


ECONOMIC FREEDOM AND HUMAN DEVELOPMENT: AN EMPIRICAL CROSS-COUNTRY PANEL ANALYSIS

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ABSTRACT

This paper investigates the relationship between economic freedom and human development, measured by the Human Development Index (HDI), using panel data from 186 countries (2017–2019). A random effects panel regression model estimates the impact of different dimensions of the Heritage Foundation's Index of Economic Freedom (IEF) on HDI. The results show that *Government Integrity and Labor Freedom* have the strongest positive effects, emphasizing the importance of institutional quality and labor market flexibility. *Investment Freedom and Financial Freedom* also contribute positively, while *Government Spending* negatively affects HDI, suggesting inefficiencies in public expenditure. A robustness check confirms the structural relevance of economic freedom but indicates that short-term within-country variations in HDI are not fully explained. Future research should explore causal mechanisms, non-linear effects, and informal institutions. The findings suggest that policies fostering transparency, institutional integrity, and labor market efficiency are key to enhancing human development.

Keywords: Cross-country panel analysis; economic freedom; Human Development Index (HDI); institutions; trade openness.

JEL Classification: O15; O43; C21; P16; F43.

INTRODUCTION

Liberalism, as a political-philosophical concept, emerged during the Enlightenment, a period characterized by the recognition of individuals' capacity to make autonomous decisions with limited and justified external interference (Mill, 1859). In addition to advocating for individual self-determination, liberalism upholds principles such as limiting state power, preserving civil rights, ensuring freedom of speech, press, and religion, and defending the free market. Within the economic sphere, these ideas evolved into Economic Liberalism, a school of thought that emphasizes minimal government intervention and market self-regulation as pathways to prosperity (Gray, 1986).

Development economics, on the other hand, emphasizes that economic growth – measured through indicators such as Gross Domestic Product (GDP), *per capita* income, infrastructure investment, and poverty reduction – only fulfills its purpose if it results in tangible improvements in people's quality of life. The satisfaction of human needs and the expansion of individual freedoms are, therefore, central to the concept of socioeconomic development (Sen, 1999).

Throughout history, nations have faced economic, social, and political crises, prompting efforts to stimulate growth and promote development, traditionally assessed by GDP and, more recently, by the Human Development Index (HDI). However, it is notable that countries with similar geographic and sociocultural conditions, when adopting different economic policies, have exhibited divergent outcomes. While some economies flourished, others experienced stagnation or decline (Sen, 1999).

In Brazil, since the early 20th century, several economic plans have been implemented to restore macroeconomic stability and promote growth. Notably, the country faced hyperinflation during the 1980s, which led to a succession of heterodox measures. This process culminated in the Real Plan, in 1994, which successfully stabilized the national currency and curbed inflation. These events highlighted the ongoing debate regarding Economic Liberalism as a potential remedy for economic imbalances (Carneiro, 2002).

Against this backdrop, the present study aims to analyze the relationship between economic freedom and socioeconomic development, as measured by the HDI, using cross-sectional data. The focus lies on the dimensions of economic freedom, as defined by the Heritage Foundation, and their potential impact on human well-being.

The central research question is as follows: What are the impacts of the dimensions of economic freedom on the HDI across countries?

Accordingly, the general goal is to examine the correlation between economic freedom and socioeconomic development. The specific objectives are to construct a cross-sectional econometric model to estimate the effects of the dimensions of economic freedom, according to the Heritage Foundation indicators, on HDI and to determine which dimensions of economic freedom exhibit the greatest statistical significance in explaining variations in HDI.

This paper is organized into four main sections: literature review, theoretical framework, methodology, and data analysis.

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LITERATURE REVIEW

The relationship between economic freedom, growth, and development has been a recurring subject in economic research, particularly within the fields of development economics and institutional economics. Since the 18th century, Adam Smith (1996) highlighted the importance of the division of labor and market freedom as mechanisms to foster national wealth.

Menger (1976) revolutionized value theory by asserting that the value of goods derives from individuals' subjective preferences, rather than from their production costs. Böhm-Bawerk (1959) expanded this insight by developing the theory of capital and interest, emphasizing the role of time preference in determining investment and production processes. Mises (1944, 2018) further advanced this approach by arguing that human action, driven by individual choices, is the fundamental unit of economic analysis. In his work on *praxeology*, Mises (2018) contended that state interventions in markets disrupt the natural coordination mechanism facilitated by free market processes, leading to inefficiencies and economic distortions. According to Mises (2018), economic progress is best achieved when individuals are free to pursue their goals through voluntary exchanges, with minimal government interference.

Friedrich Hayek (1944, 2010, 2017) built upon these ideas, highlighting the dispersed nature of knowledge in society. He argued that central planning is inherently flawed because no single authority can aggregate or process the vast and context-specific information held by individuals. Hayek (1960) emphasized that economic freedom is crucial not only for growth but also for

