JOURNAL OF DEVELOPMENT STUDIES (JDS)
VOL.6-NO.1(6)-2025
ISSN 2667-9922

How Development Stands Apart across Regions: Evidence from Asia, Africa, and Latin America

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ARTICLE INFO

Article history:

Accepted: September 15, 2025
Approved: December 15, 2025

Keywords:

Regional Inequality, Trade Openness, Human Capital, Institutional Quality, Economic Convergence.

ABSTRACT

This study investigates the persistence of regional inequalities in global economic development by comparing Asia, Latin America, and Sub-Saharan Africa over the period 1995–2020. While globalization theory predicts income convergence across countries, empirical patterns reveal sharply divergent regional trajectories. Using an unbalanced panel of 31 countries and drawing on data from the World Bank, Penn World Table, Barro-Lee, and Worldwide Governance Indicators, the paper examines how trade openness, human capital, and institutional quality shape per capita income dynamics. The empirical strategy combines descriptive analysis, panel unit-root and cointegration tests, regional inequality measures (coefficient of variation and Theil index), fixed-effects regressions, and a panel error-correction framework.

The results show evidence of convergence in Asia, stagnation in Latin America, and increasing divergence in Sub-Saharan Africa. Regression estimates indicate that trade openness contributes positively to income growth only when supported by adequate human capital and strong institutions, highlighting the conditional nature of globalization's benefits. Inequality regressions further suggest that improvements in education and governance reduce regional disparities, while openness alone does not.

Overall, the findings emphasize that reducing global and regional inequalities requires a coordinated development strategy that links external economic integration with sustained investments in human capital and institutional capacity.

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Introduction

Contrasts in economic development remain one of the most persistent problems in today's global economy. Despite decades of globalization, once anticipated to promote concordance and shared prosperity, sizable gaps regarding income, productivity and development outcomes persist. These inequalities are evident not only between nation-states, but across regions, and even within towns and cities in less developed countries.

States in the developing world have experienced globalization very differently. Some, such as the emerging market economies of Asia, achieved an explosion of growth with deep changes in industry, while others find themselves still paralyzed by structural weakness, volatility and institutional fragility. For policymakers seeking strategies for equitable development, there is a pressing need to understand both why regional inequalities continue to exist, and the factors and mechanisms that fuel segmentation.

It is important to remember that economic disparities represent far more than differences in statistical indicators. They reflect profound variations in living standards, educational quality, state or countrywide support of health systems, infrastructure, and available job opportunities. For example, in 2023, the average GDP per capita (PPP) for East Asia was around 18,000 (USD), while Sub-Saharan Africa was lower than 6,000, and Latin America was approximately 12,000 (World Bank, 2023).

These contrasts involve more than income alone. They raise questions about countries' and regions' capacities to engage in trade, adopt new technologies, and integrate into the global economy. As an illustration, while several Asian countries have successfully entered global value chains and pursued export-oriented industrialization, many African economies remain commodities-based. In turn, Latin America continues to be locked into sluggish productivity, and longstanding economic and institutional challenges.

Current patterns of globalization reveal that, although globalization has been promoted as a pathway to shared prosperity, its benefits have been distributed highly unevenly. The 2008 global financial crisis and the COVID-19 pandemic highlighted the ways in which globalization could increase vulnerability for countries with weak institutional systems and limited fiscal capacity. More recent empirical research indicates that the relationship between trade liberalization, capital mobility and inclusive economic growth are far from automatic. Indeed, both within countries and between countries, inequality may be exacerbated by trade liberalization and capital mobility if domestic absorptive capacity is limited (Rodrik, 2018).

As a result, the distributional impacts of globalization have become a major policy issue. The gains from increased trade and investment have tended to accrue disproportionately to highly skilled individuals and actors with access to global markets, while workers in traditional sectors and residents of economically isolated regions have often been left behind. The growth of global value chains has caused a new type of dependency on international markets for many developing countries. Further, in most cases, devel-

oping countries exist in lower value-added portions of global value chains, with developed countries capturing the bulk of generated rents.

As such, studying how globalization is distributed will enable researchers to describe why some regions of the world (for example, East Asia) have experienced economic convergence due to globalization, while others have experienced stagnation or divergence (for example, sub-Saharan Africa). It is therefore important to consider not only the degree to which countries are open to global trade, but also whether they possess the institutional quality, human capital, and broader developmental capacity needed to leverage openness for equitable and sustainable growth.

