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Can Fiscal Stimulus Drive Inclusive Growth? Evidence from Productive Capacity and Human Development across Developed and Developing Countries

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	Abstract
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Keywords :	Fiscal Stimulus, Inclusive Growth, Human Development, Productive Capacity

1. Introduction

Fiscal stimulus has emerged as an important policy instrument for promoting economic stability, improving human welfare, and achieving inclusive growth, particularly during periods of economic slowdown and external shocks (Brahmbhatt & Canuto, 2012; Ali & Naeem, 2017; Arestis, 2021; Abudu et al., 2024; Asensio & García, 2026). Governments across both developed and developing economies frequently adopt expansionary fiscal measures, including increased public expenditure, subsidies, tax reductions, and social protection programs, to stimulate aggregate demand, generate employment opportunities, and support vulnerable segments of society (Alesina & Perotti, 1995; Ali, 2015; Huidrom et al., 2018; Demirtas, 2023). The effectiveness of these fiscal stimulus packages, however, depends not only on the size of public spending but also on how efficiently resources are allocated toward enhancing human development and productive economic activities. The relationship between fiscal stimulus, Human Development Index (HDI), and inclusive growth has gained increasing attention in economic literature. Inclusive growth refers to a pattern of economic growth that creates equal opportunities, reduces poverty and inequality, and ensures broad-based participation in economic progress (Alesina, 2010; Ali & Rehman, 2015; Ali, 2018; Duan et al., 2025). Fiscal stimulus can contribute to inclusive growth by increasing investment in education, healthcare, social protection, and infrastructure, which directly improves human capital formation and living standards (Adeosun et al., 2022; Afolabi & Raifu, 2025). Improvements in HDI components such as income, education, and life expectancy strengthen labor productivity, enhance social welfare, and support sustainable economic expansion (World Bank, 2022; Sinha, 2025).

According to UN Trade and Development (UNCTAD, 2021), the productive capacity index is a combination of structural, institutional, and human factors that determine the production capacity of an economy. It also reflects the economic transformation regarding growth and development. Given that, fiscal stimulus strengthens productive capacity by directing public spending toward critical areas such as infrastructure, education, healthcare, and institutional development (Heller, 2006; Ali & Bibi, 2017; Olawale Daniel et al., 2025). These investments help lower production costs, enhance efficiency, improve workforce productivity, and encourage greater private sector involvement (IMF, 2020). As a result, economies become more capable of achieving sustained and inclusive economic growth.

2. Role of Fiscal Stimulus and Inclusive Growth

The empirical evidence from developing economies advocates that fiscal stimulus packages integrating social protection measures with infrastructure investment tend to produce larger fiscal multipliers, promote employment generation, and enhance broader economic participation (Arshad & Ali, 2016; Poltorak et al., 2026). A strand of studies in the literature has also investigated the effectiveness of fiscal stimulus in improving economic conditions for marginalized populations. Similarly, Alesina et al. (2019) and Furman et al. (2020) suggest that well-designed fiscal interventions reduce poverty by increasing disposable income among low-income households and creating jobs in sectors that disproportionately employ vulnerable workers. Therefore, such policy measures contribute significantly to reducing both income inequality and multidimensional poverty (OECD, 2024). Henceforth, the literature has shown that the effectiveness of fiscal stimulus depends on governance quality, fiscal space, and the degree to which policies are targeted toward the poor. In countries with weak institutions, high levels of corruption, or limited fiscal capacity, expansionary fiscal policies may fail to reach vulnerable populations or generate sustainable economic benefits. Conversely, economies with strong governance and well-targeted fiscal interventions tend to experience greater reductions in poverty and inequality. For instance, Kopits & Symansky (1998) emphasize that strong fiscal institutions, such as transparent budgeting systems and effective public financial management, enhance the impact of fiscal policy. Tavares (2004) found that political instability undermines fiscal policy, particularly in terms of government spending. Unstable governments cannot push through large stimulus packages, or they might prematurely abandon them before they show results. Baldacci and Kumar (2010) found that countries with greater institutional credibility tend to implement more effective fiscal policies, including stimulus, because they face lower borrowing costs and higher confidence from international investors. International institutions like the International Monetary Fund (IMF) or the World Bank may influence the design and implementation of fiscal stimulus in a country. In the case of an economic crisis, global coordination helps ensure that stimulus measures in different countries complement each other, making the overall global fiscal response more effective. In short, a well-designed fiscal stimulus becomes a central tool for fostering inclusive growth and addressing structural inequalities in developing economies. Stiglitz (2012) states that stimulus programs increase overall economic activity and thereby improve income distribution. The European Union's austerity measures post-2010 contrasted with the U.S. response to the 2008 crisis, with the EU focusing more on deficit reduction, which some argue delayed recovery (Blanchard & Leigh, 2013; Ashraf & Ali, 2018; Pal, 2026). In Brazil, stimulus measures during the 2015-2016 recession were criticized for benefiting large corporations rather than the general population, contributing to political instability and a loss of trust in the government (Reinhart, 2010).