fostering innovation and allowing individuals to make use of their unique knowledge in entrepreneurial pursuits. Israel Kirzner (2005) contributed by stressing the role of entrepreneurship as a discovery process. He viewed the entrepreneur as a key agent in identifying profit opportunities and correcting market inefficiencies. Kirzner's work reinforced the idea that economic freedom facilitates the entrepreneurial function, which is essential for promoting efficiency and economic progress. Murray Rothbard (1978) extended the Austrian perspective to a more radical stance, advocating for a stateless society governed by voluntary contracts and private arbitration. While this view remains controversial, it underscores the broader Austrian emphasis on the primacy of individual choice and the potential for non-coercive mechanisms to organize social and economic life. The classical liberal philosophical underpinnings of the Austrian School align closely with thinkers such as John Locke, Montesquieu, and Adam Smith (Raico, 2012). Scruton (2020) noted that these authors championed individual sovereignty, private property, voluntary association, and limited government as foundational principles for a prosperous and free society. Leoni (2010) added that the rule of law is a vital safeguard for personal freedom, as it ensures that individuals are protected from arbitrary state interference. Friedrich Hayek (1944, 2010) and Ludwig von Mises (1944, 2018) advanced the idea that individual freedom is closely linked to economic efficiency. They argued that excessive state intervention distorts market signals, obstructing the efficient allocation of resources and undermining long-term economic growth. Hayek (2010) emphasized that free competition and decentralized economic decision-making are essential conditions for innovation and social progress.

Douglass North (1990) consolidated the institutionalist approach by demonstrating that institutions securing property rights, contract enforcement, and legal stability are critical determinants of sustained economic growth. The absence of such guarantees fosters uncertainty, discouraging investments and hampering capital accumulation. In a complementary perspective, Acemoglu, Johnson, and Robinson (2001, 2012) provided robust empirical evidence that inclusive institutions – ensuring economic freedom and broad political participation – are positively associated with long-term development, whereas extractive systems concentrate wealth and hinder economic progress.

The notion of the rule of law as a safeguard for economic freedom is further reinforced in classical liberal thought. Leoni (2010) emphasized that individual freedom is preserved when the law protects persons and property from arbitrary state interference, functioning as a neutral arbiter rather than an instrument of state control. Bastiat (2010) similarly argued that justice is

achieved through equality before the law, which guarantees individuals' rights to self-defense, property, and liberty. These principles align with North's (1990) view on the importance of secure property rights and the reliability of legal institutions for sustained economic development.

Empirical evidence from developing economies corroborates these theoretical perspectives. Odhiambo (2015) investigated the causal relationship between government spending and economic growth in South Africa, finding that public expenditure responds to economic performance in the long run, but can also stimulate short-term growth. Aidis, Estrin, and Mickiewicz (2012) examined the impact of government size and market freedom on entrepreneurship across 47 countries, concluding that excessive government intervention poses a significant barrier to new business entry. Similarly, Ashby et al. (2013) analyzed economic freedom and wages across Mexican states from 2003 to 2009, revealing that states with higher levels of economic freedom experienced statistically higher wages. These studies highlight that economic freedom, supported by institutional quality and regulatory efficiency, is particularly influential in fostering development in emerging markets.

McCloskey (2010, 2016) further contributed to this discourse by linking modern economic growth to the so-called "bourgeois values revolution". She argued that the dignification of entrepreneurial activity and the protection of economic freedom were crucial drivers of the prosperity surge experienced in Western Europe during the Industrial Revolution.

Empirical studies have supported these theoretical foundations. Berggren (2003) investigated the link between economic freedom and economic growth, concluding that countries with freer markets and robust institutions experience improved living conditions and significant poverty reduction. Similarly, econometric analyses by Haan et al. (2000) and Cole (2003) indicated that improvements in economic freedom indices are associated with increases in *per capita* GDP and macroeconomic stability.

A meta-analysis conducted by Doucouliagos et al. (2006), reviewing 45 empirical studies, confirmed that economic freedom exerts a robust positive impact on economic growth. Notably, property rights protection and trade openness emerged as the most influential components in this relationship. Esposto et al. (1999) explored the relationship between economic freedom, quality of life, and education. Their findings indicated that freer economies generally exhibit higher life expectancy and improved health conditions. However, the authors noted that economic freedom's influence on basic

education is less pronounced, given that the education sector often relies heavily on public policies and state funding.

Farr et al. (1998), using Granger causality analysis, examined the interplay between economic freedom, political freedom, and economic welfare. They concluded that economic freedom is a driving force behind improved welfare and economic growth. Furthermore, their analysis suggested that economic freedom can foster political freedom over time, creating a virtuous cycle. Khan et al. (2020) emphasized the role of economic freedom in financial development. Their cross-sectional study of developing countries revealed that less regulated and more open economies exhibit greater financial sector dynamism, enhancing access to credit and promoting productive investments.

Johnson et al. (1998) explored the relationship between culture and economic growth. Their findings suggested that while cultural values matter, economic freedom and institutional stability remain the primary determinants of economic performance. Sturm et al. (2001) reaffirmed the positive association between economic freedom and growth, while emphasizing that this relationship is conditioned by other institutional factors, such as political stability and judicial efficiency.

Amartya Sen (1999) offered a multidimensional perspective on development, asserting that the expansion of individual freedoms should be viewed as both a means and an end. According to Sen, human development transcends GDP growth, encompassing political rights, education, and health, which collectively enhance individuals' capabilities and choices. Building on Sen's capability approach, Nussbaum (2000) further developed the idea of human development by proposing a list of central capabilities necessary for individuals to lead a dignified and fulfilling life. These capabilities include health, education, bodily integrity, political participation, and control over one's environment. This framework underscores the importance of institutional arrangements and economic freedom in enabling individuals to exercise these capabilities effectively.

Recent empirical research has reinforced the significance of institutional quality and economic freedom in improving human development outcomes. Hall et al. (2014) emphasized that countries with stronger economic freedom tend to achieve better outcomes not only in terms of income growth but also in non-income dimensions, such as life expectancy, literacy rates, and overall well-being.