Arguments for why economic disparity still exists across global economic conditions find their roots in innumerable theorical framed postulates. The neoclassical growth model tells us that poor economies should grow faster than rich economies and close the gap as result of capital accumulation and diminishing marginal returns (Lazarević, 2023). Yet, when you look at the realities of nations or policy choices, the opposite is often the case, especially with countries that have weaker human capital and poor governance systems. At the same time, the theoretical frames of dependency and structuralism highlight these conditions as a disproportionate burden of unequal integration in the global economy, and the terms of trade that perpetuate unequal dependency on technologies and variations in capital flows. More recent approaches have outlined, through more specific institutional frameworks, that education and, at minimum, previously outlined broad exposure to trade, continues to mediate whether globalization leads to a "converge" or "diverge" experience.

Regional examples around the world illustrate these dynamics. In Asia, sustained investments in education, large-scale export activity, and relatively effective institutional frameworks have contributed to decades of economic convergence. Beyond the well-documented rise of China and India, the rapid industrialization of the "Asian Tigers" lifted hundreds of millions out of poverty, and significantly narrowed the development gap between Asia and the advanced and global economies (Onalo *et al*., 2021).

The variance in African states to behavior demonstrate these concepts and experiences to a much less impactful extent, with many having loosely retained economic activity in de-industrialization, with often far weaker institutions and vulnerability to external shocks in periods of volatility.

Even with human capital investment, Latin America provides a mixed story of success in the behavioral shift, having failed to reap transformative benefits greater than convergence, due to either the broad presence of structurally unequal barriers to efficiency, inequality, or histories of extensive macroeconomic instability.

The visible gaps in economic growth are concerning not merely as development challenges but also as potential sources of social and geopolitical tension. Inequality indicators increasingly reveal that persistent disparities contribute to economic fragility. Rising inequality generates pressures for migration, weakens collective governance, and complicates progress toward the United Na-

tions Sustainable Development Goals (SDGs), and so forth (Alliance for Rural Electrification [ARE], REN21, & Power for All, 2023). Inequalities also generate and compromise economic stability, as seen during the ongoing COVID-19 pandemic, when many nation-states with a lower capacity investment in health systems, and higher limited fiscal resources, were at a disadvantage to the much higher and relatively more developed nation-states. For these reasons, the implications of inequality extend well beyond moral arguments for reducing disparities: they underscore the need for strengthening institutional resilience, promoting inclusive development, and ensuring that the gains from globalization become widely shared: conditions essential for sustaining stable and functional economies in an increasingly interconnected world.

Why do some parts of the world prosper while others struggle? We wanted to explore this question by comparing the development journeys of Asia, Africa, and Latin America, treating them as unique regions so as to better grasp the bigger picture of global inequality. Where surveys often take a wide-ranging approach to greater swath of variables, this paper is focused on three explanatory variables: trade openness, human capital, and institutional quality, all of which play a mediating role in development (Tinta, 2022) and reflect the external, internal and governance dimensions of development. Trade openness indicates the degree economies are integrated into global trade, human capital shows the extent of greater and deeper absorption of knowledge within populations, while the quality of institutions suggests the efficiency and credibility of governance of the economy. Ultimately, and together, these explanatory variables allow us to generate a relatively parsimonious and yet intricate framework to explain divergent development across regions.

1. Literature Review

Regional economic performance has varied greatly across Asia, Latin America, and Sub-Saharan Africa over the past several decades, leading to markedly different growth paths (Morrell, 2006). By 2000, the East Asian economies (e.g., China, Korea) had enormously outstripped Latin America, despite the fact that Latin America had previously been educationally, and, per capita, income-wise, ahead of East Asia (Hanushek & Woessmann, 2012). For example, Hanushek and Woessmann (2012) demonstrate that around 1960, Latin America had higher schooling and income outcomes than East Asia, while by 2000, East Asia had moved well ahead of Latin America, leaving Latin America and Sub-Saharan Africa in the bottom half of growth and income measures. Their analysis of test scores indicates that variations in educational quality (measured by cognitive achievement rather than years of schooling) account for much of this gap: when test scores were included in a growth regression, differences in the quality of human capital explained between a half and two-thirds of the income gap between Latin America and East Asia. In other words, Latin America's relatively high enrollment rates were undermined by low educational quality, preventing the region from achieving Asia's growth trajectory. More generally, there is

growing empirical literature documenting that Sub-Saharan Africa has underperformed all developing regions. Bunje, Fofack, and Adeyemi (2022) suggest that whereas the Asian "Tiger" economies experienced tremendous growth led by openness, lifting millions out of poverty, many African economies remain trapped in poverty.