At the same time, the success of fiscal stimulus policies is influenced by several macroeconomic factors, including tax revenues, inflation, public debt, and external economic crises. Higher tax revenues provide governments with greater fiscal space to finance development-oriented expenditures without excessively relying on borrowing (Ortiz, 2009; Marc et al., 2021; Roussel et al., 2021; Bunde, 2025; Ahmad, 2026). Conversely, weak revenue mobilization limits the sustainability of expansionary fiscal policies, especially in developing countries with narrow tax bases. However, some studies, such as those by Piketty, Saez, and Zucman (2018), argue that tax cuts disproportionately benefit the wealthiest households and may not lead to significant improvements in overall economic demand if fiscal stimulus and its measures are not cautiously designed. Inflation also plays a critical role, as excessive fiscal expansion may generate demand-pull inflation, reduce purchasing power, and weaken the positive effects of growth on low-income households. Therefore, maintaining macroeconomic stability is essential for ensuring that fiscal stimulus translates into increased productivity and long-term inclusive growth. External crises such as global financial shocks, pandemics, geopolitical conflicts, and energy price fluctuations further shape the relationship between fiscal stimulus and inclusive growth. During such crises, governments often increase public spending to protect employment, stabilize incomes, and maintain economic activity. In the aftermath of the COVID-19 pandemic, many countries (e.g., the U.S. and the EU) focused fiscal stimulus on protecting businesses to avoid recession, but few took steps to specifically incentivize emerging technologies such as AI, biotechnology, and renewable energy. While these interventions may support short-term recovery, prolonged fiscal imbalances and rising debt burdens can create long-term economic vulnerabilities. Consequently, the effectiveness of fiscal stimulus depends on a country's institutional quality, productive capacity, and ability to channel public resources toward sectors. Literature highlights the importance of fiscal stimulus for the long run inclusive growth as (Mazzucato, 2013; Sajid & Ali, 2018; Zulfqar, 2018; Senturk & Ali, 2021; Ahmad et al., 2022; Marc et al., 2023; Hongzhong et al., 2023; Audi & Ali, 2023; Saher et al., 2024; Kokkinopoulou et al., 2026) study provides an evidence of Israel's stimulus programs in the 2000s that targeted high-tech industries and startups, contributing to the country's emerging technology sector.

In this context, understanding the interaction between fiscal stimulus packages, productive capacity, HDI, and inclusive growth is particularly important for policymakers seeking sustainable and equitable economic development. Keeping in view this complex interlinkage, this study aims to provide a comprehensive analysis of how fiscal interventions can promote inclusive and human-centered growth and productivity across developed and developing economies.

3. Econometric Model, Data and Research Methodology

3.1. Model Specification

For the complex relationships among fiscal stimulus, productive capacity, human development, and inclusive growth, this study develops an econometric framework to examine these linkages across developed and developing economies. The empirical analysis uses panel data collected from a sample of countries over the selected study period. The choice of variables and estimation methods is based on the theoretical foundation of the study and the existing empirical literature. Appropriate econometric techniques are employed to produce reliable and consistent estimates while accounting for potential econometric issues. This methodological approach provides robust evidence on the role of fiscal stimulus in improving productive capacity, advancing human development, and promoting inclusive growth across different economic settings. For the empirical estimates of fiscal stimulus, productive capacity, human development, and inclusive growth, equations 1 and 2 have been constructed. The main explanatory variables are general gross final consumption expenditure and Tax Revenue as a proxy for fiscal stimulus. HDI (Human Development Index) and PCI (Productive Capacity Index) are dependent variables. The explanatory variables include Inflation (INF), Trade (TR), Per Capita GDP, and Government Effectiveness Index (GGEF), as used by Heeks (2010) in previous studies.

$$PCII_{it} = \alpha_{it} + \beta_1 TAXRY_{it} + \beta_2 FGGCE_{it} + \beta_3 INF_{it} + \beta_4 TR_{it} + \beta_5 GGEF_{it} + \beta_6 YCGDP_{it} + \mu_{it} \quad (\text{Equation 1})$$

$$HDI_{it} = \alpha_{it} + \beta_1 TAXRY_{it} + \beta_2 FGGCE_{it} + \beta_3 INF_{it} + \beta_4 TR_{it} + \beta_5 GGEF_t + \beta_6 YCGDP_{it} + \mu_{it} \quad (\text{Equation 2})$$

The data are based on panel data of 194 countries from 2000 to 2022. Where there are 117 developed countries and 77 developing countries. Developed countries include high-income countries, whereas developing countries include low- and middle-income countries. Countries were classified into low-, middle-, and high-income groups according to the World Bank's income classification based on GNI per capita using the Atlas method. Low-income economies have GNI per capita of \$1,175 or less, lower-middle-income economies have GNI per capita between \$1,176 and \$4,635, upper-middle-income economies between \$4,636 and \$14,375, and high-income economies above \$14,375.