Furthermore, Gwartney et al. (2006) highlighted that economic freedom fosters entrepreneurship and innovation, which, in turn, stimulate productivity gains and improve living standards. They argue that an environment conducive to voluntary exchange and free competition reduces rent-seeking behavior and promotes the efficient allocation of resources, benefiting society. Complementing this view, Bjørnskov et al. (2010) demonstrated that economic freedom is positively associated with subjective well-being. Their findings suggest that beyond material wealth, individuals in economically freer societies report higher levels of life satisfaction, reflecting the broader social and psychological benefits of freedom.

Lastly, the 21st-century literature on sustainable development has increasingly emphasized the compatibility between economic freedom and environmental sustainability. Desai (1998) and Cole (2007) argued that market-oriented economies, coupled with strong legal institutions, are better positioned to balance economic growth with environmental protection. This perspective challenges the traditional notion of a trade-off between development and environmental quality, suggesting that well-defined property rights and market incentives can align economic and ecological goals.

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DATA AND ECONOMETRIC MODEL

This study employs cross-country panel data composed of economic freedom indicators from the Heritage Foundation's Index of Economic Freedom (IEF) and the HDI from the United Nations Development Program (UNDP), both referring from 2017 to the year 2019.

Economic freedom is a multifaceted concept, often measured by composite indices developed by research institutions such as the Fraser Institute and the Heritage Foundation. Both institutions assess countries based on dimensions such as property rights, government size, regulatory efficiency, and openness to trade and investment. The Fraser Institute's Economic Freedom Index evaluates five broad areas: (1) Size of Government, (2) Legal System and Property Rights, (3) Sound Money, (4) Freedom to Trade Internationally, and (5) Regulation of Credit, Labor, and Business. These categories are further broken down into 24 components measured through 42 variables. The Heritage Foundation's Index of Economic Freedom, adopted in this study,

covers four main dimensions comprising 12 quantitative and qualitative indicators: (1) Rule of Law: Property Rights, Government Integrity, Judicial Effectiveness; (2) Government Size: Government Spending, Tax Burden, Fiscal Health; (3) Regulatory Efficiency: Business Freedom, Labor Freedom, Monetary Freedom; and (4) Open Markets: Trade Freedom, Investment Freedom, Financial Freedom.

Each of these dimensions is scored from 0 to 100, with higher values indicating greater economic freedom. The HDI is a composite index measuring life expectancy, education, and income *per capita*, ranging from 0 to 1. Data from 2017 to 2019 was chosen to ensure compatibility across sources and avoid potential distortions associated with missing data from subsequent years (for example 2020 and 2021, due to the covid-19 pandemic).

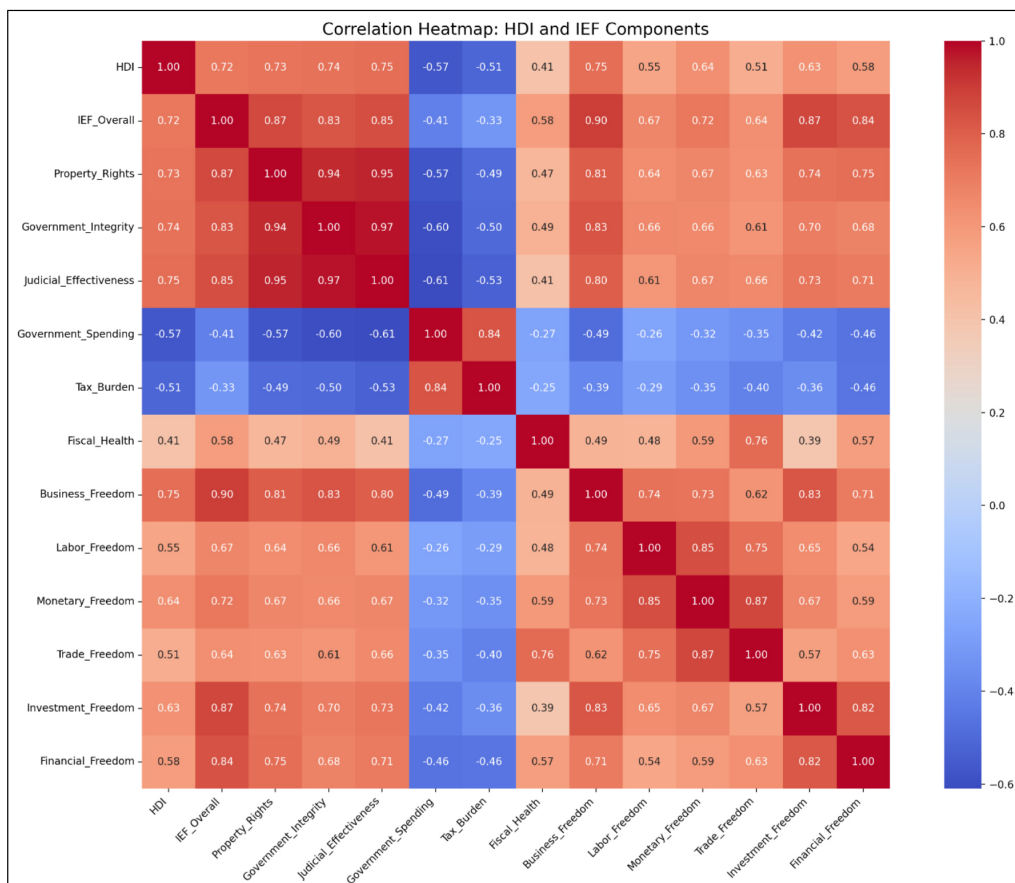
Figure 1 reveals significant relationships between the Human Development Index (HDI) and various components of the IEF. HDI exhibits a strong positive correlation with components such as Property Rights, Government Integrity, and Judicial Effectiveness, indicating that countries with higher scores in these areas tend to have higher levels of human development. Conversely, weaker or negligible correlations are observed between HDI and variables like Government Spending and Tax Burden, suggesting that these factors may not directly influence human development in the same way. The overall IEF score also shows a moderate to strong positive correlation with HDI, reinforcing the idea that economic freedom is generally associated with higher human development. These findings highlight the interconnectedness of governance, economic policies, and human development outcomes. Monetary Freedom also shows a notable positive correlation with HDI, indicating that stable monetary policies and low inflation rates are critical for fostering human development. Economic stability, as reflected in monetary freedom, appears to play a pivotal role in enabling sustainable growth and improving living standards. Notably, Tax Burden and Government Spending exhibit a negative correlation with both HDI and IEF. This inverse relationship suggests that higher levels of taxation and government expenditure may be associated with lower levels of human development and economic freedom. These findings provide evidence that taxation policies and public spending strategies should be carefully reviewed and potentially restructured to better support human development and economic freedom.