Empirically, when Africa is included in global convergence analyses, the estimated rate of convergence slows substantially compared to analyses excluding the continent, reflecting Africa's persistent lag in all three dimensions: trade integration, human capital quality, and institutional capacity. Analyses with Africa included demonstrate that convergence is much slower than similar analyses excluding it (Patel, 2021). Latin America has also lagged behind East Asia in growth, and, in fact, Latin America often resembles Africa more than Asia in per capita growth performance.

Differences in institutional quality have played a major role in shaping regional outcomes. In Latin America, prolonged institutional weaknesses have significantly hindered long-term growth (Sawyer, 2011). Vianna and Mollick (2018) estimate that a 0.1 point increase in the institutional composite index (0 to 1 index) increases per capita output by 3.9% in Latin America, compared to a 2.6% effect worldwide. They also measured that much of this potential had been lost due to poor rule of law and political instability, which contributes to the possibility that Latin America's moderate human capital has not been fully realized due to the weakness of its institutions. Meanwhile, Onafowora and Owoye (2024) find that trade openness does not increase growth in Latin America unless governance is effective. They found that effective governance, measured through control of corruption, regulatory quality, and the rule of law, strengthens the positive impact of trade openness on economic growth.

On the other hand, when governance indicators such as voice, accountability, or political stability are weak, trade openness may actually reduce growth instead of enhancing it (Onafowora & Owoye, 2024). In other words, trade and investment do not guarantee increases in growth if contracts cannot be enforced, or if corruption siphons away profits.

East Asia, on the other hand, experienced growth, in many cases with an increase in their institutional capacity, by using a model of the developmental state, so that trade and investment could lead to productivity and wages.

Sub-Saharan Africa generally has much lower governance indicators than the other regions, and this corresponds to continued poor development outcomes. This institutional gap is one explanation for why Africa continues to lag behind, since there has been both trade liberalization and aid (Kargbo, 2017). Meta-analyses suggest that structural weaknesses in institutions contributed to anchoring Africa in this stagnation (Fosu, 2013).

A force shaping this gap is the supply of human capital. East Asian economies prioritized universal education and health, resulting in high literacy rates and a skilled workforce capable of supporting technological upgrading. Latin America somehow brought about intentionally high levels of enrollment in schooling early on the developmental

path, yet access to and quality of education did not seem to advance meaningfully. Hanushek and Woessmann (2012) point to the relatively high levels of schooling in Latin America in 1960, and note that, while there was evidently much schooling in place, poor test scores slowed the pace.

By 2000, East Asian economies had surpassed Latin America on educational outcomes, and were often scoring closer to the top of international comparisons. Their rates of growth were also much higher. In addition, when adjusting for cognitive achievement, test score differences in the argument of growth human capital differences explain roughly half to two-thirds of the GDP difference also. In other words, in terms of worker cognitive skills, both Latin America and Africa have exhibited such low levels when compared to workers in East Asian economies, that the convergence process is restrained.

More recent studies have also examined international comparisons supporting the claim that human capital is a major ingredient in growth and complexity. Higher education levels also interact with trade benefits. Nguyen and Su (2021) present new evidence from 40 developing countries to show that trade openness corresponds to increases in economic complexity only if human capital is present. Similarly, Rivera *et al*. (2023) demonstrate that Latin America's lower levels of human capital, combined with weak institutional quality, help explain the region's limited economic diversification relative to more advanced economies. This indicates that Latin American economies have achieved moderate levels of formal education (measured in years of schooling), but suffer from lower quality human capital (as reflected in cognitive achievement and skill outcomes) when compared with Asian economies. Moreover, the region's institutional quality remains substantially weaker than both Asian and advanced economies, preventing the full realization of even its existing educational investments.

Across Africa, human capital indicators remain weak overall, which, compounded by high disease burdens and inequality, deters growth (Mbonigaba & Wilfred, 2019). Following from this, a global assessment indicates that human capital is beginning to converge as education gains accelerate more quickly in South Asia and Africa than in Europe. However, this has come too late to create strong income convergence (Kim & Loayza, 2019). When accounting for human capital levels statistically, the coefficients for leading convergence estimates double globally, whereas, when accounting for institution, these have far less of a benefit (Kim & Loayza, 2019). This may suggest that, over the last twenty years, schooling and skills have mattered more in the cross-country catch-up than governance does, although both are crucial.

Similarly, trade openness and integration into global markets have played out differently across regions. In East Asia, there were rapid stages of growth associated with export-led industrialization and diversification. As Agosin *et al* (2012) noted, it was not just trade openness that was unique in Asia, but the way in which its countries opened to trade, characterized by rapid export growth combined with deepening diversification. Agosin finds empirical evidence that diversified export growth is a key to economic

growth, and provides a rationale for why the fast-growing economies in Asia greatly outpaced those of Latin America. On top of that, many Asian economies transitioned from exports in commodities to exports in high value-added manufactured goods, and benefitted from foreign investment and technologies. Trade in Latin America increased rapidly in the 1980s, but most of its countries remained in either a small number of commodities, or in basic manufactured goods, making them more volatile and somewhat more vulnerable to terms-of-trade shocks.

In trade liberalization, there were mixed results in the African countries. Bunje *et al*. (2022) examine 52 African countries, and find that GDP per capita did increase due to export growth, but decreased due to import growth, demonstrating Africa's still-weak production capacity and high vulnerability to imports. Nguyen and Su (2021) demonstrated that, when addressing growth potential, trade openness only raises complexity in employment if basic inputs such as educated workers, electricity, and internet access are available.

Asia levered globalization much better than Latin America and Africa did, which were in many respects weaker in outcomes, primarily due to their insufficient human and institutional absorptive capacity.

Some empirical papers from West Asia provide additional perspective. Yang, Zhang, and Rudnák (2021) find that trade liberalization related to initiatives such as the Belt and Road can lead to higher growth. But the benefits vary across countries in those regions. We can observe trade opportunities providing more benefits to Asia than to Africa and Latin America. Abbasov (2022), based on studies after 2000 across a range of countries, argues that innovation-led development models are key to reducing the global gap between poorer and richer nations. Countries that lack innovation capacity and human capital to support globalization should not expect convergence, even if trade is liberalized, because they will continue to fall further and further behind.

The comparative literature shows that Asia's convergence with advanced world economies has been driven by a virtuous combination of high trade openness, rapid accumulation of human capital, and improving institutional strength. In contrast, Latin America's relatively high human capital and relatively open economy has been undermined by weak governance and low levels of complexity in product exports, which has contributed to moderate rates of growth. For its part, Sub-Saharan Africa has lagged in all three dimensions, leading to widespread divergence in outcomes. These factors also mediate conditional convergence: empirical analyses have regularly found that the fastest growth rates have been in low income Asia and parts of South Asia, where country strategies have been supportive of the trade-led models of growth since 2000, while African economies have not converged, and demonstrate prolonged periods of slow convergence (Patel, 2021; Kim & Loayza, 2019). In particular, Patel (2021) estimates that Africa's slow convergence and lower rates of income have held back the growth of the world economy as a whole. If Africa is treated as a separate continent, the estimated global convergence rate increases substantially. Likewise, including Asia accelerates the estimated catch-up

process, reflecting the region's relatively rapid growth performance. Latin America has a more limited impact on convergence estimates, as its higher initial income levels imply a slower catch-up process rather than a violation of convergence dynamics. In conclusion, the general observations suggest that without improvements to institutions and human capital, liberal economic policies or globalization policies will create uneven rates of convergence. Export-led growth strategies can only lead to global convergence if a country's labor force is sufficiently skilled and its institutions are strong enough to harness and sustain the productivity gains of globalization (Onafowora & Owoye, 2024; Vianna & Mollick, 2018).

2. Data and Methodology

The final unbalanced panel includes 12 countries from Asia, 10 from Latin America, and 9 from Sub-Saharan Africa, totaling 31 countries. Although the number of observations for variables and years varies due to data availability, the overall distribution ensures broad representation of each region. All of the data were collected from internationally recognized databases. The macroeconomic indicators used, including GDP per capita in purchasing power parity (PPP, constant 2017 international dollars), and trade openness in terms of the share of exports plus imports as share of gross domestic product (GDP), were obtained from the World Bank's World Development Indicators (UN-OHRLLS, 2018). The Penn World Table (PWT 10.0) is used to validate and cross-check income data. Human capital is measured using the average number of years of schooling for individuals aged 15 and above, based on data from the Barro-Lee dataset. Institutional quality is indicated by the Rule of Law index from the Worldwide Governance Indicators, which ranges from -2.5 for weak governance to +2.5 for strong governance (World Bank, 1997).

In the regressions, the dependent variable is natural log GDP per capita (PPP), and the three independent variables are trade openness, human capital, and institutional quality. See Table 1 for a list of these variables and sources.

Table 1. Variables and Sources

Variable	Symbol	Definition	Source
GDP per capita (PPP, const. 2017$)	Y_{it}	Dependent variable (log)	WDI, PWT
Trade openness (% of GDP)	$Open_{it}$	Exports + imports relative to GDP	WDI
Human capital (years)	HC_{it}	Average years of schooling (age 15+)	Barro–Lee
Institutional quality	$Inst_{it}$	Rule of Law index (–2.5 to +2.5)	WGI

The econometric model uses a fixed-effects model to address unobserved heterogeneity across countries that is time invariant. Time dummies are added to account for global shocks, such as the Asian financial crisis of 1997–1998, the global financial crisis of 2008–2009, and the COVID-19 pandemic in 2020 (Bunjo, D. D. 2021). The baseline regression is specified as follows:

$$\ln Y_{it} = \alpha_i + \lambda_t + \beta_1 Open_{it} + \beta_2 HC_{it} + \beta_3 Inst_{it} + \varepsilon_{it}$$

In Y_{it} represents the natural logarithm of GDP per capita for country i, at time t, while

α_i captures the fixed effects specific to each country. λ_t is the time effects, and the residual term is denoted by the error term ε_{it}. Standard errors are reported as robust and clustered at the country level to account for heteroskedasticity and serial correlation.

Endogeneity may have implications in the specification, as income levels may, in fact, be impacting on openness, education and institutions. To address reverse causation, we also perform additional robustness checks using lagged values of the explanatory variables, and estimate the model on regional sub-samples. Although these approaches do not necessarily deal with endogeneity directly, they lead to similar results across specifications, and suggest that we can be confident in the results. In future analysis, a more direct attempt to mitigate endogeneity may also involve using alternative empirical strategies, such as instrumental variables or system GMM.

In addition to the regression analysis, we assess variation across countries in each region using both the coefficient of variation (CV) and the Theil index. The coefficient of variation is defined as:

$$CV_{rt} = \frac{\sigma_{rt}}{\mu_{rt}},$$

Here, σ_{rt} is the standard deviation of income levels in region r at time t, and μ_{rt} is the regional mean. The Theil index captures both within- and between-country inequality, and is constructed as follows:

$$T_{rt} = \frac{1}{N_{rt}} \sum_{i=1}^{N_{rt}} \frac{\overline{y_{rt}}}{y_{it}} \ln ! \left(\frac{\overline{y_{rt}}}{y_{it}}\right)$$

In this context, y_{it} denotes the GDP per capita of country i within region r. y_{it} refers to the average GDP per capita of that region, and N_{rt} is the number of countries in the region. The coefficient of variation is useful for highlighting relative dispersion, and the Theil index provides some additional possibilities for decomposition, which can identify whether variation is much more driven by variation within regions as opposed to variation across regions.

We carried out the empirical analysis in a step-by-step manner. Descriptive statistics were employed to summarize the dataset and offer an initial overview of regional disparities globally. Following the presentation of the dataset's general features, panel regression models are estimated to examine how trade openness, human capital, and institutional quality influence economic development. Robustness checks include alternative specifications, with lagged independent variables to soften likely endogeneity, as well as sub-sample regressions by region.

3. Results and Discussion

The results section begins with a description of our dataset. Table 1 illustrates the distributions of the main variables. The lnY shows both a relatively high mean value, as well as a high degree of variation in dispersion, highlighting that the cross-country gaps remains in place. The openness indicator also echoes variation in the vicinity of the mid-range average: some economies are particularly enmeshed into the world economy, and others stay under-connected.

The mean number of years of schooling is, again, quite high, but the minimum of the variable clearly shows how acute potential gaps in education are in the sample. The in-

stitutional measure of rule of law show some countries with measures near -1, and others near +1, demonstrating meaningful institutional variation among developing areas. Descriptive statistics already demonstrate an initial emergence that Asia, Latin America, and Africa are quite different in their quality of growth fundamentals. (Table 2)

Before we conducted regressions, we needed to explore the time-series characteristics of every series in the panel. To this end, we undertook panel unit root tests, the results of which can be found in Table 2, using Fisher-type statistics pooled across countries. All results show income, openness, and human capital to be non-stationary in levels, but stationary in differences. Institutional quality appears to be near-stationary in levels, indicating its bounded scale and slow drift over longer periods. These results indicate that variables can remain in levels for regression, with fixed effects to account for unobserved heterogeneity. (Table 3)

Unit root tests reveal that the primary variables are non-stationary at their levels, but become stationary after first differencing, indicating that they are integrated of order one. Additionally, both the Pedroni and Kao panel cointegration tests reject the null of no cointegration, suggesting that a stable long-run equilibrium relationship exists among GDP per capita, trade openness, human capital, and institutional quality. To avoid the specification errors entailed in esti-

Table 2. Description of Data

Variable	mean	std	min	max
lnY	8.207	0.384	7.532	9.215
Open	0.552	0.158	0.281	1.021
HC_years	7.218	1.765	4.752	11.238
RuleOfLaw	0.041	0.871	-1.823	2.231

Table 3. Unit Root Tests (Fisher-ADF)

Variable	LLC (levels)	IPS (levels)	LLC (1st diff)	IPS (1st diff)	Integration Order
lnY	non-stationary	non-stationary	stationary***	stationary***	I(1)
Open	non-stationary	non-stationary	stationary***	stationary***	I(1)
HC_years	non-stationary	non-stationary	stationary***	stationary***	I(1)
RuleOfLaw	borderline**	borderline**	stationary***	stationary***	I(0)/I(1)

Test	Statistic	p-value	Result
Pedroni panel cointegration	–4.82	0.000	Reject H_o: no cointegration
Kao panel cointegration	–3.97	0.000	Reject H_o: no cointegration

Notes: LLC = Levin–Lin–Chu; IPS = Im–Pesaran–Shin. Variables are integrated of order one but cointegrated, validating regressions in levels. Asterisks denote significance at the 1% level.

mating an ECM around such a long-run equilibrium, the empirical strategy is extended to a panel Error Correction Model (ECM), as a way to model this long-run equilibrium and account for short-run adjustments. This approach will allow the researchers to separate the transitory changes and long-run paths implied by the cointegrating relationship. The ECM is estimated in the following form:

$$\Delta \ln Y_{it} = \alpha_i + \beta_1 \Delta Open_{it} + \beta_2 \Delta HC_{it} + \\ + \beta_3 \Delta RuleOfLaw_{it} + \gamma EC_{it-1} + \varepsilon_{it}$$

In this expression, Δ indicates first-differences, EC_{it-1} represents the lagged error-correction term obtained from the long-run cointegration equation, and γ captures the speed at which the system adjusts back to equilibrium. A negative and statistically significant γ implies that deviations from the long-run relationship are gradually corrected over time. (Table 3A.)

Table 3A. Panel Error Correction Model Results

Variable	*Coef.*	*Std.Err*	*t*	*p>|t|*
Open	0.142	0.059	2.40	0.017
HC_years	0.031	0.014	2.21	0.017
RuleOfLaw	0.044	0.019	2.32	0.028
Error-correction term	–0.387	0.092	–4.21	0.000

Notes: The negative and significant error-correction term indicates convergence toward the long-run equilibrium, with approximately 39 percent of disequilibrium corrected each year.

Next, we examined across-region differences. We present these findings in Table 4: the coefficient of variation and Theil index for Asia, Latin America, and Sub-Saharan Africa at different points in time. We find clearly different results: Asian economies reduced their dispersion, in that both of these indices have declining values over the 25-year period examined; Latin America seems to have a fairly stable disparity profile; whereas Africa continues to diverge, increasing its value on both measures. The implications are that inequitable and equitable are not universal, and appear to be closely related to where individuals reside.

Table 4. Regional Disparities in GDP Per Capita (CV and Theil Index)

Year	Region	CV	Theil
1995	Asia	0.284	0.132
1995	Africa	0.342	0.154
1995	Latin America	0.227	0.112
2005	Asia	0.213	0.101
2005	Africa	0.356	0.166
2005	Latin America	0.219	0.110
2015	Asia	0.187	0.091
2015	Africa	0.361	0.175
2015	Latin America	0.223	0.114
2020	Asia	0.171	0.083
2020	Africa	0.372	0.189
2020	Latin America	0.224	0.115

After establishing descriptive and disparity trends, the regressions give further understanding of the drivers of income differences. The baseline specification in Table 5 shows that openness, human capital, and institutions are all positively and significantly related to income. This indicates that trade integration, education, and governance are collectively responsible for providing higher living standards, even after accounting for country- and year-fixed effects.

Table 5. Regression Results (Baseline Fixed Effects Model)

Variable	*Coef.*	*Std.Err*	*t*	*p>|t|*
Open	0.362	0.094	3.85	0.002
HC_years	0.081	0.021	3.86	0.001
RuleOfLaw	0.114	0.037	3.08	0.001

The extended specification, which includes interaction terms, is seen in Table 6. We find that the effect of openness is indeed highly conditional on domestic circumstances. The interaction term between openness and human capital is strongly positive, indicating that the returns to trade are substantially greater in economies with better-educated workforces. Similarly, the interaction term between openness and institutions is also positive and of significance, but of a smaller magnitude. Taken together, we conclude that openness is not an unqualified good, and its benefits are conditional to absorptive capacity.

Table 6. Regression Results with Interactions

Variable	*Coef.*	*Std.Err*	*t*	*p>|t|*
Open	0.291	0.108	2.69	0.008
HC_years	0.067	0.022	3.05	0.004
RuleOfLaw	0.098	0.040	2.45	0.016
Open×HC_years	0.059	0.018	3.28	0.002
Open×RuleOfLaw	0.042	0.019	2.21	0.027

In addition, to provide additional evidence of robustness, the model was re-estimated using lagged values of the explanatory variables. As shown below in Table 6A, the coefficients remain positive and significant (if slightly attenuated), indicating that the baseline results are not being driven contemporaneously by endogeneity. The regional sub-sample estimates (though not shown here, so as to save space) yielded similar outcomes, which add an additional level of confidence to the overall robustness of the study's findings.

Table 6A. Robustness Check with Lagged Explanatory Variables

Variable	*Coef.*	*Std.Err*	*t*	*p>|t|*
Open(t-1)	0.294	0.101	2.91	0.005
HC_years(t-1)	0.072	0.023	3.13	0.003
RuleOfLaw(t-1)	0.097	0.039	2.49	0.015

Notes: Results using lagged regressors remain consistent with baseline estimates, alleviating some concerns of reverse causality.

The determinants of inequality were examined directly, using the Theil index as the dependent variable. As shown in Table 6, higher regional average human capital and better institutions decrease inequality across regions, while openness alone plays no significant role. This result highlights the point made earlier that global integration can actually increase inequalities in the absence of viable domestic foundations.

The Theil index regressions presented in Table 7 refer to regional averages to explain the variables, indicating that the findings represent general associations at the region level, but are not intended to be interpreted as country-level causal effects. Full findings should be understood as providing indications of regional effects, rather than seen as definitive processes at the micro level. Next steps could employ country-level inequality data to better review inequalities within regions and prevent us falling into ecological misunderstandings.

Table 7. Theil Index (y) Regression Results

Variable	*Coef.*	*Std.Err*	*t*	*p>|t|*
Open _bar	0.014	0.017	0.82	0.418
HC_bar	-0.071	0.028	-2.55	0.012
Inst_bar	-0.053	0.024	-2.21	0.031

The combination of these results yields a cohesive picture. Descriptive evidence indicates a persistence of inequalities, while state tests confirm that our econometric strategy is appropriate, and disparity indices show very different regional trajectories. The regressions suggest that openness alone is insufficient for convergence; rather, it is only with investment in human capital and improvement in institutional quality that income levels increase and disparities decrease. The circumstances of Asia demonstrate this virtuous circle, while Latin America exemplifies the limits of weakening institutions with moderate human capital development, and Africa indicates the impact of deficits across all three dimensions simultaneously.

Limitations of the Study

The study provides useful information for understanding various aspects of the development of regions, yet there are several limitations that should be acknowledged by the author. Our measures of human capital (the average number of years of schooling completed), are measures of the quantity of education, whereas the quality of education is what will more accurately explain economic growth. Additionally, if the authors were to include cognitive skills measured by test scores, it would likely be a better explanation of how trade openness contributes to economic growth than the years of schooling completed by residents of a region.

There may also be a potential selection bias, as the data was collected at different points in time and features different periods, according to available data. This could affect the results of the study. There is a further potential issue of endogeneity, even though the authors used lagged variables and performed robustness tests, since income can influence the level of trade openness, education investment and institution building simultaneously.

Finally, the analysis uses aggregate measures of the diverse countries included within each broad regional category, which may conceal important heterogeneity between countries located in the same region (for example, Asia is comprised of both high performing east Asian and low income south Asian countries, while sub-Saharan Africa contains both rich and poor countries).

The Theil Index regression equations use regional averages, and therefore limit the authors' ability to make country-level causal inferences regarding the relationship between trade openness and income inequality. Nevertheless, the authors' findings provide strong evidence that the benefits of globalization are dependent upon the absorptive capacity of countries, and the regional patterns documented in the studies have been shown to hold true across multiple specifications.

4. Discussion

Our study shows that there are much more complex explanations for how global economic integration has influenced regional economic development than have been commonly described. Global economic integration

(trade) does interact with a country's internal economic capacity (its "endowments") to determine whether and how well it converges economically, and, therefore, its development trajectory is not simply a function of geography or of its endowments at the start of the process of global economic integration.

Openness to trade does not guarantee convergence, as we can see from our regression results; and, indeed, unless a country has a high level of human capital and strong institutions, openness will generate no positive growth effect. Our regression results also demonstrate that countries with large educated populations and good institutions gain much larger benefits from being part of the global economy than countries without these characteristics. This accounts for why the adoption of the global economy has contributed to such rapid convergence in Asia, but why trade liberalization was unsuccessful in generating any convergence in Africa.

Human capital quality is important for a country's economic development, far beyond an individual's number of years in education. The results of countries in Latin America are illustrative: although they have achieved better student enrollment ratios than many other regions, their low scores on international tests of cognitive skills have resulted in them being unable to adapt to new technologies and transition to high value-added activities. The growth of educational attainment in Asian countries was not solely due to an expansion of the population with an increased number of years of education; rather, it was due to improvements in the quality of education through changes in curricula and competition among schools. As our study utilized years of schooling as a proxy measure of educational attainment, we most likely underestimated the impact of quality of education as a source for the differences in the long-run economic performance between the two regions.

Institutional factors play a very significant role in converting possible growth into actual performance. It has been shown that even modest amounts of human capital can create impressive levels of growth, given the presence of adequate institutions, as illustrated by a number of East-Asian countries. Yet, inadequate institutions can diminish the returns from both education and trade openness, as a corrupt diversion of resources will occur; contracts will be unenforceable; and productive investment will be discouraged due to policy uncertainty. These institutional deficits help explain why trade liberalization has had little positive effect on the stagnant economies of many African countries.

These inequality data also support the prior conclusions. The decline in Asia's Coefficient of Variation (CV) and Theil Index indicate that convergence is attainable, but it requires sustained advances in all key areas. Latin America's CV and Theil Index have remained constant at the same level over time, illustrating the region's inability to convert its intermediate human capital and openness into institutional advancements, while Africa's increasing CV and Theil Index suggest that economic liberalization without the development of critical skills and governance can lead to increased disparity among regions and within countries, since resource rich countries, and/or countries that begin with favorable initial conditions, are pulled further ahead.

Conclusion

Global inequality continues to exist throughout multiple regions, not because of a failure of globalization, but due to different levels of absorption capacity. Globalization has been successful at creating opportunities for growth and convergence; however, it requires an initial level of human capital, quality education and institutional capacity within a region to achieve this goal. A country's ability to converge is dependent on the degree to which these factors complement each other (i.e., trade openness with human capital, accumulation with institutional development). Convergence is achievable in countries with strong complementary relationships between institutional development, human capital and trade openness (Asia), yet moderate success in one area is insufficient to create convergence (Latin America), and premature liberalization in the absence of human capital and institutional development may exacerbate regional inequality (Africa).

The future of reducing global inequality requires the understanding that economic integration is needed, but will not necessarily lead to global convergence. Therefore, simultaneous consideration must be given to both external engagement and internal reforms to strengthen institutional capacity, enhance the quality of education, and build technological capabilities that are tailored to the unique characteristics and needs of each region.

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APPENDIX: Additional Robustness Estimations

This appendix presents additional robustness estimations, including System GMM, MG/PMG, CCEMG, and cross-sectional dependence tests. These results complement the fixed-effects and ECM models in the main text and strengthen the econometric validity of the study.

Table A1. System GMM Results

Variable	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
L.log(GDP per capita)	0.59	0.07	8.43	0.000
Trade openness	0.22	0.08	2.75	0.006
Human capital	0.06	0.02	3.02	0.003
Rule of Law	0.09	0.03	3.07	0.002
AR(2) p-value				0.192
Hansen p-value				0.301

Table A2. MG and PMG Long-run Estimates

Variable	*MG Coef.*	*MG SE*	*MG p*	*PMG Coef.*	*PMG SE*	*PMG p*
Trade openness	0.27	0.1	0.012	0.23	0.07	0.002
Human capital	0.12	0.03	0.000	0.09	0.02	0.000
Rule of Law	0.14	0.04	0.001	0.11	0.03	0.001
ECT	-0.31	0.07	0.000	-0.38	0.06	0.000

Table A3. CCEMG Estimates

Variable	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
Trade openness	0.19	0.07	2.71	0.007
Human capital	0.07	0.03	2.55	0.011
Rule of Law	0.11	0.04	2.89	0.004

Table A4. Cross-sectional Dependence Tests

Model	*Pesaran CD*	*p-value*	*LM Stat*	*p-value*	*BC-LM Stat*	*p-value*
FE model	7.21	0.000	231.4	0.000	209.6	0.000
ECM model	5.97	0.000	193.2	0.000	178.1	0.000
Theil regression	3.45	0.001	87.3	0.000	81.6	0.000