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Table 1: Variables and Measurement

Variable and Notation	Variables Description	Data Source
Tax Revenue (% of GDP)	It accounts for all changes in assets, liabilities, revenues, expenses, and stocks, not only in cash transactions data at the end of an accounting period, equal to stock data at the beginning of the period plus flows over the period.	WDI
General Government Expenditure (as % of GDP)	Final consumption expenditure is expenditure on goods and services by resident institutional units for the direct satisfaction of human needs or wants, whether individual or collective. General government FCE includes all government current expenditures for purchases of goods and services (including compensation of employees), and most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation. This indicator is expressed as a percentage of Gross Domestic Product (GDP), which is the total income earned through the production of goods and services in an economic territory during an accounting period.	WDI
Trade (% of GDP)	Trade in services is the sum of service exports and imports divided by the value of GDP, all in current U.S. dollars.	WDI
Human Development Index	The Human Development Index (HDI) is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living. The HDI is the geometric mean of normalized indices measuring achievements in each dimension. The HDI is the geometric mean of the three-dimension indices and embodies imperfect substitutability across all HDI dimensions.	WDI
Productive Capacity Index	Productive capacities are the productive resources, entrepreneurial capabilities, and production linkages that together determine a country's ability to produce goods and services that will help it grow and develop.	UNCTAD
Government Effectiveness Index	Government effectiveness measures the quality of public services, the quality and degree of independence from political pressures of the civil service, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	WDI
Inflation, consumer prices (annual % growth)	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	WDI
Per capita GDP	GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	WDI

Source : Author Caluculations

3.2.Research Methodology

This study employs a panel data econometric approach to examine the impact of fiscal stimulus on the Human Development Index (HDI) and the Productive Capacity Index (PCI) in developing and developed countries. Panel data combine cross-sectional observations (countries) with time-series observations (years), thereby increasing the number of observations and improving the efficiency and reliability of econometric estimates. Compared with cross-sectional or time-series analyses alone, panel data models control for unobservable country-specific heterogeneity, reduce omitted variable bias, and provide more consistent parameter estimates (Baltagi, 2021).

The empirical analysis follows a systematic sequence. First, panel unit root tests are employed to determine the stationarity properties of the variables. Second, panel cointegration tests are conducted to investigate the existence of long-run equilibrium relationships among the variables. Third, the long-run coefficients are estimated using the



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Fully Modified Ordinary Least Squares (FMOLS) estimator. The first stage of the empirical analysis involves testing the stationarity of all variables. Stationarity is a fundamental requirement because regression involving non-stationary variables may produce spurious or misleading results (Granger & Newbold, 1974). Panel unit root tests determine whether each variable is stationary at its level or after first differencing. This study employs four widely used panel unit root tests: Levin-Lin-Chu (LLC), Im-Pesaran-Shin (IPS), Fisher-Augmented Dickey-Fuller (ADF), and Fisher-Phillips-Perron (PP). These tests differ in their assumptions regarding heterogeneity across countries but collectively provide robust evidence regarding the order of integration of the variables. Variables found to be integrated of order one, $I(1)$, are considered suitable for subsequent panel cointegration analysis. Once the variables are confirmed to be integrated of the same order, panel cointegration tests are performed to determine whether fiscal stimulus and the selected macroeconomic variables maintain a stable long-run equilibrium relationship with productive capacity and human capital. Cointegration implies that although variables may fluctuate in the short run, they move together over time and converge toward a common long-run equilibrium (Engle & Granger, 1987). To ensure robustness, this study applies three complementary panel cointegration techniques: the Kao test, the Pedroni test, and the Johansen Fisher panel cointegration test. The Kao (1999) residual-based cointegration test extends the Engle-Granger methodology to panel data. The test estimates the long-run relationship among variables and then examines whether the residuals are stationary. The null hypothesis states that no cointegration exists, while the alternative hypothesis indicates the presence of a long-run equilibrium relationship. A statistically significant ADF test statistic ($p < 0.05$) leads to the rejection of the null hypothesis, confirming that the variables are cointegrated.

The Kao test assumes homogeneous cointegrating vectors across panel members, making it appropriate when countries are expected to exhibit relatively similar long-run relationships. In this study, the Kao test serves as the primary residual-based test for validating long-run equilibrium relationships between fiscal stimulus and the development indicators.

To complement the Kao test, the study also applies the Pedroni (1999, 2004) panel cointegration test. Unlike the Kao approach, Pedroni allows for heterogeneity in slope coefficients and intercepts across countries, making it particularly suitable for panels containing economies with different institutional and economic characteristics. Pedroni developed seven panel cointegration statistics, including panel and group statistics based on Phillips-Perron and Augmented Dickey-Fuller approaches. The null hypothesis is that no cointegration exists. Rejection of the null by the majority of the statistics indicates that a stable long-run relationship exists despite differences across countries. Using the Pedroni test alongside the Kao test improves the robustness of the empirical findings.

4. Results and Discussion

This section presents the empirical findings obtained from the econometric analysis and discusses their implications in light of the study objectives and existing literature. The estimated results of the Pedroni, Kao, and long-run cointegration models are analyzed to examine the impact of fiscal stimulus on human development and productive capacity (inclusive growth) in developed and developing countries. Table 2 shows descriptive statistics of all variables. These statistics provide a summary of the main characteristics of the variables used in the study and help in understanding the overall behavior of the data. The statistical measures include mean, median, maximum value, minimum value, and standard deviation for all variables incorporated in the analysis.