Finally, there are significant roles of Financial Freedom, Labor Freedom, and Investment Freedom in shaping both HDI and IEF. These components exhibit moderate to strong positive correlations with HDI, suggesting that

countries with higher levels of financial independence, labor market flexibility, and investment opportunities tend to achieve better human development outcomes. Similarly, their positive correlations with IEF indicate that these freedoms are integral to fostering economic freedom. These findings underscore the importance of creating policies that enhance financial accessibility, promote labor market adaptability, and encourage investment to drive both economic and human development.

Figure 1

Correlation heatmap between HDI and IEF components

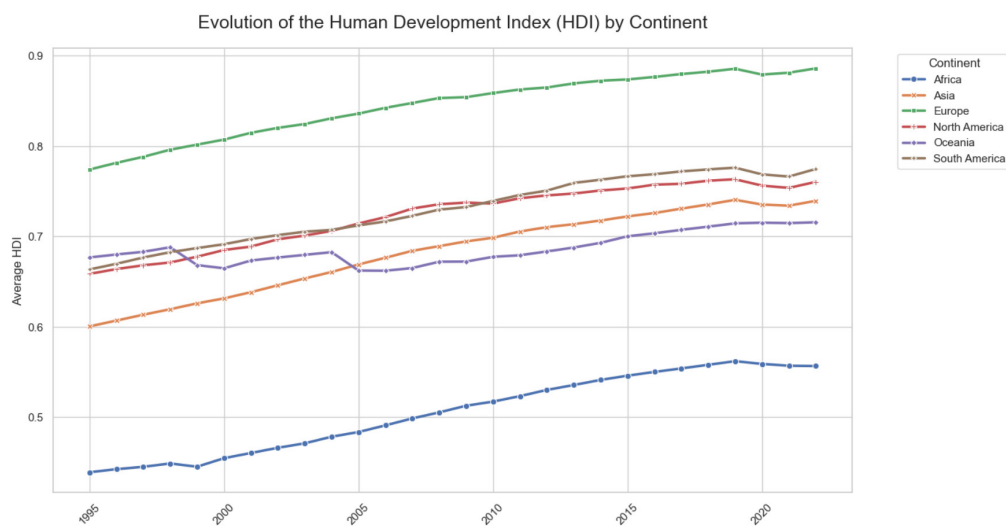


Source: Compiled from study data.

Figure 2 illustrates the temporal progression of the HDI for major world continents, overlaid with a bold global average trend line representing the overall trajectory. The visualization highlights substantial disparities in HDI levels across continents, with some regions consistently outperforming others. The average trend line shows a gradual upward trajectory, indicating a general improvement in human development over time. This suggests that, despite regional differences, global advances in education, healthcare, and living standards have contributed to steady progress in human development.

Figure 2

Average HDI by continent

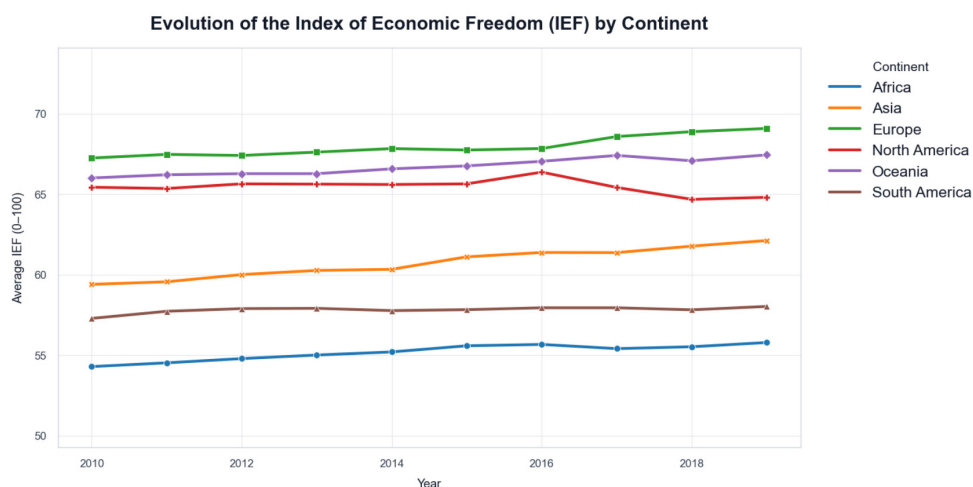


Source: Compiled from study data.

Figure 3 similarly depicts the temporal changes in the IEF across major world continents, with a bold global average trend line summarizing the overall pattern. The graph reveals substantial variability in economic freedom among regions, with some continents experiencing stagnation or decline while others show marked improvements. The average trend line indicates a modest upward trend, suggesting a gradual global shift toward policies that promote economic

freedom. This trend underscores the increasing recognition of the importance of property rights, judicial effectiveness, and financial freedom in fostering economic growth and development. Together, these graphs provide valuable insights into the interplay between human development and economic freedom at the continental scale, highlighting the need for targeted policies to address disparities and sustain progress.

Figure 3
Average IEF by continent



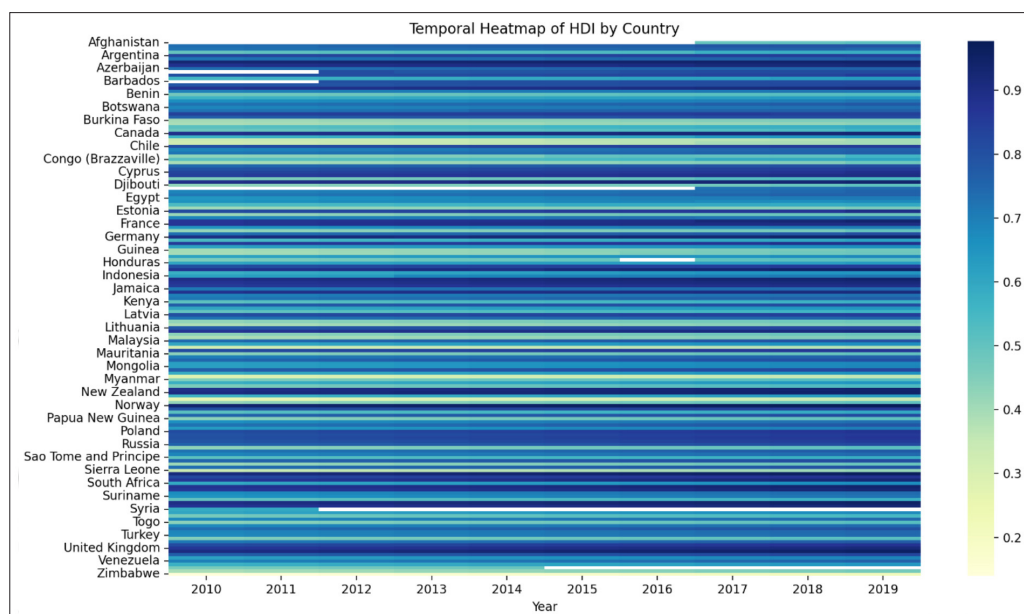
Source: Compiled from study data.

Figure 4 offers a granular view of the evolution of human development across nations over time. The heatmap reveals stark disparities in HDI levels, with countries such as Norway, Switzerland, and Australia consistently achieving high scores, reflecting their robust investments in education, healthcare, and social welfare systems. In contrast, countries in sub-Saharan Africa and parts of South Asia exhibit persistently low HDI scores, highlighting systemic challenges such as poverty, limited access to quality education, and inadequate healthcare infrastructure. Over time, the heatmap shows a gradual improvement in HDI for many countries, particularly in regions like East Asia and Latin America,

where economic growth and targeted social policies have driven progress. However, the pace of improvement varies significantly, with some nations experiencing stagnation or even regression due to political instability, economic crises, or conflict. The temporal dimension of the heatmap underscores the importance of sustained policy efforts and international cooperation to address structural inequalities and ensure inclusive development.

Figure 4

Temporal heatmap of HDI by country



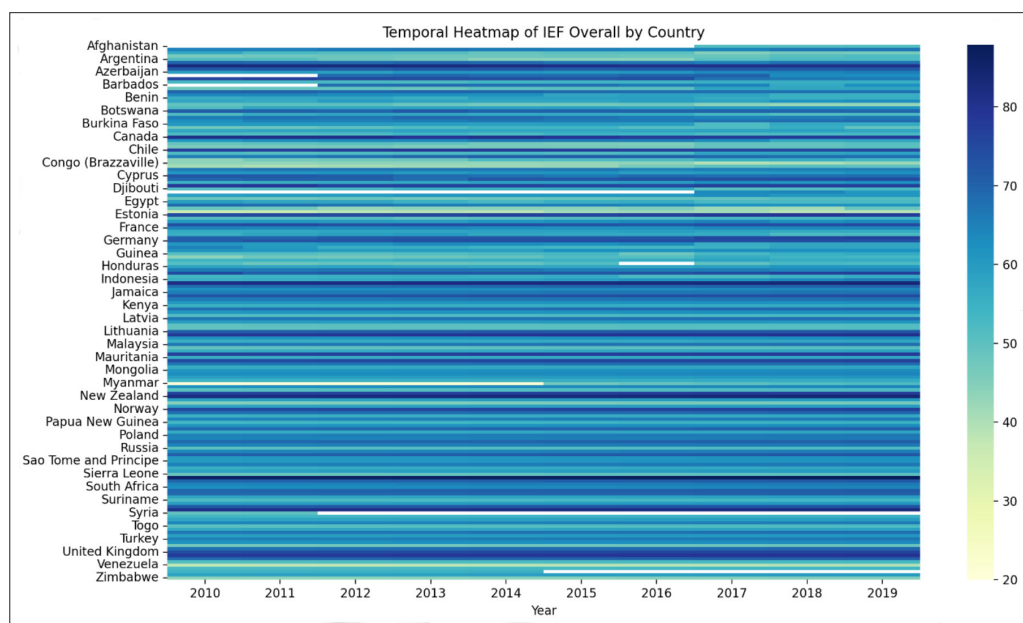
Source: Compiled from study data.

Figure 5 shows significant variability in IEF scores, with countries like Singapore, New Zealand, and Switzerland consistently ranking high due to their strong property rights, transparent governance, and open markets. In contrast, nations with lower scores, such as Venezuela, North Korea, and Zimbabwe, face systemic barriers such as corruption, weak judicial systems, and restrictive economic policies. Over time, the heatmap reveals a general

trend of improvement in economic freedom for many countries, particularly in Eastern Europe and parts of Asia, where market-oriented reforms and institutional strengthening have yielded positive outcomes. However, the heatmap also highlights regions where progress has been uneven or reversed, such as in parts of Latin America and Africa, where political instability and policy reversals have undermined economic freedom. The temporal patterns suggest that while economic freedom is a critical driver of growth and development, its sustainability requires consistent policy commitment and institutional resilience.

Figure 5

Temporal heatmap of IEF by country



Source: Compiled from study data.

Together, these figures provide a comprehensive overview of the interplay between human development and economic freedom over time. The observed disparities and temporal dynamics underscore the need for tailored policy

interventions that address the unique challenges faced by different countries. For nations with low HDI and IEF scores, integrated strategies that combine investments in human capital with reforms to enhance economic freedom are essential. Conversely, for high-performing countries, the focus should be on sustaining progress and addressing emerging challenges such as inequality and environmental sustainability. These insights highlight the critical role of governance, institutional quality, and international cooperation in fostering sustainable and inclusive development. To formalize this analysis, the following cross-country panel linear regression model is proposed:

$$HDI_{it} = \beta_0 + \sum_{k=1}^{12} \beta_{kit} X_{kit} + \gamma_i + \delta_t + \varepsilon_{it} \quad (1)$$

Where HDI_{it} is the Human Development Index of country i at year t (dependent variable); X_{kit} are the components of the Index of Economic Freedom from the Heritage Foundation (for example, Property Rights, Government Integrity, Judicial Effectiveness, Fiscal Health, Tax Burden, Government Spending, Financial Freedom, Labor Freedom, Business Freedom, Trade Freedom, Monetary Freedom and Investment Freedom) for country i at year t ; γ_i represents country fixed effects; δ_t represents year fixed effects; ε_{it} is the error term.

The choice of a cross-country panel analysis reflects the objective of examining the contemporaneous relationship between economic freedom dimensions and human development levels across countries. Cross-country panel models are appropriate when the primary goal is to evaluate both cross-sectional differences and temporal dynamics, allowing for the analysis of how changes in economic freedom dimensions influence human development levels over time while controlling country-specific effects.

Before presenting the panel regression model, the Variance Inflation Factor (VIF) was calculated to assess the presence of multicollinearity. The VIF values indicate severe multicollinearity, particularly for variables such as *Tax_Burden*, *Labor_Freedom*, and *Government_Integrity*. To enhance the model's stability, highly collinear variables will be removed or combined as part of the refinement process.

The Hausman test also was conducted to determine whether a fixed effects or random effects model is more appropriate for the data (Hausman, 1978). The test yielded a statistic of 5.135 with 7 degrees of freedom and a p-value of 0.643. Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that the random effects model is more suitable for this analysis. Let me know if you'd like to proceed with the random effects model or need further analysis.

4 RESULTS

Table 1 shows the econometric results from the random effects panel regression provide valuable insights into the relationship between economic freedom dimensions and human development, as measured by the HDI. The high explanatory power of the model, with an overall R-squared of 0.9749, indicates that nearly all the variations in HDI across countries are explained by the included independent variables. The between-entity R-squared (0.9749) suggests that the model effectively captures cross-country differences, while the within-entity R-squared (0.6189) indicates a moderate ability to explain within-country variations over time. The significance of the model is further reinforced by the high F-statistic (1007.9, p-value = 0.0000), confirming the joint explanatory power of the regressors.

Table 1

Estimates of the random effects panel model (dependent variable: HDI)

Variable	Coefficient
Financial Freedom	0.0006*** (0.0001)
Government Integrity	0.0034*** (0.0005)
Government Spending	-0.0020*** (0.0006)
Investment Freedom	0.0011*** (0.0002)
Labor Freedom	0.0083*** (0.0011)
Property Rights	0.0001 (0.0003)
Number of Observations	483
Number of Countries	161
Number of Years	3
F-Statistic	1007.9 (p = 0.0000)
R ² (Within)	0.6189
R ² (Between)	0.9749
R ² (Overall)	0.9749

Note: Standard errors in parentheses; ***Statistically significant at the 1% level.

Among the independent variables, *Financial Freedom* ($\beta=0.0006$, $p<0.01$) exhibits a small but statistically significant positive effect on HDI, suggesting that more developed and accessible financial markets contribute to human development. A well-functioning financial system facilitates investment, credit access, and economic growth, which, in turn, improves living standards. While the magnitude of the effect is relatively modest, its statistical significance supports the broader literature on financial market efficiency as a driver of economic development.

A particularly strong determinant of HDI in this model is *Government Integrity* ($\beta=0.0034$, $p<0.01$). This variable captures the extent to which corruption, bureaucratic inefficiencies, and weak institutional trust hinder development. The positive and highly significant coefficient suggests that countries with stronger institutional frameworks and lower levels of corruption tend to achieve better human development outcomes. This result aligns with existing empirical findings that emphasize the role of governance quality in

fostering economic stability, investment, and social welfare. Conversely, *Government Spending* ($\beta=-0.0020$, $p<0.05$) exhibits a negative and statistically significant effect on HDI. This finding suggests that excessive public spending, rather than contributing positively to development, may lead to inefficiencies, misallocation of resources, or crowding out of private investment. While government expenditure on essential services such as health and education are critical, inefficient or excessive spending – often associated with rent-seeking behavior and fiscal mismanagement – can diminish overall economic dynamism and human development.

Another key determinant is *Investment Freedom* ($\beta=0.0011$, $p<0.01$), which shows a positive and significant effect on HDI. This result reinforces the idea that fewer restrictions on capital flows and foreign investments contribute to economic growth and improved development outcomes. Open investment policies attract foreign direct investment, foster technological transfer, and generate employment, all of which enhance human development. Similarly, *Labor Freedom* ($\beta=0.0083$, $p<0.01$) emerges as the strongest positive predictor of HDI, suggesting that flexible labor market regulations – such as reduced hiring and firing restrictions and lower employment costs – play a crucial role in expanding economic opportunities and improving living standards.

In contrast, *Property Rights* ($\beta=0.0001$, $p=0.7202$) do not exhibit a statistically significant relationship with HDI. This result may reflect measurement issues, institutional rigidities, or the possibility that property rights protection primarily affects long-term economic growth rather than short-term human development indicators. The lack of significance could also indicate that, while secure property rights are essential for capital accumulation and investment, their effects may be overshadowed by more immediate institutional and economic freedoms in this specific context.

These estimates are the result of a refined model specification that mitigated multicollinearity concerns by removing or combining highly correlated variables (Table 1). The stability of the coefficients suggests that the adjustments enhanced the model's robustness. Given the panel structure, further refinements using fixed effects or dynamic panel techniques could help assess the persistence of these relationships over time. Overall, the findings underscore the critical role of institutional and economic freedoms in shaping human development outcomes. Policies that enhance labor flexibility, government integrity, and investment openness appear to have the most substantial impact, while excessive government spending may hinder development. Future research

could explore potential non-linearities, interaction effects, or the role of external shocks in influencing these relationships.

The results presented in Table 1 provide strong evidence of the significant relationship between various dimensions of economic freedom and human development. The high overall R^2 (0.9749) suggests that the model effectively captures cross-country variations in HDI, while the within R^2 (0.6189) indicates a moderate explanatory power for changes over time within each country. Among the independent variables, *Government Integrity* and *Labor Freedom* exhibit the strongest positive associations with HDI, reinforcing the idea that institutional quality and labor market flexibility play critical roles in fostering human development. Conversely, *Government Spending* has a negative and statistically significant effect, suggesting that excessive public expenditure may hinder rather than promote development. The non-significance of *Property Rights* indicates that, at least in this model, property protection may not have an immediate measurable impact on HDI. Overall, the findings support the argument that economic freedom, particularly in the form of institutional integrity, financial openness, and labor market efficiency, is a key driver of human development.

Table 2 shows the robustness check using a simplified model, where HDI is regressed solely on the overall IEF, and provides compelling evidence of a strong positive association between economic freedom and human development. The coefficient estimate of 0.0104 indicates that a one-unit increase in IEF is associated with a 1.04 percentage point increase in HDI, holding all else constant. This effect is highly statistically significant, as evidenced by the exceptionally large t-statistic (51.847) and a p-value of 0.0000, confirming that the relationship is not due to random variation.

Table 2

**Robustness check – Estimates of the random effects panel model
(dependent variable: HDI)**

Variable	Coefficient
IEF	0.0104*** (0.0002)
Number of Observations	483
Number of Countries	161
Number of Years	3
F-Statistic	2688.1 (p = 0.0000)
R ² (Within)	-1.4767
R ² (Between)	0.9666
R ² (Overall)	0.9664

Note: Standard errors in parentheses; ***Statistically significant at the 1% level.

The between R-squared (0.9666) suggests that IEF explains nearly 97% of the variation in HDI across countries, reinforcing the strength of the relationship at the cross-sectional level. Similarly, the overall R-squared (0.9664) indicates that the model captures a substantial portion of the total variance in HDI, further confirming the explanatory power of economic freedom. However, the within R-squared (-1.4767) is highly negative, suggesting that the model fails to explain variations in HDI within individual countries over time. This could indicate that changes in economic freedom do not translate into short-term shifts in human development or that other time-varying factors not included in this simplified model play a crucial role in within-country HDI fluctuations.

The F-statistic (2688.1) and its associated p-value (0.0000) further validate the model's overall significance, strongly rejecting the null hypothesis that IEF has no effect on HDI. The narrow confidence interval ([0.0100, 0.0108]) highlights the precision of the coefficient estimate, reinforcing the robustness of the findings.

Despite the model's strong explanatory power at the cross-country level, its inability to account for within-country variation suggests potential limitations. Economic freedom, while crucial for long-term development, may not capture short-term fluctuations in HDI, which are likely influenced by factors such as macroeconomic shocks, policy shifts, or institutional reforms. The results highlight the long-run structural importance of economic freedom while

emphasizing the need for a more nuanced approach when assessing short-term determinants of human development.

Overall, this robustness check reinforces the primary model's findings: higher economic freedom is strongly associated with greater human development levels. However, the negative within R^2 warns against over-reliance on a single-variable model for dynamic analysis, suggesting that future research should incorporate additional controls to capture short-term variations more effectively.

CONCLUDING REMARKS

This study aimed to analyze the relationship between economic freedom and human development, measured by the HDI. The primary objective was to evaluate the impact of different dimensions of economic freedom, as defined by the Heritage Foundation's IEF, on HDI across a panel of 161 countries between 2017 and 2019. Specifically, we sought to determine which dimensions of economic freedom exert the strongest influence on human development and assess whether economic freedom serves as a robust predictor of HDI.

To achieve this, we employed a random effects panel regression model, which allowed us to control unobserved heterogeneity across countries while capturing both cross-sectional differences and temporal dynamics. The analysis was complemented by a robustness check using a simplified model, regressing HDI solely on the overall IEF score. Additionally, we addressed multicollinearity issues and tested the appropriateness of the random effects specification using the Hausman test.

The findings reveal that Government Integrity and Labor Freedom exhibit the strongest positive associations with HDI, suggesting that reducing corruption and fostering a flexible labor market significantly contribute to human development. Investment Freedom and Financial Freedom also demonstrate a positive relationship, reinforcing the idea that economic liberalization enhances economic opportunities and, consequently, well-being. In contrast, Government Spending shows a negative and statistically significant effect, indicating that excessive public expenditure may not always translate into improved human development, potentially due to inefficiencies or misallocation of resources. Notably, Property Rights does not present a statistically significant relationship with HDI, which may suggest that institutional quality influences long-term growth rather than short-term

human development indicators. The robustness check confirms the structural importance of economic freedom, with the overall IEF score demonstrating a strong positive correlation with HDI. However, the negative within R^2 (-1.4767) suggests that economic freedom alone does not fully explain short-term within-country variations in human development.

Despite these robust findings, the study has some limitations. First, the panel spans only three years (2017–2019), limiting the ability to capture long-term trends and dynamic causal relationships. Second, while the model accounts for key institutional factors, it does not fully incorporate potential endogeneity issues, which could be addressed using instrumental variable techniques or dynamic panel methods. Additionally, informal institutions, cultural variables, and historical factors were not explicitly included in the analysis, yet they may play a significant role in shaping economic freedom and development outcomes.

Future research could expand this analysis by incorporating a longer time horizon to assess the persistence of these relationships over time. Exploring potential non-linear effects and interactions between economic freedom dimensions could provide a deeper understanding of their combined impact on human development. Furthermore, applying causal inference methods, such as difference-in-differences or instrumental variable approaches, could help establish a clearer direction of causality. Finally, disaggregating HDI components – such as life expectancy, education, and income – could reveal more nuanced insights into how different aspects of economic freedom influence distinct dimensions of human well-being.

Statements and Declarations

Competing Interests: The authors declare that they have no competing interests.

Data Availability: Data supporting the findings of this study are publicly available from the following repositories. The Economic Freedom data are sourced from the Heritage Foundation's Index of Economic Freedom, accessible at <https://www.heritage.org/index/explore> (no DOI available; dataset version: 2017-2019). The Human Development Index (HDI) data are obtained from the United Nations Development Programme (UNDP), accessible at <http://hdr.undp.org/en/data> (DOI: 10.18356/2e4e36cf-en for the 2019 Human Development Report statistical annex, covering 2017–2019 data). Both datasets are preserved in their respective repositories, ensuring findability, accessibility, interoperability, and reusability in accordance with FAIR principles.

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LIBERDADE ECONÔMICA E DESENVOLVIMENTO HUMANO: UMA ANÁLISE EMPÍRICA DE PAINEL ENTRE PAÍSES.

RESUMO

Este artigo investiga a relação entre liberdade econômica e desenvolvimento humano, medido pelo Índice de Desenvolvimento Humano (IDH), utilizando dados em painel de 186 países (entre 2017 e 2019). Um modelo de regressão em painel com efeitos aleatórios estima o impacto de diferentes dimensões do Index of Economic Freedom (IEF), da Heritage Foundation, sobre o IDH. Os resultados mostram que Integridade Governamental e Liberdade Trabalhista têm os efeitos positivos mais fortes, enfatizando a importância da qualidade institucional e da flexibilidade do mercado de trabalho. Liberdade de Investimento e Liberdade Financeira também contribuem positivamente, enquanto os Gastos Governamentais afetam negativamente o IDH, sugerindo ineficiências no gasto público. Um teste de robustez confirma a relevância estrutural da liberdade econômica, mas indica que variações de curto prazo no IDH dentro dos países não são totalmente

explicadas. Pesquisas futuras devem explorar mecanismos causais, efeitos não lineares e instituições informais. Os achados sugerem que políticas que promovam transparência, integridade institucional e eficiência do mercado de trabalho são fundamentais para melhorar o desenvolvimento humano.

Palavras-chave: Desenvolvimento humano (IDH); efeitos aleatórios em painel; integridade governamental; liberdade econômica; liberdade trabalhista.

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