

Research Report - Brief

Artificial Intelligence Preparedness Index and Its Relationship with Global Macroeconomic Conditions

An Analysis of 165 Countries and a Case Study of Indonesia

September 2026



About This Report

This report examines the relationship between the Artificial Intelligence Preparedness Index (AIPI), an index measuring countries' readiness for artificial intelligence, and global macroeconomic conditions. The analysis covers 165 countries, using the International Monetary Fund (IMF) AIPI for 2023 and World Development Indicators (WDI) for 2015–2024. The indicators examined are income per capita, economic growth, inflation, unemployment, trade, foreign direct investment, and internet use.

The analysis employs descriptive statistics, correlation analysis, regression models, and tests of geographic patterns. Some models also account for initial income levels and the historical trajectories of macroeconomic indicators to assess whether the associations with AIPI remain after these factors are considered. The findings describe cross-country relationships and should not be interpreted as evidence that AI preparedness causes changes in economic outcomes.

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Executive Summary

Finding	Key evidence	Interpretation
Wide gaps in AI preparedness persist across countries	Highest: 0.801 (Singapore); lowest: 0.184 (Central African Republic); median: 0.465. Median AIPI rises from 0.297 (low income) to 0.646 (high income).	Higher-income countries tend to be more AI-ready, but scores can vary substantially even within the same region.
Countries with similar preparedness tend to be neighbors	Moran's I = 0.56 ($p = 0.001$); 0.59 with four neighbors and 0.53 with eight neighbors.	This statistic measures the strength of geographic clustering, not the magnitude of influence between countries.
AI preparedness is closely associated with prosperity	Correlation with log GDP per capita: 0.89; standardized β : 0.86, the highest among the indicators examined.	The data do not establish which came first.
Similar patterns occur for other macro indicators	Internet use: 0.84; trade: 0.39; inflation: -0.38 ; growth: -0.31 ; unemployment: -0.08 ; FDI: 0.03.	The strongest association is with digital connectivity; the associations with unemployment and FDI are weak.
Associations with 2024 macroeconomic performance are not significant after controls	Without controls, $p \leq 0.030$ for growth, inflation, unemployment, and trade; with controls, all $p > 0.30$.	AI may generate economic benefits, but these are not detected using a single-year snapshot of AIPI.
All four pillars are associated with macro indicators, although not all remain significant	Pillar correlations with GDP per capita: 0.74–0.90; with internet use: 0.67–0.86. In the joint model, only the digital and human-capital pillars are significant.	The pillars are interrelated, so the other two should not be regarded as unimportant.
Indonesia is above the global and regional medians	AIPI: 0.516, compared with 0.465 globally and 0.507 in East Asia and the Pacific. Innovation pillar: 0.423, below both medians.	Readiness is uneven across pillars. Indonesia's 2024 macro performance compares favorably with the median of the middle AIPI tertile (descriptive comparison).

Recommendations: Assess all four AIPI pillars to identify weaknesses rather than focusing solely on the overall score. Explore regional cooperation on skills, digital infrastructure, and data standards. Measure AI's economic contributions through actual adoption and use by firms, workers, and public institutions, and use multi-year data to better test relationships with productivity, employment, and investment.



Section 1

Introduction

The IMF developed the AI Preparedness Index (AIPI) to compare countries' readiness to take advantage of AI and manage its risks. The index ranges from 0 to 1 and consists of four pillars: digital infrastructure; human capital and labor market policies; innovation and economic integration; and regulation and ethics. In the dataset used here, each pillar is recorded as a weighted contribution of approximately one-quarter of the overall index. These values are multiplied by four so that the pillar profiles can be compared on a common scale.

AI preparedness depends on more than access to technology. Workforce skills, innovation capacity, and governance are also reflected in the index. Because these factors are associated with levels of development, wealthier countries may have higher AIPI scores. Relationships between AIPI and economic conditions therefore require cautious interpretation. AI preparedness may reflect development capacity accumulated over time, while economic benefits from using AI may not be immediately observable.

Section 2

Objectives

The central question of this report is whether countries that are more prepared to adopt, integrate, and use AI experience faster economic growth. To address this question, the analysis describes the distribution of AIPI by region and income group; compares macroeconomic conditions across levels of AI preparedness; tests associations between AIPI and seven economic indicators; identifies the associations of individual pillars; and investigates geographic clustering in AI preparedness. Macroeconomic trends for 2015–2024 are compared across three groups defined by the 2023 AIPI: low, middle, and high, each containing 55 countries.

This analysis is not designed to establish whether AIPI causes economic growth. AIPI is available here only as a snapshot for 2023, and some of its components also reflect existing development conditions. Accordingly, neither the direction of the relationship nor the effects of other factors can be identified with confidence.

Section 3

Methodology and Data Sources

3.1 Data

The 2023 AIPI data come from IMF DataMapper, while the 2015–2024 macroeconomic indicators come from the World Development Indicators (WDI) via the World Bank API. The principal indicators include GDP per



capita at purchasing power parity (PPP, adjusting for differences in purchasing power across countries), real GDP growth, inflation, unemployment, trade as a share of GDP, net foreign direct investment (FDI) as a share of GDP, and internet users. Government debt is included as an additional indicator but is not used for the main conclusions because it is available for only 56 countries.

WDI indicator	Code	Role	Latest N
GDP per capita, constant 2021 PPP	NY.GDP.PCAP.PP.KD	Structural economic capacity	163
Real GDP growth	NY.GDP.MKTP.KD.ZG	Cyclical performance	165
Consumer price inflation	FP.CPI.TOTL.ZG	Price stability	164
Total unemployment	SL.UEM.TOTL.ZS	Labor market conditions	164
Trade (% of GDP)	NE.TRD.GNFS.ZS	Global integration	152
Net FDI (% of GDP)	BX.KLT.DINV.WD.GD.ZS	Investment flows	164
Internet users	IT.NET.USER.ZS	Digital baseline	165
Government debt	GC.DOD.TOTL.GD.ZS	Additional; limited data	56

3.2 Analytical Strategy

The descriptive analysis uses maps, distribution plots, scatter plots, and trend charts to illustrate cross-country differences. Spearman rank correlation is used to assess the direction and strength of monotonic relationships, making the measure less sensitive to extreme values. Simple regressions are estimated using ordinary least squares (OLS) with HC3 robust standard errors (an adjustment that makes inference more robust to unequal variance in the data). For 2024 macroeconomic indicators, additional models include log GDP per capita in 2022 and the 2015–2019 average of the same outcome indicator. This assesses whether the association with AIPI persists after accounting for initial development levels and historical patterns. The models remain observational and do not identify causal effects.

The spatial analysis identifies each country's six nearest neighbors using geographic centroids. Moran's I measures whether countries with similar AIPI values tend to be located near one another. Statistical significance is assessed using 999 permutations (random reallocations of observed values to compare the actual pattern with a random pattern). The test is repeated with four and eight neighbors to assess robustness. This analysis measures geographic clustering rather than the magnitude of any cross-country influence or spillover in AI preparedness.

Section 4

Results

4.1 AI Preparedness Varies Across Countries and Clusters Geographically

Across 165 countries, the mean AIPI is 0.476 and the median is 0.465, meaning that half of the sampled countries score below 0.465. Singapore has the highest score (0.801), while the Central African Republic has the lowest (0.184). Preparedness increases with country income level: median AIPI rises from 0.297 in low-income countries (N = 20) to 0.355 in lower-middle-income countries (N = 41), 0.481 in upper-middle-income countries (N = 47), and 0.646 in high-income countries (N = 57). Across regions, North America has the highest median (0.742), while Sub-Saharan Africa has the lowest (0.326). Yet preparedness can differ markedly within a region. In East Asia and the Pacific, for instance, scores range from 0.290 to 0.801, with a median of 0.507. Income level and geography are thus associated with AI preparedness but do not fully account for cross-country variation.

Countries at similar levels of AI preparedness also tend to be geographically close. Moran's I based on the six nearest countries is 0.56 ($p = 0.001$). Results are consistent when the number of neighbors changes: 0.59 with four and 0.53 with eight. In other words, countries with relatively high AIPI tend to be close to other high-AIPI countries, while low-AIPI countries tend to cluster. Moran's I measures the strength of spatial clustering, not the effect of one country on its neighbors, and therefore cannot be used to quantify spillovers.

Figure takeaway

Countries with comparable AI preparedness tend to be geographically close (Moran's I = 0.56; $p = 0.001$). The sample median is 0.465.

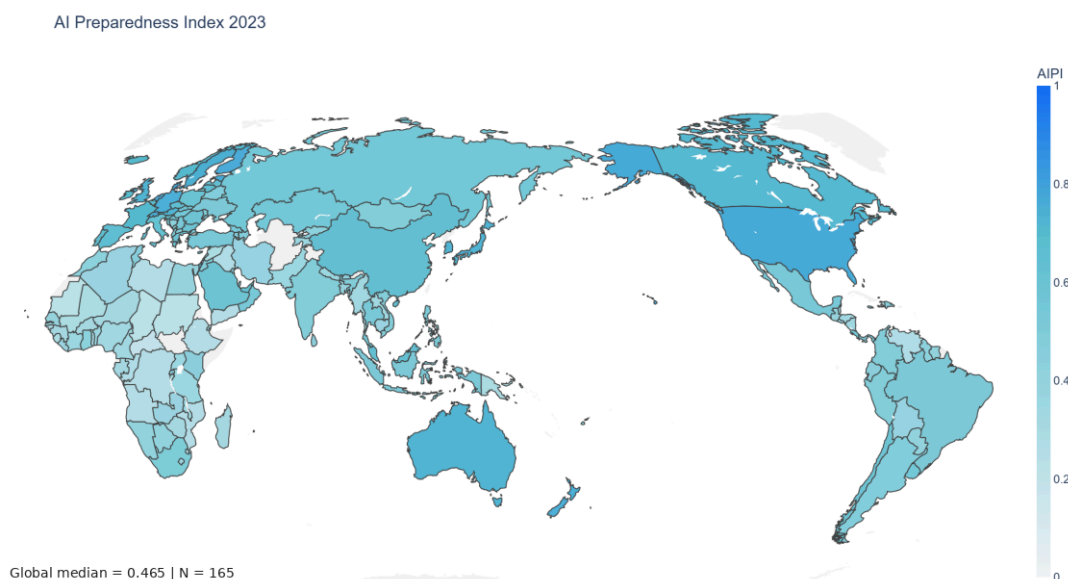


Figure 1. Spatial distribution of AIPI in 2023. Darker shades indicate higher AIPI scores. The global median and country count are displayed in the graphic. Source: IMF AIPI; authors' calculations.

**Figure takeaway**

The cross-country gap in AI preparedness remains substantial: Singapore scores highest (0.801), while the Central African Republic scores lowest (0.184).

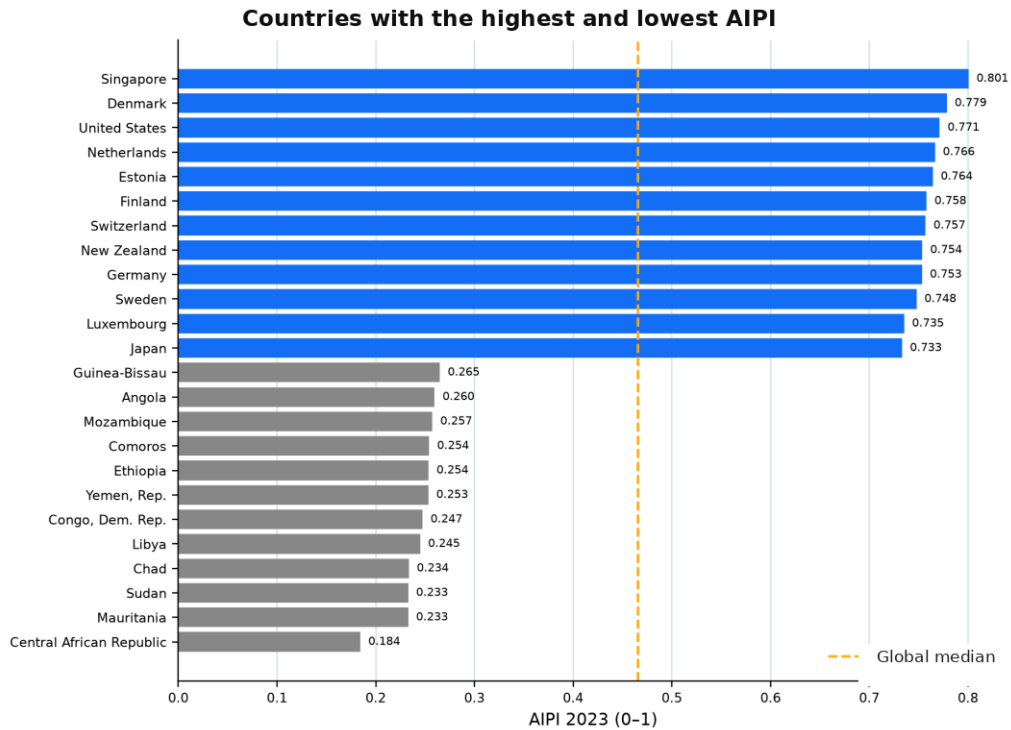


Figure 2. Twelve countries with the highest and lowest AIPI scores. Country scores and the global median are shown.

Figure takeaway

Higher-income countries tend to be more prepared for AI. Median AIPI rises from



0.297 (low income), 0.355 (lower-middle income), and 0.481 (upper-middle income), to 0.646 (high income).

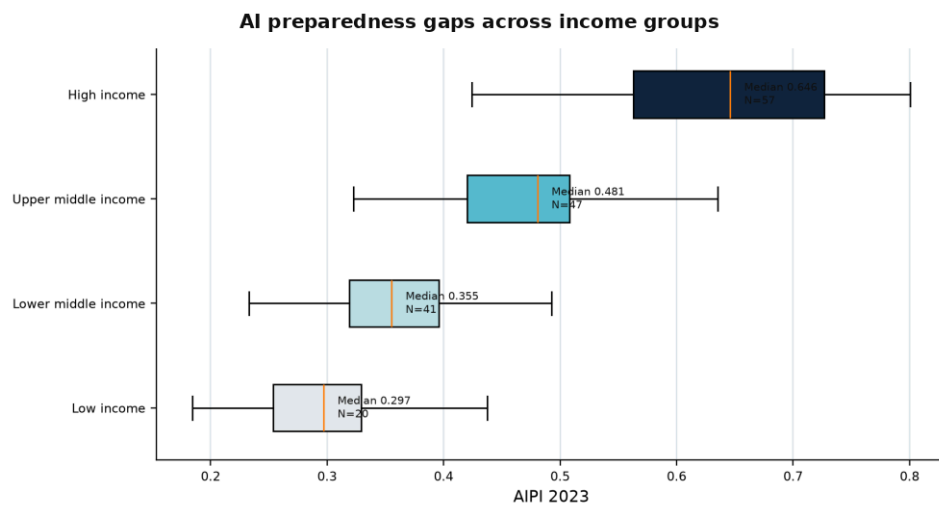


Figure 3. Horizontal box plots of AIPI by income group. Group medians and sample sizes are shown.

Figure takeaway

North America has the highest regional median (0.742) and Sub-Saharan Africa the lowest (0.326). Within-region variation is also substantial, including in East Asia and the Pacific (0.290–0.801; median 0.507).



Figure 4. Strip plots of AIPI by region. Red lines and figures indicate regional medians.

Figure takeaway

Countries with similar AIPI values tend to be neighbors. This pattern holds for alternative neighborhood definitions: Moran's I is 0.59 for four neighbors and 0.53 for eight.

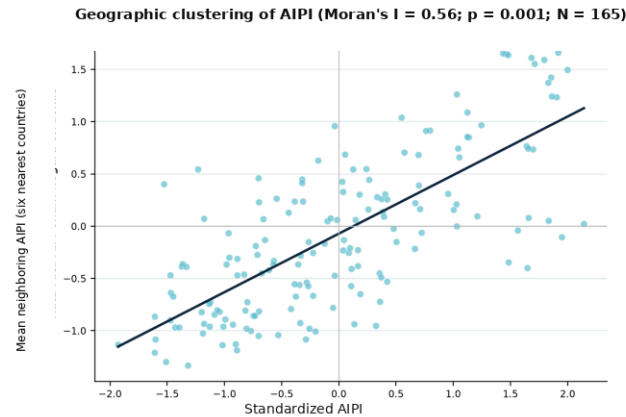


Figure 5. Moran scatter plot for 2023 AIPI. Moran's I, permutation-based p-value, and sample size are shown.

4.2 AI Preparedness Is Closely Associated with Prosperity and Several Macroeconomic Indicators

AI preparedness is strongly associated with economic prosperity. The Spearman correlation between AIPI and log GDP per capita at PPP is 0.89 (N = 163). In a simple regression, the standardized coefficient is 0.86, the largest among the indicators examined. Standardized coefficients allow comparisons of association strength across outcomes measured in different units. Nevertheless, these data do not show which came first: AI preparedness that contributes to prosperity, or greater prosperity that supports AI preparedness.

Similar patterns appear for other macroeconomic indicators. AIPI is positively correlated with internet use (0.84) and trade (0.39), and negatively correlated with inflation (−0.38) and economic growth (−0.31). Its associations with unemployment (−0.08) and FDI (0.03) are weak. In simple regressions, standardized coefficients are 0.77 for internet use and 0.40 for trade openness, while the FDI coefficient is not significant (p = 0.511). For unemployment, the rank correlation is weak, but the simple linear regression gives a standardized coefficient of −0.21 (p = 0.003). This difference indicates that the linear association is not consistent with countries' rank ordering and warrants caution. Overall, AIPI is more closely associated with prosperity and digital connectivity than with the other macroeconomic indicators.

Figure takeaway

AIPI is strongly correlated with GDP per capita (0.89) and internet use (0.84),



positively correlated with trade (0.39), and negatively correlated with inflation (−0.38) and growth (−0.31). Associations with unemployment (−0.08) and FDI (0.03) are weak.

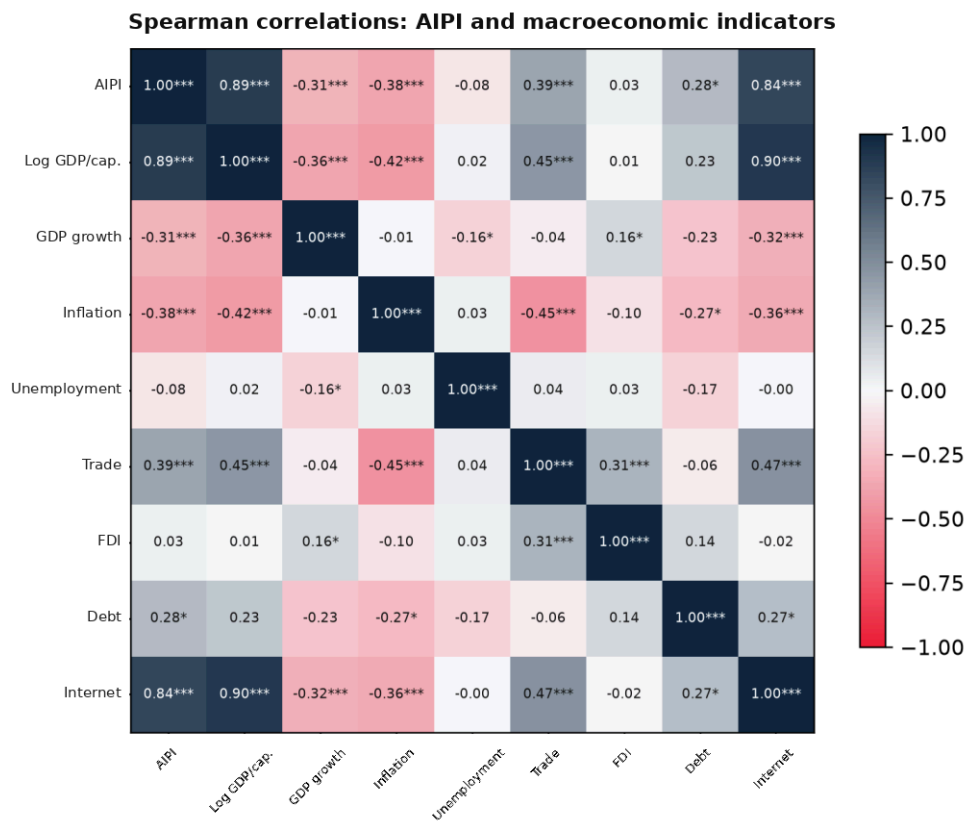


Figure 6. Spearman correlation matrix. Values are coefficients; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure takeaway

The correlation between AIPI and log GDP per capita at PPP is 0.89 (N = 163). These data do not



show which comes first: AI preparedness leading to prosperity, or greater prosperity supporting AI preparedness.

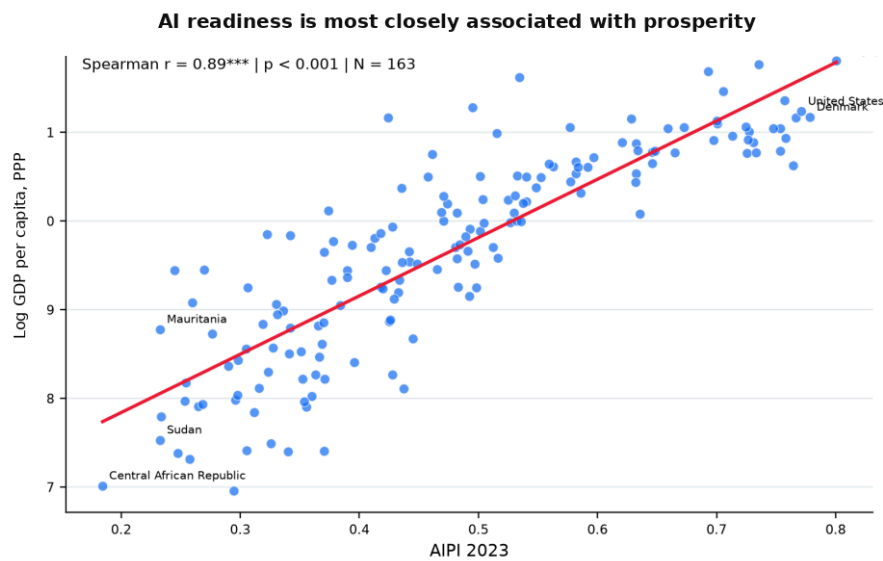


Figure 7. AIPI and log GDP per capita at PPP. Spearman correlation, significance, and N are displayed.

Figure takeaway

In simple regressions, the largest standardized coefficient is for GDP per capita (0.86), followed by internet use (0.77) and trade (0.40). The FDI coefficient is not statistically significant.

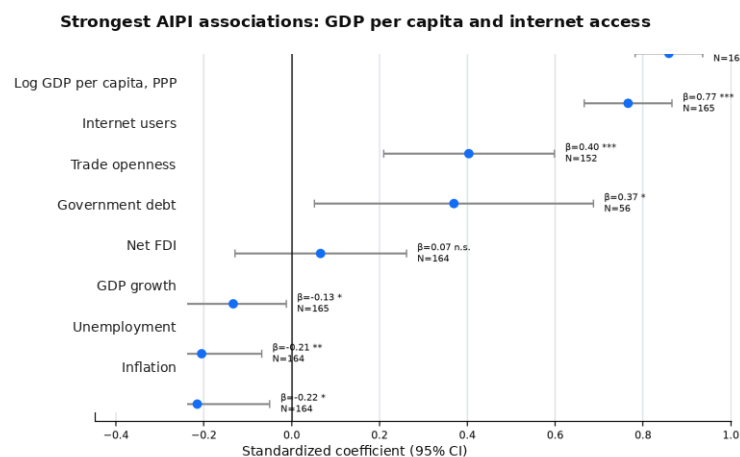


Figure 8. Standardized bivariate regression coefficients and 95% confidence intervals. Standardized β , significance, and N are indicated.

4.3 Associations Between AIPI and 2024 Macroeconomic Performance Are Not Significant After Controls

Without controls, AIPI coefficients are significant in simple regressions for GDP growth ($p = 0.030$), inflation ($p = 0.011$), unemployment ($p = 0.003$), and trade openness ($p < 0.001$), while net FDI is



not significant ($p = 0.511$). The associations are negative for growth, inflation, and unemployment and positive for trade. The negative association with growth is consistent with the tendency for high-income countries, which generally have higher AIPI scores, to grow more slowly; the correlation between log GDP per capita and growth is also negative (-0.36). Uncontrolled associations therefore cannot directly be interpreted as benefits or costs of AI preparedness.

The extended models include log GDP per capita in 2022 and the 2015–2019 average of each corresponding outcome. After accounting for these factors, AIPI coefficients are not significant even at the 10% level for any 2024 outcome: growth ($p = 0.309$), inflation ($p = 0.840$), unemployment ($p = 0.664$), trade ($p = 0.409$), or FDI ($p = 0.791$). The models therefore do not provide sufficient statistical evidence of an independent association between AIPI and these indicators. This does not prove that such a relationship is absent. AI may have economic benefits that cannot yet be detected from a single-year AIPI snapshot and the indicators used in this report.

P-values for AIPI coefficients and 2024 macroeconomic indicators, with and without controls

2024 indicator	p without controls	p with controls
GDP growth	0.030	0.309
Inflation	0.011	0.840
Unemployment	0.003	0.664
Trade openness	< 0.001	0.409
Net FDI	0.511	0.791

The uncontrolled specification is a simple regression of each outcome on AIPI. The controlled specification includes log GDP per capita in 2022 and the average value of that outcome in 2015–2019. All models are estimated by OLS with HC3 standard errors. None of the controlled AIPI coefficients is significant at the 10% level. Full estimates are provided in Section 4.6 and the Appendix.

Figure takeaway

The AIPI groups show different inflation and unemployment patterns. GDP growth in

all three groups also declined in 2020. These charts illustrate historical differences, not the impact of AIPI.

Macroeconomic trends, 2015–2024, by 2023 AIPI tertile

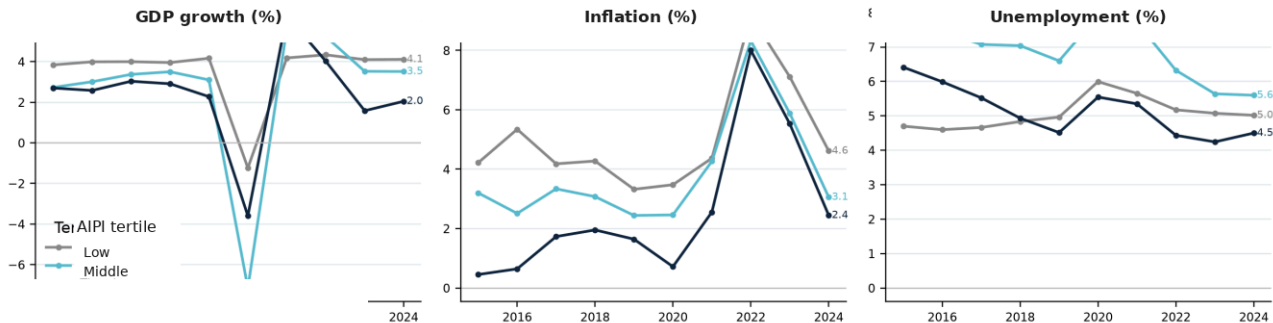


Figure 9. Median GDP growth, inflation, and unemployment in 2015–2024 by 2023 AIPI tertile. Groups are defined using fixed 2023 AIPI positions; the charts do not show AIPI trends.

4.4 All Four AIPI Pillars Are Associated with Macroeconomic Indicators, but Not All Associations Remain Significant

All four AIPI pillars are also associated with macroeconomic indicators. The Spearman correlations between individual pillars and log GDP per capita range from 0.74 to 0.90; their correlations with internet use range from 0.67 to 0.86. Digital infrastructure has the highest correlation with both indicators (0.90 and 0.86, respectively). Like the overall index, all four pillars are negatively correlated with growth (−0.34 to −0.24) and inflation (−0.42 to −0.31), while their associations with unemployment (−0.11 to −0.05) and FDI (−0.02 to 0.06) are weak. When all four pillars enter the same model, only digital infrastructure ($p < 0.001$) and human capital and labor market policies ($p = 0.003$) remain significant for log GDP per capita. Both are also positively associated with internet use ($p < 0.001$). Independent associations for innovation and economic integration, and for regulation and ethics, are not stable after accounting for relationships among pillars. These findings require caution because the pillars are correlated with each other and form part of the same composite index. They do not imply that the other two pillars are unimportant.

Figure takeaway

Countries in the high-AIPI tertile have higher average scores across all four pillars. This difference partly reflects the way the composite index is constructed.

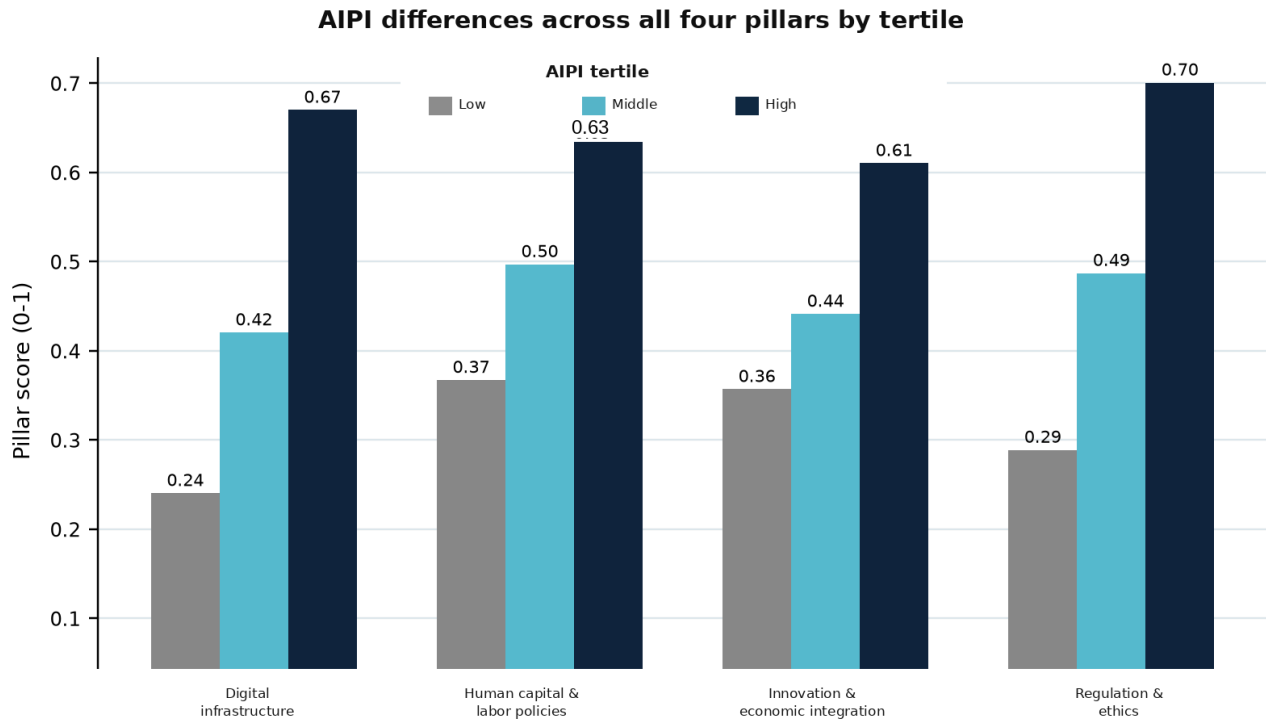


Figure 10. Average AIPI pillar scores by tertile of the overall index.

Figure takeaway

All four pillars are positively correlated with GDP per capita (0.74–0.90). Digital infrastructure has the strongest correlation (0.90).

All four pillars correlate with prosperity, with varying strength

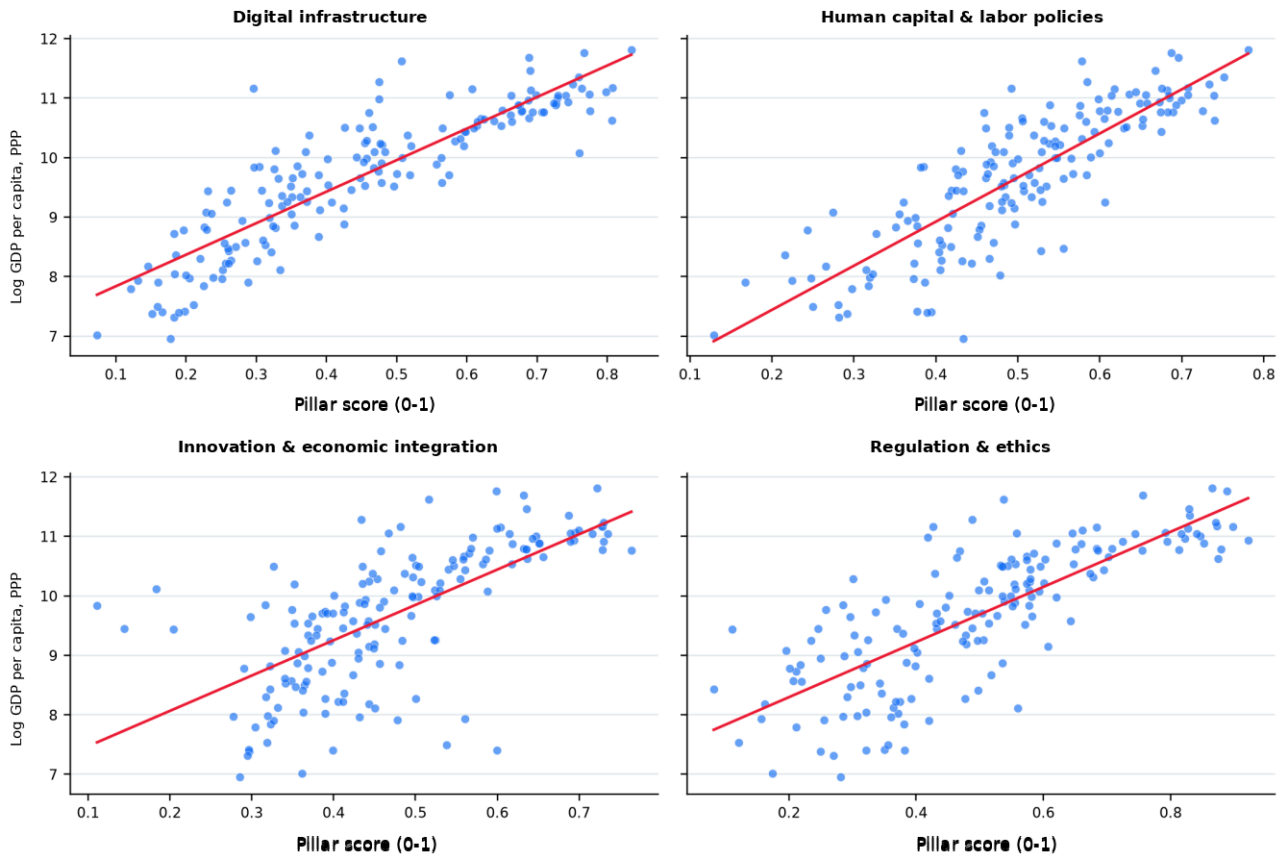


Figure 11. Scatter plots of the four AIPI pillars against log GDP per capita at PPP. Each panel displays its Spearman correlation, p-value, and N.

Figure takeaway

Correlations with GDP per capita range from 0.74 to 0.90, and those with internet use from 0.67 to 0.86. Associations with unemployment and FDI are weak.

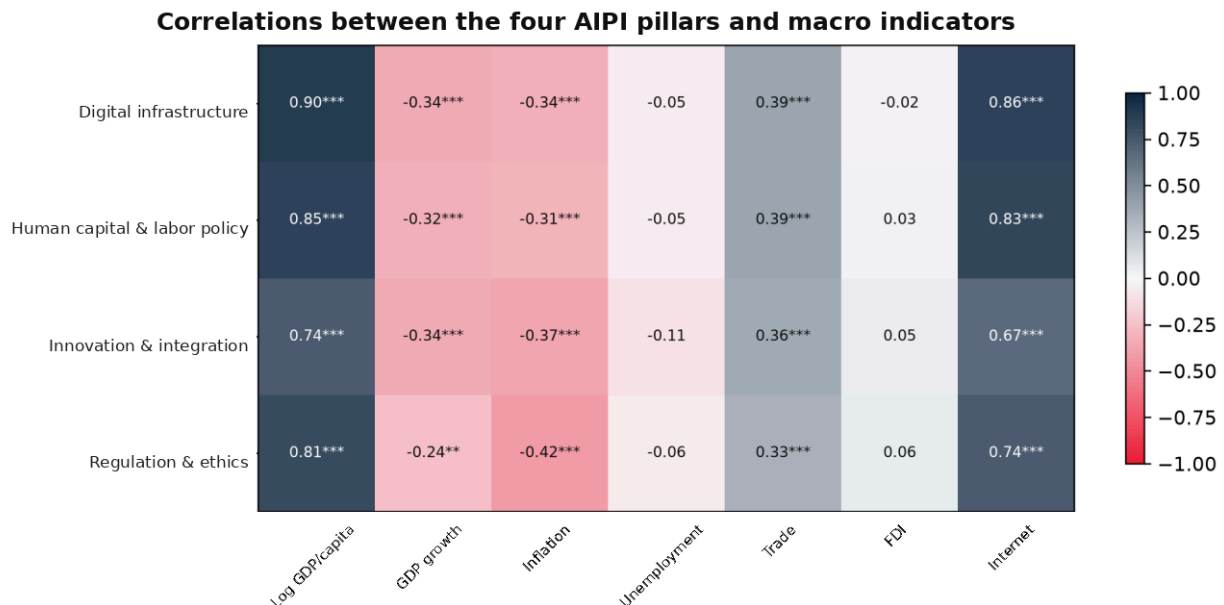


Figure 12. Spearman correlations of the four AIPI pillars with seven macroeconomic indicators. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The pillars are interrelated; these results do not mean the other pillars are unimportant.

4.5 Indonesia Case Study

Indonesia has an AIPI score of 0.516, above both the global median (0.465) and the East Asia and Pacific median (0.507), although its performance is not above the median for every pillar. Regulation and ethics (0.643) is Indonesia's highest-scoring pillar and exceeds both medians. Human capital and labor market policies (0.520) and digital infrastructure (0.478) are above the global median but below the regional median. Innovation and economic integration (0.423) is the lowest-scoring pillar and falls below both medians. These comparisons indicate an uneven preparedness profile across pillars. However, pillar scores do not directly measure the quality of policy implementation or actual levels of AI use.

According to the WDI data used, Indonesia's GDP per capita at PPP is approximately 14,471 constant international dollars, and internet use reaches 72.8%. To provide a more comparable benchmark, Indonesia's macroeconomic performance is compared with the median of countries in the middle AIPI tertile, the group to which Indonesia belongs. In 2024, Indonesia recorded GDP growth of 5.0% (group median: 3.5%), inflation of 2.2% (group median: 3.1%), and unemployment of 3.3% (group median: 5.6%). Thus, Indonesia performed better on these three indicators than the median country in its preparedness group in 2024. This comparison is descriptive and does not attribute differences in economic performance to AI preparedness.

Figure takeaway

Indonesia's overall AIPI is above the global and East Asia and Pacific medians.

Regulation and ethics exceeds both medians; human capital and labor market policies and digital infrastructure exceed the global median only, while innovation and economic integration falls below both.

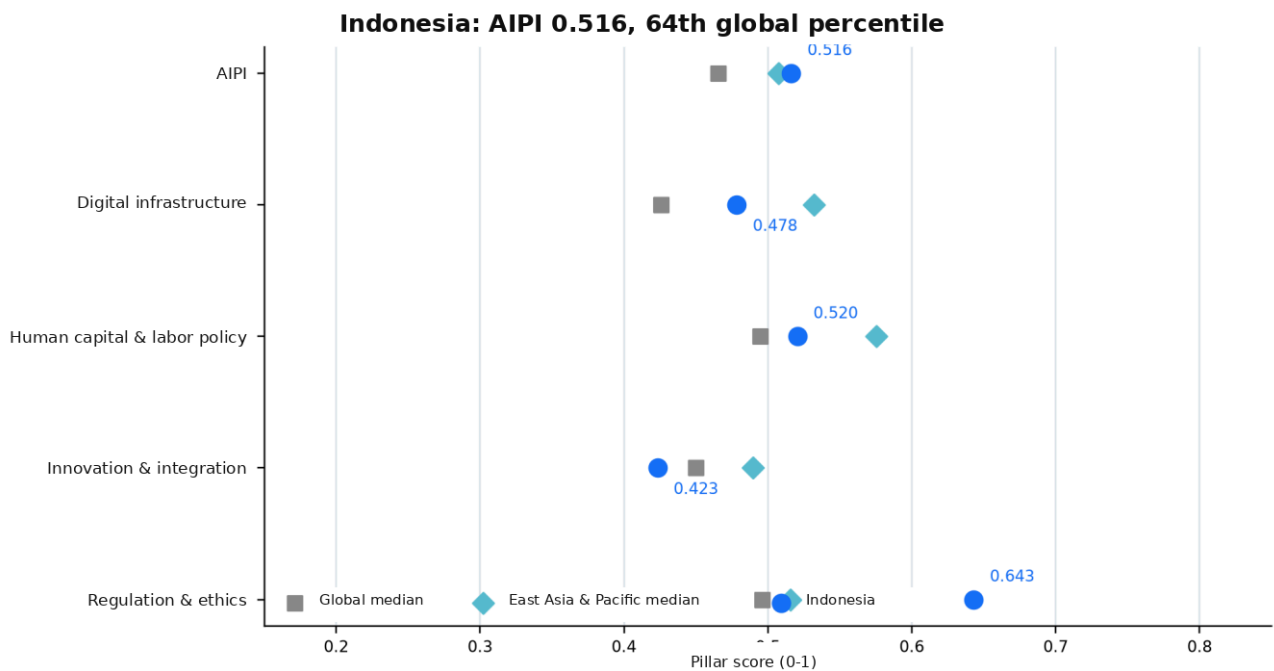


Figure 13. Indonesia's overall AIPI and four pillar scores compared with global and East Asia and Pacific medians.

Figure takeaway

In 2024, Indonesia's growth (5.0%) was higher, while inflation (2.2%) and unemployment (3.3%) were lower than the medians for the middle AIPI tertile (3.5%, 3.1%, and 5.6%). The differences cannot be causally attributed to AIPI.

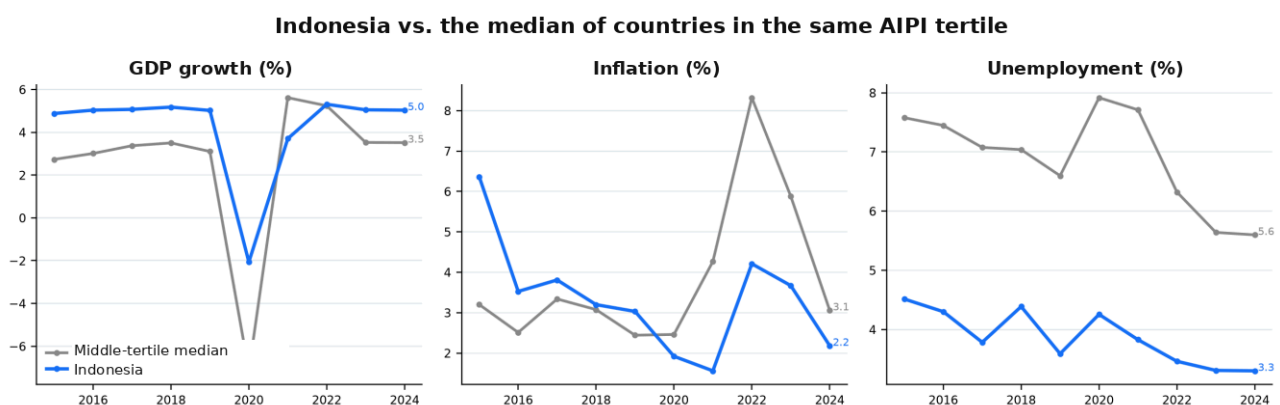


Figure 14. Macroeconomic trends for Indonesia and the median of countries in the same AIPI tertile, 2015–2024. Values at the right-hand ends of lines denote 2024 observations.



4.6 Main Regression Results

Outcome	Spearman r	AIPI coef.	HC3 SE	Std. β	p	N	R ²
Log GDP per capita, PPP	0.89	6.577	(0.301)	0.86	< 0.001	163	0.736
GDP growth	-0.31	-3.861	(1.780)	-0.13	0.030	165	0.018
Inflation	-0.38	-42.378	(16.588)	-0.22	0.011	164	0.047
Unemployment	-0.08	-7.571	(2.567)	-0.21	0.003	164	0.042
Trade openness	0.39	151.292	(37.244)	0.40	< 0.001	152	0.163
Net FDI	0.03	8.576	(13.039)	0.07	0.511	164	0.004
Government debt	0.28	86.676	(38.027)	0.37	0.023	56	0.136
Internet users	0.84	131.057	(8.704)	0.77	< 0.001	165	0.586

Notes: Spearman r reports rank correlation (as in Figure 6). The other columns are obtained from separate simple regressions for each outcome, using HC3 standard errors. AIPI coefficients cannot be directly compared because the dependent variables have different units; standardized β is used to compare association strength (as in Figure 8). These results describe statistical associations, not effects of AIPI. Government debt is available for only 56 countries and is therefore excluded from the main findings.

Section 5

Conclusions and Recommendations

This analysis finds that AI preparedness is strongly associated with prosperity and digital connectivity: AIPI is correlated with GDP per capita at 0.89 and with internet use at 0.84. Preparedness varies widely between countries, rises with income level, and clusters geographically (Moran's $I = 0.56$). In relation to the report's central question, the data do not indicate that countries with higher AI preparedness grow faster. Without controls, the correlation between AIPI and GDP growth is negative (-0.31). After accounting for initial income and the historical trajectories of each indicator, AIPI has no statistically significant association with growth, inflation, unemployment, trade, or FDI in 2024. This does not mean that AI lacks economic benefits. Such benefits may exist but remain undetectable with a one-year snapshot of AIPI and the indicators examined here. Indonesia exceeds both the global and regional AIPI medians, although innovation and economic integration remains an area of relative weakness.

First, the four AIPI pillars should help identify specific preparedness gaps rather than simply increasing the overall index. Policy priorities should reflect each country's conditions and draw on more detailed data. Second, geographic clustering may motivate further examination of regional cooperation, including skills development, digital infrastructure, and data standards. However, this analysis does not



assess the effectiveness of such cooperation. Third, AI's economic benefits should be evaluated using measures of actual adoption and use by businesses, workers, and public institutions. Fourth, further studies should draw on multi-year data and investigate productivity, occupational changes, and AI investment to better identify the timing of effects and account for other factors.

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Brief Appendix

This appendix summarizes the regression results with controls and the spatial robustness checks. The source document states that raw data, merged datasets, regression outputs, influence diagnostics, figures, and analysis code are stored together. The availability and reproducibility of these materials should be checked against the analytical archive before they are considered independently verified.

Controlled Regressions for 2024 Macroeconomic Performance

2024 outcome	AIPI coef.	HC3 SE	p	N	R ²
GDP growth	-7.931	(7.799)	0.309	162	0.103
Inflation	2.478	(12.251)	0.840	155	0.560
Unemployment	-1.127	(2.590)	0.664	159	0.828
Trade openness	-21.057	(25.493)	0.409	145	0.937
Net FDI	-2.378	(8.961)	0.791	160	0.018

Each specification includes log GDP per capita in 2022 and the 2015–2019 average of the same indicator. No AIPI coefficient is statistically significant at the 10% level. The models therefore provide insufficient statistical evidence of an independent relationship between AIPI and the 2024 macroeconomic indicators examined.

Spatial Robustness Checks

Number of neighbors	Moran's I	Permutation p-value	N
4	0.590	0.001	165
6	0.560	0.001	165
8	0.535	0.001	165

All specifications use geographic country centroids and row-standardized nearest-neighbor matrices (weights for each country sum to one). P-values are based on 999 permutations. These results measure geographic clustering and do not establish cross-country spillover effects.