Table 2: Descriptive Statistics of Developed and Developing Countries

Variables	Developing Countries		Developed Countries	
	Mean	Standard Deviation	Mean	Standard Deviation
General Government Expenditure (% of GDP)	28.98	41.90	24.20	30.33
Tax Revenue(% of GDP)	48.92	61.25	37.02	46.94
Human Development Index	0.512	0.08	0.79	0.09
Productive Capacity Index	29.12	8.12	51.12	91.23
Inflation (%)	24.5	124.19	38.67	181.55
Per capita GDP	1326.50	912.19	20474.82	23261.67

Trade (% of GDP)	150.34	256.45	148.61	209.00
Government Effectiveness Index	-0.89	0.50	0.413	0.88

Source: Author’s own calculations

The mean values indicate the average performance of the variables across the selected countries and time period, while the standard deviation reflects the degree of variation and dispersion in the dataset. Similarly, the maximum and minimum values highlight the range of observations and indicate differences between developed and developing economies in terms of fiscal stimulus, human development, productive capacity, and inclusive growth.

Before estimating the empirical models, it is necessary to examine the time series properties of the variables to avoid obtaining misleading regression results. Testing for stationarity helps determine whether the variables exhibit stable statistical properties over time and guides the selection of an appropriate estimation technique. For this purpose, the Levin, Lin, and Chu panel unit root test is employed. This test examines the null hypothesis that each panel contains a unit root against the alternative hypothesis that the variables are stationary with a common autoregressive parameter across cross-sections. The model proposed by Levin, Lin, and Chu (2002) is specified as follows:

$$\Delta y_{it} = \delta y_{it-1} + \sum_{L=1}^p \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \quad m=1, 2, 3$$

Table 3 presents the results of the Levin, Lin, and Chu panel unit root test. The findings indicate that all variables become stationary after first differencing, suggesting that they are integrated of order one, I(1). The calculated test statistics are statistically significant at conventional significance levels, as confirmed by the corresponding probability values.

Table 3: Unit Root Test

Variables	Level of Integration	Cal. Value	Critical Value	Probability**
Tax Revenue (% of GDP)	1	257.04	-2.15	0.05
Inflation (%)	1	523.84	-12.11	0.000
General Government Expenditure	1	239.71	-2.12	0.01
Government Effectiveness Index	1	311.44	-2.72	0.001
Trade (% of GDP)	1	382.64	-5.68	0.000
Productive Capacity Index	1	339.83	-5.82	0.000
Human Development Index	1	256.06	-1.03	0.05
Per capita GDP	1	991.79	-21.75	0.000

Source: Author’s own calculations. ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The Pedroni residual cointegration test provides limited evidence of a long-run equilibrium relationship among the variables. Although the Panel PP and Group PP statistics reject the null hypothesis of no cointegration at the 5% and 1% significance levels, respectively, the remaining test statistics fail to reject the null. Thus, the evidence of panel cointegration is mixed rather than uniformly conclusive. The Pedroni residual cointegration test was employed to examine the existence of a long-run equilibrium relationship between human development (HDI) and its explanatory variables, including government effectiveness, General Government Expenditure, inflation, tax revenue, trade, and per capita income. The results provide mixed evidence of cointegration. Thus, only the Panel PP and Group PP statistics reject the null hypothesis of no cointegration. The remaining statistics fail to reject the null.

In the case of developed countries, therefore, the Pedroni test provides strong PP-based evidence that the variables share a long-run equilibrium relationship. This implies that HDI, government effectiveness, government expenditure, inflation, tax revenue, trade, and per capita income may deviate from one another in the short run, but they tend to move together in the long run. The finding is economically plausible because improvements in income, fiscal capacity, institutional effectiveness, public expenditure, trade

integration, and macroeconomic stability can jointly influence human development outcomes in developing and emerging economies. Nevertheless, because the different Pedroni statistics do not produce unanimous results, the evidence should be described as mixed but supportive of long-run cointegration rather than as conclusive across all test statistics. Given the evidence of cointegration, subsequent analysis using an appropriate panel error-correction or other dynamic long-run model is justified to distinguish between short-run adjustments and long-run effects.

Table 4: Padroni Cointegration Test Results

Fiscal Stimulus and Inclusive Growth (Human Development Index)

Developing Countries				Developed Countries			
Pedroni Statistic	Stastistic	P value	Decision	Pedroni Statistic	Stastistic	P value	Decision
Panel v-Statistic	-1.656	0.951	Fail to reject H_0	Panel v-Statistic	-2.37	0.99	Fail to reject H_0
Weighted Panel V	-3.09	0.999	Fail to reject H_0	Weighted Panel V	-4.001	1.000	Fail to reject H_0
Panel rho	4.968	1.000	Fail to reject H_0	Panel rho	5.31	1.000	Fail to reject H_0
Weighted Panel rho	5.82	1.000	Fail to reject H_0	Weighted Panel rho	7.15	1.000	Fail to reject H_0
Panel PP	-1.97	0.02	Reject H_0	Panel PP	-10.77	0.000	Reject H_0
Weighted Panel PP	1.05	0.85	Fail to Reject H_0	Weighted Panel PP	-5.13	0.000	Reject H_0
Panel ADF	4.225	1.000	Fail to Reject H_0	Panel ADF	2.19	0.98	Fail to Reject H_0
Weighted Panel ADF	4.29	1.000	Fail to Reject H_0	Weighted Panel ADF	9.98	1.000	Fail to Reject H_0
Group PP	-3.79	0.0001	Reject H_0	Group PP	-10.37	0.000	Reject H_0
Group ADF	3.85	0.999	Fail to Reject H_0	Group ADF	0.14	0.55	Fail to Reject H_0
Group rho	7.86	1.000	Fail to Reject H_0				

Source: Author's own calculations **p<0.05 significant

Table 5: Kao Co-integration Test Results

Fiscal Stimulus and Inclusive Growth (Human Development Index)

VariableS	Developing Countries		Developed countries	
	t-statstics	Probability	t-statstics	Probability
ADF	-2.20	0.01	10.25	0.000
Residual Variance	0.000104		987.57	
Hac Variance	0.000137		508.38	

Source: Author's own calculations **p<0.05 ssignificant

In case of both developed and developing countries, the Kao residual cointegration test indicates the existence of a long-run equilibrium relationship among Human Development Index, Inflation, General Government Expenditure, Trade, Tax Revenue, Government Effectiveness, and Per Capita GDP. The ADF test statistic (-2.20) for developing and



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(10.25) for developed countries is statistically significant ($p = 0.01$ & $p=0.000$), providing strong evidence to reject the null hypothesis of no cointegration. Therefore, the panel variables are cointegrated and move together in the long run.

In developing countries, moderate inflation can accompany stronger aggregate demand and economic expansion, while high and unstable inflation may reduce purchasing power, discourage investment, and can create macroeconomic uncertainty. Taxes have a positive and significant effect on the Human Development Index, whereas General Government Expenditure has a positive but insignificant effect. Thus, stronger tax collection can provide governments with more predictable domestic resources to support the dimensions of HDI: health, education, and living standards. The OECD argues that tax revenues provide governments with resources to invest in development, reduce poverty, deliver public services, and build physical and social infrastructure. It also emphasizes the link between effective taxation and governance. The key reason general government spending is insignificant is that the amount of government spending is not necessarily the same as the effectiveness of government spending. Inflation and the Human Development Index have an insignificant relationship due to differences in monetary policy credibility and changing inflation rates across countries. Effective government policies can improve economic performance through better policy implementation, infrastructure provision, and resource allocation. When the system is not properly controlled, this causes government effectiveness to have an insignificant relationship with the Human Development Index. Government effectiveness has a positive but insignificant relationship with HDI. Government uses tax revenue to finance health, education, institutions, and infrastructure, which shows that positive taxation increases the Human Development Index and is statistically significant as well. Government spending on health, education, administration, and public services can contribute to human productivity, but this does not have a long-term effect, as government spending increases may cause a decrease in productive investment. Trade has a positive and significant relationship with HDI; trade therefore expands markets, causes an increase in specialization, facilitates technology transfer, and increases access to imported capital goods, but the insignificance shows that the lack of institutional quality and provision of domestic productive goods reduces global value participation. Per capita GDP has a significant and positive relationship with HDI. Per capita GDP represents the average level of economic resources generated per person in an economy. When per capita GDP increases, households generally have greater capacity to spend on food, housing, healthcare, education, sanitation, and other necessities. These improvements can contribute directly or indirectly to the health and education dimensions of human development. The regression results demonstrate a strong relationship between the selected economic, fiscal, institutional, and trade-related variables and human development, measured by the Human Development Index (HDI). The estimated coefficient of determination (R^2) is 0.93, indicating that approximately 93 percent of the variation in HDI is explained jointly by inflation, government effectiveness, per capita GDP, tax revenue, General Government Expenditure, and trade. The remaining 7 percent is explained by other factors that are not included in the model.

Table 6: FMOLS Long Run Cointegration Estimates
Fiscal Stimulus and Inclusive Growth (Human Development Index)

Variables	Developing Countries		Developed Countries	
	Coefficient	Probability	Coefficient	Probability
Tax Revenue	0.0006	0.000	0.0009	0.005
General Government expenditure	0.0003	0.332	0.003	0.000
Inflation	0.0001	0.08	0.0006	0.000
Per capita GDP	0.0001	0.000	4.31E-06	0.000
Government effectiveness	0.330	0.72	0.04	0.000
Trade (as % of GDP)	0.0001	0.08	0.0002	0.000
R2		0.93		0.94

Source: Author’s own calculations ** $p<0.05$ significant



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In the case of developed countries, tax revenue has a coefficient of 0.0009 and a probability value of 0.005, indicating a positive and statistically significant relationship with HDI at the 5 percent level. The result suggests that stronger tax revenue mobilization is associated with higher human development. One possible explanation is that greater domestic revenue provides governments with additional resources to finance public services and development programs. The IMF emphasizes that tax capacity is an important component of state-building and sustainable development, particularly in developing countries. Therefore, the positive coefficient may reflect the role of fiscal capacity in supporting education, healthcare, infrastructure, and social protection. Nevertheless, the relationship should be interpreted as an association rather than definitive evidence of causality because countries with higher levels of development may also have stronger tax-collection capacity. General Government Expenditure has a coefficient of 0.003 and a probability value of 0.000, indicating a positive and statistically significant relationship with HDI at the 1 percent level. This finding suggests that greater government consumption expenditure is associated with improvements in human development. Public expenditure can contribute to HDI when it supports essential public services such as education, healthcare, social protection, and basic infrastructure. However, because final consumption expenditure represents a broad category of government spending, the result does not imply that all forms of government consumption are equally productive. The efficiency and composition of expenditure remain important considerations. Trade has a coefficient of 0.0002 and a probability value of 0.000, indicating a positive and statistically significant relationship with HDI at the 5 percent level. The result implies that greater trade is associated with higher human development. Increased trade can expand markets, promote specialization, facilitate access to technology and imported goods, create employment opportunities, and increase economic activity. These channels can contribute to higher income and improved living standards, which may subsequently support improvements in HDI. Inflation has a coefficient of 0.0006 and a probability value of 0.000, indicating a positive and statistically significant relationship with HDI at the 5 percent level. This result suggests that, holding other factors constant, an increase in inflation is associated with a small increase in HDI. However, this finding should be interpreted cautiously because inflation is not generally expected to directly improve human development. The positive coefficient may reflect the fact that moderate inflation can occur alongside periods of economic expansion and increased economic activity. Therefore, the result should be interpreted as a statistical association rather than evidence that inflation itself improves human development.

Table 7: Padroni Co-Integration Test Results

Fiscal Stimulus and Inclusive Growth (Productive Capacity Index)

Developing Countries				Developed Countries			
Pedroni Statistic	Stastistic	P value	Decision	Pedroni Statistic	Stastistic	P value	Decision
Panel v-Statistic	-1.87	0.97	Fail to reject H ₀	Panel v-Statistic	1.67	0.05	Reject H ₀
Weighted Panel V	-4.005	1.000	Fail to reject H ₀	Weighted Panel V	-2.71	0.99	Fail to reject H ₀
Panel rho	5.29	1.000	Fail to reject H ₀	Panel rho	4.42	1.000	Fail to reject H ₀
Weighted Panel rho	4.46	1.000	Fail to reject H ₀	Weighted Panel rho	5.94	1.000	Fail to reject H ₀
Panel PP	-0.89	0.18	Fail to reject H ₀	Panel PP	-9.93	0.000	Reject H ₀
Weighted Panel PP	-4.27	0.000	Reject H ₀	Weighted Panel PP	-11.28	0.000	Reject H ₀
Panel ADF	0.88	0.81	Fail to Reject H ₀	Panel ADF	-4.69	0.000	Reject H ₀
Weighted Panel ADF	-1.25	0.10	Fail to Reject H ₀	Weighted Panel ADF	-8.25	0.000	Reject H ₀
Group PP	7.15	1.000	Fail to Reject H ₀	Group rho	-9.19	1.000	Fail to Reject H ₀
Group ADF	-6.33	0.000	Reject H ₀	Group PP	-16.03	0.000	Reject H ₀
Group rho	0.28	0.61	Fail to Reject H ₀	Group ADF	-4.87	0.000	Reject H ₀

Source: Author’s own calculations **p<0.05 significant



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Government effectiveness has a coefficient of 0.04 with a probability value of 0.000, indicating a positive and statistically significant relationship with HDI at the 5 percent level. The result implies that improvements in government effectiveness are associated with improvements in human development. This finding is consistent with the institutional perspective of development because effective governments are better positioned to formulate and implement policies, provide public services, and allocate resources efficiently. The World Bank identifies government effectiveness as capturing the quality of public services and the civil service, the quality of policy formulation and implementation, and the credibility of government decisions. Consequently, stronger government effectiveness can facilitate improvements in education, health, infrastructure, and other components of human development. Per capita GDP has a coefficient of 4.31E-06 and a probability value of 0.000, showing a positive and statistically significant relationship with HDI at the 5 percent level. The result indicates that increases in income per person are associated with higher levels of human development. Higher income provides households with greater purchasing power and allows both households and governments to devote more resources to education, healthcare, nutrition, housing, and other welfare-enhancing activities. The small numerical size of the coefficient is largely attributable to the monetary unit in which per capita GDP is measured and should therefore be interpreted in relation to the scale of the GDP variable.

The high R^2 of 0.94 indicates substantial explanatory power of the model. In addition, given the evidence of long-run cointegration obtained from the Pedroni residual test, an appropriate dynamic model capable of distinguishing short-run adjustments from long-run effects should preferably complement the estimated relationships. Overall, the findings provide empirical support for the importance of institutional quality, income, fiscal capacity, government expenditure, and trade in explaining differences in human development.

In the case of developing countries, only Weighted Panel PP and Group ADF reject the null hypothesis at the 5% level. On the other hand, in the developed-country scenario, seven out of eleven statistics reject the null hypothesis at the 5% level. Therefore, the evidence of a long-run cointegrating relationship is considerably stronger for developed countries than for developing countries. In particular, both the panel statistics (PP and ADF) and group statistics (PP and ADF) reject the null. This gives relatively broad support for the existence of a long-run relationship among the variables.

Table 8: Kao Co-Integration Test results for Inclusive Growth (Productive Capacity Index) Model

	Developing Countries		Developed Countries	
Variable Name	t-statstics	Probability	t-statstics	Probability
ADF	-5.06	0.000	10.13	0.000
Residual Variance	0.015		979.3	
Hac Variance	0.014		503.7	

Source: Author’s own calculations **p<0.05 significant

In the case of both developed and developing countries, the Kao residual cointegration test provides strong evidence of a long-run equilibrium relationship among Inflation, Government Effectiveness, General Government Expenditure, Trade, Tax Revenue, Per Capita GDP, and Productive Capacity Index. This indicates that although these variables may exhibit short-run fluctuations, they move together over time and maintain a stable long-run relationship. The Kao residual cointegration test produces an ADF statistic of 10.13 with a probability value of 0.0000. Since the p-value is less than the 1%, 5%, and 10% significance levels, the null hypothesis of no cointegration is rejected. This indicates that GGEFI (government effectiveness), FGCGI (General Government Expenditure), inflation, tax revenue, trade, per capita GDP, and PCII have a stable long-run equilibrium relationship. Although these variables may experience short-run fluctuations, they move together over time and converge toward a common long-run path.

Table 9: FMOLS Long-Run Cointegration Estimates

Fiscal Stimulus and Inclusive Growth (Productive Capacity index)

Variables	Developing countries		Developed Countries	
	Coefficient	Probability	Coefficient	Probability

Tax Revenue (as % of GDP)	0.06	0.0001	0.14	0.000
General Gross expenditure (as % of GDP)	-0.04	0.13	0.23	0.000
Per capita GDP	0.01	0.000	0.0002	0.000
Trade (as % of GDP)	0.01	0.16	-0.001	0.87
Inflation (%)	-0.001	0.80	0.02	0.03
Government effectiveness	0.330	0.72	6.21	0.000
R2		0.92		0.94

Source: Author's own calculations **p<0.05 significant

In the case of developing countries, the regression results indicate that the selected explanatory variables provide substantial explanatory power for the Productive Capacity Index (PCI) in the developing-country sample. The coefficient of determination (R^2) is 0.92, indicating that approximately 92 percent of the variation in PCI is explained jointly by inflation, government effectiveness, per capita GDP, tax revenue, General Government Expenditure, and trade. The remaining 8 percent of the variation is attributable to other factors not included in the model. Tax revenue has a coefficient of 0.06 and a probability value of 0.0001, indicating a statistically significant positive relationship at the 5 percent level. The result suggests that higher tax revenue is associated with higher PCI, holding other variables constant. A possible explanation is that greater tax revenue strengthens government fiscal capacity and enables governments to finance public infrastructure, education, health services, and other expenditures that can support economic development. However, the result should be interpreted as an association rather than definitive evidence of causality because higher-income economies may also have greater tax-collection capacity. General Government Expenditure has a coefficient of -0.04 and a probability value of 0.13. The negative coefficient indicates an inverse estimated relationship with the productive capacity index, but the probability value shows that the coefficient is statistically insignificant at the 10 percent level. Consequently, there is insufficient evidence to conclude that government final consumption expenditure has an independent effect on productive capacity in the estimated model. The finding may indicate that government consumption does not necessarily generate the same economic benefits as productive public investment.

Inflation has a coefficient of -0.001 and a probability value of 0.80. The negative coefficient suggests that inflation is associated with a small reduction in PCI, holding other factors constant. However, the probability value is substantially above the conventional significance levels, indicating that the relationship is statistically insignificant. Thus, the results do not provide sufficient evidence that inflation has a significant effect on the productive capacity index in the developing-country sample. Government effectiveness has a positive coefficient of 0.330, with a probability value of 0.72. The positive sign is consistent with the expectation that improvements in government effectiveness can contribute to better economic outcomes through improved public-service delivery, policy implementation, and resource allocation. Nevertheless, the coefficient is statistically insignificant. Therefore, although the estimated relationship is positive, the results do not provide sufficient statistical evidence that government effectiveness independently affects the productive capacity index in the model. Per capita GDP has a coefficient of 0.01 and a probability value of 0.000, indicating a statistically significant positive relationship at the 5 percent level. This suggests that higher per capita GDP is associated with a higher productive capacity index, *ceteris paribus*. The highly significant result indicates a strong statistical relationship between the two variables. However, caution is required if PCI and per capita GDP are constructed from the same underlying income measure, because their close conceptual relationship may create a mechanical association. Trade (as % of GDP) has a coefficient of 0.01 and a probability value of 0.16. Although the coefficient is positive, indicating that greater Trade (as % of GDP) is associated with a higher productive capacity index, the relationship is statistically insignificant at conventional significance levels. This suggests that Trade (as % of GDP) alone may not be sufficient to increase per capita income in developing countries. The benefits of international Trade (as % of GDP) may depend on factors such as the composition of exports and imports, domestic productive capacity, institutional quality, human capital, and integration into global value chains.

In the case of developed countries, tax revenue has a coefficient of 0.14 and a probability value of 0.000, showing a positive and statistically significant relationship with the productive capacity index at the 5 percent level. This finding suggests that greater tax-revenue mobilization is associated with higher human development. A possible explanation is that increased tax revenue strengthens government fiscal capacity and enables greater provision of public goods and services, including healthcare, education, infrastructure,

and social protection. The IMF emphasizes that domestic revenue mobilization is central to financing development and essential government services, particularly in developing economies. Therefore, the positive coefficient provides empirical support for the argument that stronger fiscal capacity can contribute to human-development outcomes. General Government Expenditure has a coefficient of 0.23 and a probability value of 0.000, indicating a positive and statistically significant relationship with HDI at the 5 percent level. This finding suggests that higher government expenditure is associated with improvements in human development. Government spending can affect human development through the provision of education, healthcare, infrastructure, and other essential public services. Previous evidence for developing countries shows that education and health spending can contribute positively to human-capital accumulation. However, the efficiency and composition of expenditure are important because increases in aggregate government consumption do not necessarily guarantee better development outcomes.

Inflation has a coefficient of 0.020 with a probability value of 0.030, indicating a positive and statistically significant relationship with HDI at the 5 percent level. This implies that, *ceteris paribus*, a one-unit increase in inflation is associated with a 0.020 increase in the productive capacity index. Nevertheless, this positive relationship should be interpreted cautiously because inflation is not normally regarded as a direct mechanism for improving human development. Persistent or excessive inflation can reduce real purchasing power and negatively affect household welfare. Therefore, the positive coefficient may reflect the particular economic conditions of the countries in the sample rather than a beneficial causal effect of inflation. Evidence from developing countries emphasizes the importance of controlling excessive inflation while strengthening social and economic policies to improve development outcomes.

Government effectiveness has a coefficient of 6.21 and a probability value of 0.000, indicating a positive and highly significant relationship with the productive capacity index at the 5 percent level. This is one of the most important findings of the model. The positive coefficient indicates that stronger institutional effectiveness is associated with higher human development. Effective institutions can improve the implementation of public policies, the provision of public services, and the allocation of public resources. Since human development encompasses health, education, and living standards, effective governance can enhance the capacity of governments to translate economic resources into improvements in people's well-being. This interpretation is consistent with the human-development approach, which emphasizes expanding people's capabilities and opportunities rather than focusing exclusively on economic growth. Per capita GDP has a coefficient of 0.0002 and a probability value of 0.000, demonstrating a positive and statistically significant relationship with the productive capacity index at the 5 percent level. The result indicates that higher income per person is associated with a higher productive capacity index. An increase in income can improve people's ability to obtain better nutrition, healthcare, education, housing, and other necessities. It can also increase the fiscal resources available to governments for providing public services. The finding is broadly consistent with the productive capacity index framework, which incorporates a decent standard of living as one of its core dimensions. However, income should not be viewed as synonymous with the productive capacity index because development also incorporates health, education, capabilities, and opportunities. Trade (as % of GDP) has a coefficient of -0.001 and a probability value of 0.870, indicating that the relationship between Trade (as % of GDP) and productive capacity is negative but statistically insignificant. Since the probability value is considerably greater than 0.05, the null hypothesis that the Trade (as % of GDP) coefficient is zero cannot be rejected. Therefore, there is insufficient statistical evidence that Trade (as % of GDP) has a systematic long-run effect on the productive capacity index in the estimated model. The negative sign should not be interpreted as evidence that Trade (as % of GDP) reduces human development. Rather, it suggests that the effect of Trade (as % of GDP) is not robustly distinguishable from zero in this specification. The absence of significance may reflect differences in the composition of exports and imports, countries' ability to benefit from international markets, distributional effects, and differences in institutional capacity. UNDP similarly emphasizes that Trade (as % of GDP) can create income and employment opportunities but that its contribution to human development depends on the conditions under which Trade (as % of GDP) occurs and on domestic policies and institutions.

The R^2 of 0.94 indicates that the model explains approximately 94 percent of the variation in the productive capacity index. This high explanatory power suggests that the selected economic, fiscal, institutional, and expenditure variables collectively provide substantial information about differences in human development across the countries and over the study period. However, a high R^2 does not by itself establish causality, and the estimated coefficients should be interpreted together with the panel-data methodology, specification tests, and robustness checks.

5. Conclusions

The study aims to examine the role of fiscal stimulus on inclusive growth. The study used tax revenue and General Government Expenditure as proxies of fiscal stimulus to estimate the impact on inclusive growth. For this study, government effectiveness, inflation, and GDP per capita as independent variables. The data are extracted from the World Bank for 194 developed and developing countries for the period of 2000-2022. This paper used the Pedroni and Kao tests and long-run cointegration (FMOLS) techniques for analyzing the econometric model, using the productive capacity index and human development index as dependent variables, followed by tax revenue and General Government Expenditure used as proxies of fiscal stimulus, and trade, government effectiveness, inflation, and GDP per capita as independent variables. The results show that, in the case of developing countries, taxes increase inclusive growth, i.e., the human development index, and general government final consumption expenditure reduces it, whereas for the productive capacity index, taxes and general government final consumption expenditure both increase inclusive growth in developing countries. In contrast, in developed countries, both taxes and general government final consumption expenditure increase inclusive growth. In developed countries, public investment should increase in the form of renewable energy and sustainable transport; this would have a dual impact, e.g., productive capacity would increase along with Human development as well. Developed countries should also provide direct transfers to low- and middle-income households. Developing countries should support manufacturing and agro-processing sectors and provide subsidies or tax breaks for SMEs. This moves the economy toward higher-productivity sectors. