ways AI can boost economic development is through automation (Butt, 2024; Gonzales, 2023). AI-powered automation allows businesses to execute activities that traditionally demand human operators, such as data entry, customer service, and complex processes including product design and decision-making (Butt, 2024). Automation reduces operational costs and increases delivery of products and services. By automating time-consuming and repetitive tasks, firms can reallocate human resources to promote overall improvements in productivity (Andiyappillai, 2021; Brynjolfsson & McAfee, 2014; Butt, 2024; Prasanth et al., 2023). In manufacturing, machine learning and robotics based on AI may streamline production processes, reducing downtime and waste while increasing output. Companies can then achieve economies of scale, producing more goods at lower costs, boosting economic growth for the company and at national levels (Ajiga et al., 2024; Brynjolfsson & McAfee, 2014), and enhancing corporate revenues and state tax collections.

We note that there are legitimate concerns regarding AI's impact on labor markets and potential worker displacement. If organizations significantly reduce their workforces and unemployed individuals cannot obtain new jobs, it could result in increased inequality, poverty, and rising political tensions within states (Adams & Kletter, 2018; Hunter et al., 2023; Su, 2018). Thus, governments and corporations must closely manage the effects of AI on labor markets to ensure that there is an appropriate balance between encouraging the productivity-enhancing features of AI while limiting the potentially damaging effects.

Those concerns notwithstanding, AI can create new employment opportunities that positively affect skills development (CBO, 2023) and enhance human worker productivity via assistive AI technologies (Gonzales, 2023). As industries embrace AI, there is an increasing demand for experts in data science, machine learning, and other AI related fields. Demand can foster new jobs and boost education and training development that support workforce skills (Chui et al., 2016). Overall, if AI is implemented responsibly in a human-centric framework, it can increase productivity, enhancing decision-making, fostering innovation, and creating new employment opportunities, which likely promote higher bond ratings.

The capacity of AI's to analyze data and produce actionable policies is another way in which AI can benefit economies and support higher ratings. Machine learning can process much data at speeds humans cannot match, allowing firms to generate better decisions (Mahadik et al., 2024). AI-driven data analytics allow companies to understand consumer behavior better, forecast demand, optimize supply chains, and manage inventory more effectively (Butt, 2024; Chui et al., 2016). This efficiency reduces operational costs and maximizes profit margins, stimulating overall economic growth and again supporting higher state tax revenues.³

AI development can also foster innovation by creating new industries and business models that drive economic growth. AI growth has promoted new sectors, such as the AI-as-a-service industry, which allows businesses to access AI tools and technologies on demand without the need for significant upfront investments (Makridis & Mishra, 2022). AI democratization capabilities enables smaller enterprises to leverage advanced technologies, improving their competitiveness and boosting economic growth (Chui et al., 2016). Furthermore, AI development drives innovation in other fields, such as medical, infrastructure, and finance. For example, government and non-government industry can employ AI to create more effective treatments and medical devices, improving public health and reducing healthcare costs (Butt, 2024). AI

can also improve transportation systems, leading to more efficient logistics networks, reducing transportation costs, improving global trade flows, and enhancing domestic economic conditions (Brynjolfsson & McAfee, 2014).

Further, AI technologies can enhance private sector productivity through automation, increased efficiency, and better decision making (Brynjolfsson & McAfee, 2014). For multinational companies, investing in states with advanced AI capabilities becomes appealing because it allows them to leverage the capabilities to enhance their competitiveness (Muro et al., 2017). States with strong AI ecosystems (driven by skilled labor and innovation hubs) can foster innovative technologies (Muro et al., 2017) in machine learning, robotics, and data analytics, supporting increased job creation and economic growth that promotes higher bond ratings.

AI Development and Government Effectiveness

While we contend that AI development can improve domestic economic conditions that increase the likelihood of higher bond ratings, we also posit that governments can utilize AI for planning purposes to increase private sector expansion. AI tools can help governments predict economic trends, identify potential investment areas, and guide infrastructure development, which increase corporate profits and personal incomes and raise state tax revenues (Brynjolfsson & McAfee, 2014). AI also can boost tax revenues by improving product quality, reducing costs, and increasing efficiency that promote private sector revenues. AI can assist businesses in automating and streamlining activities, optimizing their supply chains, and tailoring their customer service experiences, increasing productivity and profits (Butt, 2024; Chen et al., 2022). The rise in private sector productivity also can increase employee wages, leading to an expanded taxable base for businesses and individuals (CBO, 2023).

Further, AI can increase government effectiveness and reduce costs in public services related to infrastructure and governance. As an example, in healthcare, AI has the potential to streamline administrative processes and improve clinical operations, leading to reduced government healthcare costs (Sahni et al., 2023). AI also can increase government efficiency in areas such as education, social services, and government administration by automating routine tasks, predicting maintenance needs in public infrastructure, enhancing government decision-making capabilities, and enhancing citizens' engagement through improved delivery of public services (Butt, 2024). The increases in government efficiency can help reduce government expenditures (CBO, 2023; Viechnicki & Eggers, 2017). Thus, we expect that the cost savings and revenue generation from AI will favor higher bond ratings.

Anecdotal Cases of AI Development and Bond Ratings

Although many factors affect states' bond ratings, several brief examples highlight how AI development can positively affect domestic economies and government effectiveness, which corresponds with higher bond ratings. South Korea, Singapore, the United Arab Emirates (UAE), and Malaysia have each made significant strides in AI development and employ AI to enhance various aspects of governance, business, and innovation.

Beginning with South Korea, it has been leader in AI development in Asia, with significant research investment and commercial tools as part of its "Digital New Deal" initiative launched in 2020 (Junaid, 2025). This strategy promotes AI manufacturing, smart cities, and healthcare, with significant government financing to support post-pandemic recovery (Baek, 2024). South Korea's focus on AI-driven innovation in manufacturing includes efforts to enhance factory automation through machine learning, robotics, and big data analytics (VisionMakr, 2024). South Korea has

also incorporated AI into governance, optimizing public services like urban planning and disaster management, particularly through “AI-Based Smart City” projects, where AI is applied to traffic management, waste disposal, and public safety (Junaid, 2025; VisionMakr, 2024). Additionally, South Korea has founded ethics committee to safeguard responsible AI deployment (VisionMakr, 2024). Under the CRA’s context, South Korea’s stable and high bond ratings over the past ten years reflect the economic advantages incumbent with AI development.

Next, is Singapore, whose approach to AI is linked to its broader “Smart Nation” initiative, which seeks to leverage digital technologies, including AI, to enhance government operations and economic development (Smart Nation, 2024). The state has been an important part in driving AI adoption in public administration, healthcare, and finance (Smart Nation, 2024). In healthcare, AI applications improve diagnostics and patient care through predictive analytics and personalized medicine (Smart Nation, 2024). The national AI strategy, introduced in 2019, emphasizes increasing productivity and generating economic value by integrating AI into businesses (Smart Nation, 2024). Singapore has also developed a dynamic AI startup ecosystem supported by government initiatives, offering funding and resources for AI innovation (AI Singapore, 2024). Singapore also uses AI to enhance public governance in the areas of urban management, transportation, and public safety (Woo, 2024). AI-powered systems monitor traffic patterns and improve public transport efficiency, streamlining city operations (Woo, 2024). Additionally, public services increasingly rely on AI to assist in assessing eligibility and benefits in social welfare programs (Woo, 2024). Like South Korea, Singapore has received stable and the highest possible bond ratings over more than a decade, showcasing how AI can contribute to greater efficiency and economic development.

Similarly, the UAE has placed AI at the center of its economic and governmental strategies (UAE, 2024a). Beginning in 2017, the UAE was the first state to establish an AI Ministry (Olama, 2024). This ministry is responsible for overseeing and investing in AI policy and integration across all sectors (particularly in smart cities, healthcare, and public sector applications), with the goal of making the UAE a global AI leader by 2031 (Middle East Briefing, 2024; UAE, 2024a). (). In smart cities, AI is used to observe and supervise waste, traffic, and energy consumption, and improve efficiency and sustainability (Future UAE, 2024). AI also affects governance, with the UAE adopting AI systems to streamline public administration, including automating visa issuance, public service delivery, and social welfare programs (Akhoirshieda et al., 2024). Additionally, the UAE has implemented AI-driven tools for national security purposes, such as surveillance systems and predictive analytics for crime prevention (Akhoirshieda et al., 2024). The UAE’s commitment to AI extends to substantial investments in AI education and workforce training, ensuring the development of a skilled labor force to support the state’s ambitious AI agenda (UAE, 2024b). All of these policies have helped the UAE receive stable and high bond ratings for years.

Lastly, we have Malaysia. While it is not as advanced as South Korea or Singapore in AI development, Malaysia has integrated AI into its economic and governmental frameworks. The Malaysian government has outlined a comprehensive AI strategy in its “Malaysia Digital Economy Blueprint,” aiming to position it as a digital economy regional leader by 2030 in agriculture, finance, and healthcare (Malaysia Digital Economy Blueprint, 2021). To support this strategy, the government has established various funding programs and partnerships with private sector companies to develop AI technologies, particularly in areas like automation and data analytics (International Trade Administration, 2024). In terms of governance, Malaysia has engaged in a cautious strategy to AI implementation, emphasizing the enhancement of its regulatory framework to make sure that AI deployment comports with ethical and privacy standards. The government has set up an AI steering committee to oversee AI, addressing

concerns over job displacement and data security (National Guidelines on AI Governance and Ethics, 2024). Moreover, Malaysia integrated AI into public services, such as e-government systems, where AI tools are used to improve efficiency and transparency in bureaucratic processes (Malaysia Digital Economy Blueprint, 2021). Like the other countries, Malaysia has maintained a stable and positive (investment grade) bond rating for years. While many countries have recently witnessed bond rating decreases (or outlooks) particularly because of Covid and supply-chain bottlenecks, Malaysia has incorporated AI into its governance and businesses and has received higher bond ratings.⁴

South Korea, Singapore, the UAE, and Malaysia, all have above-average levels of AI development and bond ratings compared to other states in our analysis. While many factors affect bond ratings, AI development plays an important role in domestic economic conditions and government effectiveness. Based on the previous discussion, we argue that AI development increases economic growth, private sector revenue, personal incomes, and government effectiveness, all of which can expand governments' tax revenues and reduce expenditures. While AI can assist governments in expanding their revenues, it can also help governments increase efficiency and reduce costs. Increased tax revenue, reduced government expenditures, and greater government effectiveness resulting from incorporating AI into economies and public sectors should improve the perception of government stability and the ability of states to service sovereign debt, which supports higher bond ratings. This leads to the paper's hypothesis:

Hypothesis. There is a positive relationship between overall AI development levels and sovereign bond ratings.

Research Design

We examine 101 states between 2020 and 2023 to assess the effect AI development has on bond ratings. We include states from all continents and provide a list of the states (see the Appendix (Table A1)). We select the states, years, and measures based on variable and data availability, collecting data for as many states and years as possible. Summary statistics for the primary variables are available in the Appendix (see Table A2).

Dependent Variable: Bond Ratings

Moody's and Standard & Poor's (S&P) bond ratings serve as the dependent variables in the analysis. These agencies have long occupied a dominant position within the global credit rating industry and remain the two largest CRAs. Following established practice in the literature (Vaaler et al., 2006), letter grades assigned by each agency are transformed into an ordinal scale ranging from 0 to 16, with higher scores corresponding to more favorable bond ratings. Moody's and S&P websites provide sovereign bond ratings data.

Independent Variable: AI Development

To measure AI development, we collect data from Oxford Insights' Government AI Readiness Index (Hankins et al., 2023). As Nettel et al. (2024, p. 4) report, "The Government AI Readiness Index has become a trusted resource for policymakers, adopted as an official benchmark by national governments and referenced by leading organisations such as UNESCO and the G20." Oxford Insights produces the annual Government AI Readiness Index according to a mixture of

internal research and existing publicly available data (Hankins et al., 2023). To capture the degree to which states can develop and implement AI in their societies, the index gauges three primary pillars to generate an overall AI Readiness score.

The three pillars come from the government, technology sector, and infrastructure. The government pillar refers to the degree to which states have a strategy and vision for governing and developing AI, support effective regulation regarding the ethical risks associated with AI, and promote skills and practices that support the state's ability to adapt to AI. The technology sector pillar gauges the AI tools from states' technology sectors and measures states' technological maturity level. The pillar captures the innovation capacity of states' technology sectors and the degree to which business environments support entrepreneurship and research and development spending. The technology sector pillar also measures human capital skills. The data and infrastructure pillar measures the data available to ensure AI programs have the required data to operate with as minimal bias and error as possible and the degree to which representative training data is available. Also, the pillar gauges the quality of infrastructure in place to power and operate AI programs. Higher values of each pillar indicate that states are more capable in that area regarding AI development (i.e., AI governance, technology, and data and infrastructure). Higher overall values indicate that states have greater AI development and readiness when taking all three pillars into account (Hankins et al., 2023). The primary measure in the study (AI Development) is the continuous, aggregate AI Readiness Index score.⁵ For robustness, we also use the continuous measures for each pillar and list their corresponding descriptions, dimensions, indicators, and data sources in the Appendix (Table A3).⁶

Economic, Political, and Social Control Measures

We employ several economic, political, and social factors that can affect AI bond ratings. We include economic control variables for GDP growth, GDP per capita, unemployment, inflation, financial reserves, current account balance, fuel exports, and trade. The expectation, *ceteris paribus*, is that better economic circumstances lead to higher bond ratings (see Cantor & Packer, 1996; Jensen, 2003). The World Bank (2024) provides the data. Further we include a bond default measure as states that experience histories of bond defaults may engender more pessimistic reactions from international investors (Tomz, 2007), raising debt non-repayment risk. We collect bond default data from Beers et al. (2024).⁷ For the political control variables we employ measures for government ideology, rule of law, and democracy.⁸ Studies suggest that democracy, the rule of law, and host-government ideology affect bond ratings, with democracy and higher rule of law leading to better ratings, while leftist executives receive lower ratings.⁹ We collect data for these measures from VDEM (Coppedge et al., 2021). As a social control, we include an education variable that measures education levels within states, as better educated states tend to have higher economic growth and bond ratings.¹⁰ To address possible variable collinearity, in Table A6 in the Appendix we show the Variance Influence Factor for the primary control variables.¹¹

Methodology

The empirical analysis is based on pooled time-series data in which the dependent variable is a count measure. Given that the outcome variable comprises non-negative integer observations recorded over a fixed period, Poisson regression with robust standard errors is used to estimate the models. More specifically, the Poisson estimation technique is utilized because it models the conditional mean of the dependent variable (bond ratings) as a function of the covariates

while retaining the discrete nature of the count outcomes. Overall, the Poisson estimation allows predicted values to remain non-negative and for covariate effects to scale proportionally with the expected count (Croxt et al., 2014). This method is frequently employed in research where the dependent variable is a count with non-negative values that are dispersed over a set period (Cameron & Trivedi, 2009). However, to ensure the Poisson model specification is not driving our results, we also conduct negative binomial regression models for robustness. We also employ structural equation modeling (SEM) to assess AI's effects on national income, government effectiveness, gross savings, and bond ratings. In additional models, we employ 2-stage least squares instrumental variable (2SLS-IV) models to address any issues pertaining to endogeneity. We discuss the methodology and results of the SEM and 2SLS-IV models in the paper's findings section.

Findings

Results with the Poisson Estimate Technique and Robust Standard Errors

Table 1 displays the effect AI development has on the two bond ratings dependent variables (S&P and Moody's). Tables 1 (Models 1-2) indicates that AI has a positive and statistically significant effect on both the S&P and Moody's ratings. In considering the real-world implications of regime type on bond ratings, it is important to examine the marginal effects. In Figure 1, we observe the expected value of the S&P bonds ratings score based on changes in the AI development measure as AI development increases from the minimum observed value (22) to the maximum observed value (88) and the control variables are held constant at their mean values. Figure 1 shows that the expected S&P ratings value increases from 3.0 to 15.4 when moving from the minimum to maximum level of AI development. We find similar results in Figure 2 with the Moody's dependent variable, as we note a positive and statistically significant association between AI development and bond ratings. When moving from the minimum to the maximum level of AI development, the expected Moody's bond rating value increases from 3.0 to 14.7. Thus, in Figures 1-2, higher levels of AI development are associated with higher expected bond rating values.

For robustness purposes, in Table 2, we also examine the effect the components of the AI development measure (Government, Technology, and Data and Infrastructure) have on bond ratings. Looking at Table 2 (Models 1-6), we find that Government, Technology, and Data and Infrastructure have positive and significant impacts on both bond ratings' dependent variables. Results from Tables 1-2, and Figures 1-2, provide support for our hypothesis that greater levels of AI development are associated with higher bond ratings.

As mentioned, to ensure that our primary model specification is not driving the results, we also examine the effects of the AI variables on bond ratings using negative binomial regression. We display the results in Tables A4-A5 in the Appendix, which back the findings in the main models, indicating that AI variables have a positive and significant impact on ratings.

Mediation Analysis and Findings

We also conduct mediation analysis to examine how AI development affects bond ratings with net national income per capita, government effectiveness, and gross savings utilized as mediating variables while employing the control measures that were included in the main models.¹² National income is employed to assess the effect AI development has on corporate and individual earnings within states; government effectiveness is used to examine the effect AI development has on the

ability of governments to deliver public services efficiently and effectively; and gross savings is utilized to examine the effect AI development has on government savings, which is based on overall government revenue and expenditures. In utilizing the three mediating variables, we attempt to assess AI's impact on domestic economic conditions, government effectiveness, and bond ratings. We expect government effectiveness, in particular, is critical for higher bond ratings since it parallels arguments in the CRA literature. As noted earlier, CRAs reward governments with higher ratings that inhibit fiscal spending, impose executive constraints, adhere to the rule of law, and bolster central bank independence. Government effectiveness captures many of these same elements as it also supports policy formulation and implementation that could reduce fiscal spending, backs government credibility as showcased by respect for the rule of law, and informs central bank independence, as governed by independence from political pressures. Structural equation modeling (SEM) is used to assess the proposed mediation relationships. As a linear

Table 1. Effect of AI development on bond ratings

Variables	Model 1 DV: S&P	Model 2 DV: Moody's
Total Score	0.025*** (0.002)	0.024*** (0.002)
Liberal Democracy	0.327* (0.177)	0.216 (0.188)
Rule of Law	0.261 (0.197)	0.349* (0.210)
GDP Growth	-0.010* (0.005)	-0.012** (0.006)
GDPPC	0.000 (0.000)	0.000 (0.000)
Inflation	-0.017*** (0.004)	-0.018*** (0.004)
Unemployment	-0.013** (0.006)	-0.010 (0.007)
Trade	0.000** (0.000)	0.000 (0.000)
Education	-0.008 (0.016)	-0.009 (0.017)
Government Ideology	-0.038 (0.052)	-0.031 (0.059)
Financial Reserves	0.009 (0.010)	0.009 (0.010)
CAB	0.084*** (0.032)	0.098*** (0.034)
Fuel Exports	-0.000 (0.001)	0.000 (0.001)
Bond Default	-2.110*** (0.298)	-3.327*** (0.522)
Observations	351	361
Pseudo r^2	.4308	.4385
Prob. > χ^2	.0000***	.0000***

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Robust standard errors in parentheses.

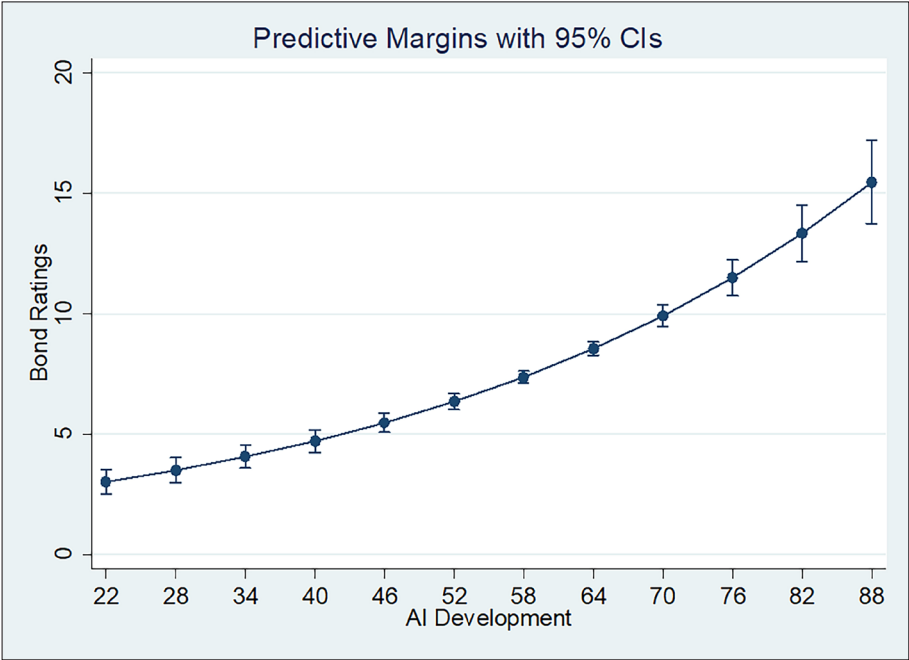


Figure 1. Effect of AI development (total score) on bond ratings (S&P)

equation modeling technique, SEM is well suited for estimating indirect effects through multiple mediating variables (Baron & Kenny, 1986). Prior cross-national research has also employed the coefficient-based approach used here and found it to produce valid estimates of mediated effects (Hunter & Biglaiser, 2025).

In Tables 3-5, we report the mediation analysis results. In reviewing Table 3, we observe that AI development has a significant and positive effect on national income and national income has a significant and positive effect on both bond ratings measures, where national income mediates 8.4% of the relationship between AI development and bond ratings for S&P and 9.8% of the relationship with Moody's. In reviewing Table 4, we see that AI development has a significant and positive effect on government effectiveness and government effectiveness has a positive and significant effect on bond ratings (S&P and Moody's), with government effectiveness mediating 32.2% (S&P) and 26.1% (Moody's). In Table 5, we see that AI development has a positive and significant effect on gross savings and gross savings has a positive and significant effect on bond ratings. Gross savings mediates 6.1 % (S&P) and 3.4 % (Moody's). Overall, the results provide a clearer mechanism for how AI development influences bond ratings.

Endogeneity

We also address the possibility of endogeneity in the study. A potential counterargument is that higher bond ratings could increase levels of AI development. We employ a 2SLS-IV method to address endogeneity issues. Implementing a 2SLS-IV approach requires identifying an instrument that is theoretically associated with variation in the hypothetically endogenous independent variable (AI development) but not directly related to variation in the dependent variable (sovereign bond ratings). According to previous research (Le Gallo & Páez, 2013), we employ

Table 2. Effect of AI development components on bond ratings

Variables	Model 1 DV: S&P	Model 2 DV: Moody's	Model 3 DV: S&P	Model 4 DV: Moody's	Model 5 DV: S&P	Model 6 DV: Moody's
Government	0.014*** (0.002)	0.014*** (0.002)				
Technology			0.020*** (0.002)	0.017*** (0.002)		
Data & Infrastructure					0.027*** (0.003)	0.025*** (0.003)
Liberal Democracy	0.289 (0.187)	0.186 (0.193)	0.441** (0.201)	0.287 (0.209)	0.182 (0.192)	0.054 (0.196)
Rule of Law	0.457** (0.210)	0.519** (0.213)	0.435* (0.225)	0.566** (0.231)	0.292 (0.224)	0.392* (0.232)
GDP Growth	-0.007 (0.006)	-0.010 (0.006)	-0.008 (0.006)	-0.012* (0.007)	-0.003 (0.006)	-0.008 (0.007)
GDPPC	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Inflation	-0.019*** (0.005)	-0.022*** (0.005)	-0.015*** (0.005)	-0.018*** (0.005)	-0.012*** (0.004)	-0.015*** (0.005)
Unemployment	-0.014* (0.007)	-0.009 (0.008)	-0.022*** (0.007)	-0.017** (0.007)	-0.017** (0.007)	-0.013* (0.007)
Trade	-0.000 (0.000)	-0.001** (0.000)	0.001*** (0.000)	0.001 (0.000)	0.000** (0.000)	0.000 (0.000)
Education	-0.051*** (0.019)	-0.059*** (0.019)	-0.020 (0.019)	-0.029 (0.020)	-0.003 (0.018)	-0.011 (0.018)
Government Ideology	0.003 (0.064)	0.012 (0.069)	0.016 (0.062)	0.025 (0.068)	0.036 (0.060)	0.044 (0.067)
Financial Reserves	0.011 (0.011)	0.011 (0.010)	0.010 (0.011)	0.013 (0.010)	0.027*** (0.009)	0.027*** (0.008)
CAB	0.082** (0.038)	0.095** (0.038)	0.086** (0.039)	0.098** (0.040)	0.091** (0.037)	0.097** (0.038)
Fuel Exports	-0.002 (0.001)	-0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Bond Default	-2.332*** (0.415)	-4.117*** (0.958)	-2.495*** (0.425)	-4.274*** (0.969)	-2.347*** (0.409)	-4.115*** (0.960)
Observations	275	283	275	283	275	283
Pseudo r^2	.4147	.4286	.4119	.4226	.4256	.4369
Prob. > χ^2	.0000***	.0000***	.0000***	.0000***	.0000***	.0000***

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Robust standard errors in parentheses.

an instrumental variable approach that employs the exogenous variation in FDI net inflows.¹³ The state-specific variable captures the amount of FDI net inflows per state-year. The rationale for selecting the instrument is that, based on previous research, states receiving FDI tend to have higher levels of AI development (Muro et al., 2017), but FDI is not necessarily linked to bond ratings.¹⁴ Studies indicate that FDI can stimulate AI development, as foreign firms often bring advanced technologies, management expertise, and capital, catalyzing funding and infrastructure for startups and research institutions (Osano & Koine, 2016). FDI also can strengthen states' talent pool and foster a collaborative ecosystem, boosting AI development (Muro et al., 2017). The FDI-based instrument varies across both states and time, thereby generating exogenous

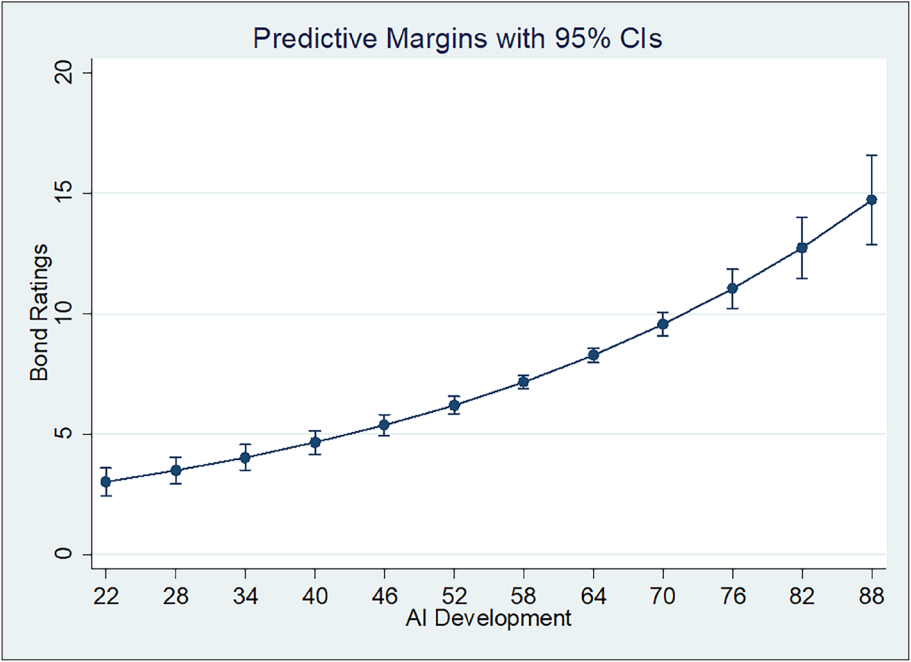


Figure 2. Effect of AI development (total score) on bond ratings (Moody's)

variation to the extent that the outcome of interest is excluded from the underlying sources of variation used to construct the instrument (Lang, 2021).

In the first stage of the two-stage analysis, we estimate AI development as a function of FDI while including the control variables. We find that the instrument has a positive and statistically significant effect on AI development. We employ weak instrument tests and the F-statistic, and we see the selected instrument and 2SLSIV regression models appear appropriate for estimating AI development's impact on bond ratings. In the second stage, the instrumented AI development variables are used to estimate their effect on sovereign bond ratings while controlling for all covariates. In examining Table 6 (Models 1-2), the instrumented AI development variable has a positive and statistically significant effect on both bond ratings variables. Thus, the findings from our 2SLSIV models provide added confidence that endogeneity issues are not causing our results.

Table 3. Mediation Analysis for AI development (total score), national income, bond ratings nexus

Mediator (MV)	AI Development → Mediator	Mediator → Bond Ratings (S&P)	AI Development → Bond Ratings (S&P)	Percent Mediated
National Income	79.47466***	.0001***	.1751***	0.084***

Mediator (MV)	AI Development → Mediator	Mediator → Bond Ratings (Moody's)	AI Development → Bond Ratings (Moody's)	Percent Mediated
National Income	84.7869***	.0001***	.1664***	0.098***

Note: Bold represents a significant mediation (significance in all causal links). All models contain the economic, social, and political controls found in the main models. Full models available upon request.

*** $p < 0.01$

Table 4. Mediation analysis for AI development (total score), government effectiveness, bond ratings nexus

Mediator (MV)	AI Development → Mediator	Mediator → Bond Ratings (S&P)	AI Development → Bond Ratings (S&P)	Percent Mediated
Government Effectiveness	.0257 ^{***}	2.1677 ^{***}	.1735 ^{***}	0.322^{***}
Mediator (MV)	AI Development → Mediator	Mediator → Bond Ratings (Moody's)	AI Development → Bond Ratings (Moody's)	Percent Mediated
Government Effectiveness	.0266 ^{***}	1.6434 ^{***}	.1682 ^{***}	0.261^{***}

Note: Bold represents a significant mediation (significance in all causal links). All models contain the economic, social, and political controls found in the main models. Full models available upon request.

^{***} $p < 0.01$

Table 5. Mediation analysis for AI development (total score), gross savings, bond ratings nexus

Mediator (MV)	AI Development → Mediator	Mediator → Bond Ratings (S&P)	AI Development → Bond Ratings (S&P)	Percent Mediated
Gross Savings	.0902 ^{**}	.1173 ^{***}	.1735 ^{***}	0.061^{***}
Mediator (MV)	AI Development → Mediator	Mediator → Bond Ratings (Moody's)	AI Development → Bond Ratings (Moody's)	Percent Mediated
Gross Savings	.07013 [*]	.0806 ^{***}	.1682 ^{***}	0.034^{***}

Note: Bold represents a significant mediation (significance in all causal links). All models contain the economic, social, and political controls found in the main models. Full models available upon request.

^{*} $p < 0.1$, ^{**} $p < 0.05$, ^{***} $p < 0.01$

Conclusion

This study investigated the correlation between AI development and bond ratings. We found that AI development has a positive relationship with bond ratings, as AI development increases productivity and incomes within states while improving government effectiveness. AI features can enhance governments' perceived stability, leading to lower capital costs and higher bond ratings (Markusen & Venables, 1999).

We recognize the possible limitations of our work. First, regarding the analysis, we understand that the data only cover from 2020–2023 due to cross-national AI data availability. Although we would prefer more data years, the main results and robustness checks indicate a significant association between AI development and bond ratings. Moreover, while our methodological approach controls for potential endogeneity between AI development and bond ratings, from a theoretical perspective, the relationship among AI development, economic development, and government efficiency is interrelated. AI development can increase economic development and government efficiency, and stronger economies under efficient governments are more likely to excel in AI development. Nonetheless, our research provides an initial understanding of the mechanism between AI development and bond ratings.

This study offers opportunities for new scholarship. Future research may consider investigating the effects of AI development on domestic politics. Does AI development impact political situations, such as elections, by promoting greater political stability, or is it more liable to

heighten domestic conflict? Studies also might consider the effects of AI on other capital flows such as portfolio investment and the increased availability of capital. Additionally, future research could expand upon prior scholarship to identify more precisely the relationship among AI development, economic growth, and government efficiency.

Our study holds implications for AI development and bond ratings research. First, as discussed earlier, no prior empirical research has investigated AI development and bond ratings. Given the advances in AI development and the import of sovereign bonds, our work represents a first step in an incipient research area. Second, our mediation analysis identifies the mechanism between

Table 6. Effect of AI development on bond ratings

Variables	Model 1 DV: S&P	Model 2 DV: Moody's
Total Score	0.144*** (0.029)	0.147*** (0.027)
Liberal Democracy	0.792 (1.152)	0.270 (1.207)
Rule of Law	3.268** (1.374)	3.174** (1.346)
GDP Growth	-0.076** (0.031)	-0.092*** (0.035)
GDPPC	0.000*** (0.000)	0.000*** (0.000)
Inflation	-0.011 (0.008)	-0.013 (0.009)
Unemployment	-0.112*** (0.033)	-0.092*** (0.035)
Trade	0.001 (0.002)	-0.002 (0.002)
Education	0.177 (0.158)	0.194 (0.168)
Government Ideology	0.068 (0.416)	0.192 (0.470)
Financial Reserves	0.112* (0.067)	0.103 (0.069)
CAB	0.680*** (0.194)	0.615*** (0.191)
Fuel Exports	-0.003 (0.005)	-0.001 (0.006)
Bond Default	-2.606*** (0.430)	-2.961*** (0.437)
Observations	351	361
Prob. > F	0.0000***	0.0000***
Centered R-squared	.8597	.8341
Instrument	0.0000***	0.0000***
<i>FDI</i>	(0.000)	(0.000)
Weak ID F Test	39.919	41.266
Kleibergen-Paap underidentification test	22.886	22.814

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Robust standard errors in parentheses.

AI development and bond ratings. Consistent with prior research on the association between AI development and national income, government effectiveness, and gross savings (e.g., Butt, 2024; Gao & Feng, 2023), we find such factors mediate between AI development and bond ratings. Thus, AI development has the potential to promote job creation, lower-cost capital, and higher economic development.

Despite the potential benefits, we recognize the possible serious downsides to AI development. While our study argued that greater AI development can improve economic conditions and government efficiency, the positive effect of AI on economies and governments is not guaranteed. Previous scholarship highlights the dangers that can occur if companies and governments utilize AI in a manner that negatively affects employees and labor markets (Adams & Kletter, 2018; Hunter et al., 2023; Su, 2018). This scholarship posits that AI can potentially destabilize societies if labor markets are disrupted and governments do not regulate AI responsibly. As Kalai et al. (2024, p. 30) remark: “AI has great potential to boost productivity, creativity, and industry growth, but its fall or disruption could hurt the economy. A slowdown in AI progress, technical regressions, or unexpected repercussions like job displacement and societal inequity might diminish economic production and increase market volatility.” Although our findings indicate that AI positively affects economies, governments, and bond ratings, we realize that the future impact of AI will likely depend on the degree to which governments and firms incorporate AI in a responsible manner that supports human labor and productivity while minimizing labor market disruptions. Hopefully, governments and firms will advance such constraints to allow AI to provide benefits that include lower-cost capital.

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Conflict of Interest

The authors declare that there are no conflicts of interest in this research.

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Notes

1. We expand on AI development operationalization and each AI element in the research design section.
2. See also Biglaiser et al. (2017), who note the benefits of political and legal constraints on the economy. Additionally, see Biglaiser et al. (2021) and Biglaiser et al. (2024) who show how domestic political unrest and domestic terrorism can negatively impact bond ratings.
3. See also Sang and Lee (2024), who similarly discuss how management efficiency and soundness indicators affect bank profitability.
4. Butt (2024, p. 66) also shows how Nordic states' economies and governments have benefited from the incorporation of AI, writing that “AI adoption has had a profound impact on various sectors within Nordic welfare states, driving productivity gains, cost reductions, and economic growth across the board.”
5. The total score is the three pillars' arithmetic mean (Hankins et al., 2023).
6. The methodology, data sources, and states included for each pillar can vary for each year based on data availability (Hankins et al., 2023).
7. Bond default (coded as “1”) is recorded in the default year and for the next five years. The default data comes from <https://www.bankofcanada.ca/2024/07/staff-analytical-note-2024-19/>

8. We use the liberal democracy measure from the VDEM that captures the degree to which states protect individual liberties and minority rights. The rule of law variable measures to what extent laws are enforced, and to what extent the government officials comply with the law. The government ideology measure whether governments are considered left-oriented.
9. See also Lee et al. (2012), who show the advantages of rule of law in attracting portfolio flows.
10. Education is measured as primary education (duration in years) and comes from the World Bank (2024).
11. In reviewing Table A6, we find the overall mean VIF is 2.85 and that collinearity does not appear to be biasing the results. However, to ensure that collinearity between democracy and the rule of law does not bias the results, we run additional models excluding the rule-of-law variable. The results are consistent with and similar to those of the primary models. The results are available upon request.
12. National income is measured as adjusted net national income per capita. The measure includes individual and corporate income. Government effectiveness measures public services, civil service, and many other factors related to effectiveness. The measure is constructed from 35 unique data sources, including household and firm surveys and expert analysis from numerous organizations and Non-Governmental Organizations. The measure is often employed for cross-national comparisons to assess state capacity and policy consistency (World Governance Indicators, 2024). Gross savings comes from the World Bank (2024).
13. We collected FDI inflows data from the World Bank (2024).
14. The correlation between the FDI measure and bond ratings is low and insignificant (FDI and S&P (.12) and FDI and Moody's (.13)), which should mitigate concerns that FDI is affecting bond ratings.

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Appendix

Table A1. States included in analysis

Albania	Georgia	Oman
Angola	Germany	Pakistan
Armenia	Ghana	Panama
Australia	Greece	Paraguay
Austria	Guatemala	Peru
Azerbaijan	Honduras	Philippines
Bahrain	Hungary	Poland
Belarus	Iceland	Portugal
Belgium	India	Qatar
Benin	Indonesia	Republic of the Congo
Bolivia	Ireland	Romania
Botswana	Israel	Rwanda
Brazil	Italy	Saudi Arabia
Bulgaria	Ivory Coast	Singapore
Cambodia	Japan	Slovakia
Cameroon	Jordan	Slovenia
Canada	Kazakhstan	South Africa
Chile	Kenya	South Korea
China	Latvia	Spain
Colombia	Lebanon	Sri Lanka
Costa Rica	Lithuania	Sweden
Croatia	Luxembourg	Switzerland
Cyprus	Malaysia	Thailand
Czech Republic	Malta	Togo
Denmark	Mauritius	Turkey
Dominican Republic	Mexico	Uganda
Ecuador	Mongolia	Ukraine
Egypt	Montenegro	United Kingdom
El Salvador	Morocco	United States of America
Estonia	Mozambique	Uruguay
Ethiopia	Netherlands	Uzbekistan
Fiji	New Zealand	Vietnam
Finland	Nicaragua	Zambia
France	Norway	

*The state-years included vary based on data availability.

Table A2. Summary statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
S&P	361	7.925926	5.181305	0	16
Moody's	361	7.66759	5.19832	0	16
Total Score	351	54.49981	15.5957	22.54	88.16
Government	283	59.61579	19.4269	21.33	94.88
Technology	283	41.25325	14.11336	13.86	83.31
Data & Infrastructure	283	66.28657	15.89233	27.44	94.17
Liberal Democracy	361	.4980228	.2658086	.027	.887
Rule of Law	361	.6689829	.2860734	.012	.998
GDP Growth	361	2.098146	5.596266	-21.3999	20.01646
GDPPC	361	23740.42	26666.62	456.5819	133711.8
Inflation	361	7.403841	14.72231	-2.595243	171.2055
Unemployment	361	6.876356	4.713921	.13	28.838
Trade	361	95.46582	63.89603	20.58541	394.2207
Education	361	5.660969	.889069	4	8
Government Ideology	361	.2146467	.2786376	0	1
Financial Reserves	361	.0869005	1.337706	-8.357752	11.68547
CAB	361	.1206292	.6865766	-3.198093	2.968729
Fuel Exports	361	13.69343	20.83931	.0000693	94.92334
Bond Default	361	.0683761	.2527504	0	1

Table A3. Government pillar

Dimension	Indicators	Data Sources
Vision (Does the government have a vision for implementing AI?)	National AI strategy (Y/N)	Desk research (e.g. OECD AI Policy Observatory, UN IDIR AI policy portal)
Governance and Ethics (Are there the right regulations and ethical frameworks in place to implement AI in a way that builds trust and legitimacy?)	Data protection and privacy legislation	UN data protection and privacy legislation worldwide
	Cybersecurity	Global Cybersecurity Index
	Regulatory quality	Worldwide Governance Indicators
	National ethics framework (Y/N)	Desk research (e.g. Nature, AI Ethics Lab)
	Accountability	Worldwide Governance Indicators

Table A3. Government pillar (continue)

Dimension	Indicators	Data Sources
Digital Capacity (What is the existing digital capacity within government?)	Online services	UN e-Government Survey
	Foundational IT infrastructure	World Bank GovTech Maturity Index
	Government promotion of investment in emerging technologies	Network Readiness Index
Adaptability (Can the government change and innovate effectively?)	Government effectiveness	Worldwide Governance Indicators
	Government's responsiveness to change	Global Competitiveness Index
	Procurement data	Global Data Barometer
Maturity (Does the country have a technology sector capable of supplying governments with AI technologies?)	Number of AI unicorns	CB Insights
	Number of non-AI technology unicorns	CB Insights
	Value of trade in ICT services (per capita)	UNCTAD
	Value of trade in ICT goods (per capita)	UNCTAD
	Computer software spending	Global Innovation Index
Innovation Capacity (Does the technology sector have the right conditions to support innovation?)	Time spent dealing with government regulations	World Bank World Development Indicators
	VC availability	Global Innovation Index
	R&D spending	UNESCO
	Company investment in emerging technology	Network Readiness Index
	Research paper published in AI	Scimago

Table A3. Government pillar (continue)

Dimension	Indicators	Data Sources
Human Capital (Are there the right skills in the population to support the technology sector?)	Graduates in STEM	UNESCO
	GitHub users per thousand population	GitHub
	Female STEM graduates	World Bank
	Quality of engineering and technology higher education	QS Engineering & Technology rankings
	ICT Skills	ITU
Infrastructure (Does the state have a good technological infrastructure to support AI technologies)	Telecommunications infrastructure	UN e-government survey
	Supercomputers	Top 500
	Broadband quality	EIU Inclusive Internet Index
	5G infrastructure	Ookla 5G Map
	Adoption of emerging technologies	Network Readiness Index
Data Availability (Is there good availability of data that could be used to train AI models?)	Open data	Global Data Barometer
	Data governance	World Bank GovTech Maturity Index
	Mobile-cellular telephone subscriptions	ITU
	Households with internet access	ITU
	Statistical capacity	World Bank
Data Representativeness (Is data available likely to be representative of the population as a whole?)	Gender gap in internet access	EIU Inclusive Internet Index
	Cost of internet-enabled devices relative to GDP per capita	GSMA Mobile Connectivity Index

Source: Hankins et al. (2023)

Table A4. Effect of AI development on bond ratings

Variables	Model 1 DV: S&P	Model 2 DV: Moody's
Total Score	0.025*** (0.002)	0.024*** (0.002)
Liberal Democracy	0.327* (0.177)	0.216 (0.188)
Rule of Law	0.261 (0.197)	0.349* (0.210)
GDP Growth	-0.010* (0.005)	-0.012** (0.006)
GDPPC	0.000 (0.000)	0.000 (0.000)
Inflation	-0.017*** (0.004)	-0.018*** (0.004)
Unemployment	-0.013** (0.006)	-0.010 (0.007)
Trade	0.000** (0.000)	0.000 (0.000)
Education	-0.008 (0.016)	-0.009 (0.017)
Government Ideology	-0.038 (0.052)	-0.031 (0.059)
Financial Reserves	0.009 (0.010)	0.009 (0.010)
CAB	0.084*** (0.032)	0.098*** (0.034)
Fuel Exports	-0.000 (0.001)	0.000 (0.001)
Bond Default	-2.110*** (0.298)	-3.327*** (0.522)
Observations	351	361
Pseudo r^2	.2982	.2952
Prob. > χ^2	.0000***	.0000***

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Robust standard errors in parentheses.

Table A5. Effect of AI development components on bond ratings

Variables	Model 1 DV: S&P	Model 2 DV: Moody's	Model 3 DV: S&P	Model 4 DV: Moody's	Model 5 DV: S&P	Model 6 DV: Moody's
Government	0.014*** (0.002)	0.014*** (0.002)				
Technology			0.020*** (0.002)	0.017*** (0.002)		
Data & Infrastructure					0.027*** (0.003)	0.025*** (0.003)
Liberal Democracy	0.289 (0.187)	0.186 (0.193)	0.441** (0.201)	0.287 (0.209)	0.182 (0.192)	0.054 (0.196)
Rule of Law	0.457** (0.210)	0.519** (0.213)	0.435* (0.225)	0.566** (0.231)	0.292 (0.224)	0.392* (0.232)
GDP Growth	-0.007 (0.006)	-0.010 (0.006)	-0.008 (0.006)	-0.012* (0.007)	-0.003 (0.006)	-0.008 (0.007)
GDPPC	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Inflation	-0.019*** (0.005)	-0.022*** (0.005)	-0.015*** (0.005)	-0.018*** (0.005)	-0.012*** (0.004)	-0.015*** (0.005)
Unemployment	-0.014* (0.007)	-0.009 (0.008)	-0.022*** (0.007)	-0.017** (0.007)	-0.017** (0.007)	-0.013* (0.007)
Trade	-0.000 (0.000)	-0.001** (0.000)	0.001*** (0.000)	0.001 (0.000)	0.000** (0.000)	0.000 (0.000)
Education	-0.051*** (0.019)	-0.059*** (0.019)	-0.020 (0.019)	-0.029 (0.020)	-0.003 (0.018)	-0.011 (0.018)
Government Ideology	0.003 (0.064)	0.012 (0.069)	0.016 (0.062)	0.025 (0.068)	0.036 (0.060)	0.044 (0.067)
Financial Reserves	0.011 (0.011)	0.011 (0.010)	0.010 (0.011)	0.013 (0.010)	0.027*** (0.009)	0.027*** (0.008)
CAB	0.082** (0.038)	0.095** (0.038)	0.086** (0.039)	0.098** (0.040)	0.09** (0.037)	0.097** (0.038)
Fuel Exports	-0.002 (0.001)	-0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Bond Default	-2.332*** (0.415)	-4.117*** (0.958)	-2.495*** (0.425)	-4.274*** (0.969)	-2.347*** (0.409)	-4.115*** (0.960)
Observations	275	283	275	283	275	283
Pseudo r^2	.2855	.2903	.2821	.2829	.2988	.3007
Prob. > χ^2	.0000***	.0000***	.0000***	.0000***	.0000***	.0000***

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Robust standard errors in parentheses.

Table A6. Variance inflation factor (VIF) table

Variable	VIF	1/VIF
Liberal Democracy	7.67	0.13035
Rule of Law	9.46	0.105714
GDP Growth	2.61	0.382606
GDPPC	4.27	0.234374
Inflation	1.5	0.665156
Unemployment	1.32	0.756248
Trade	1.6	0.625572
Education	1.33	0.751168
Government Ideology	1.15	0.872263
Financial Reserves	1.16	0.863944
CAB	1.61	0.62225
Fuel Exports	1.26	0.794655
Bond Default	1.37	0.730081
Mean VIF = 2.85		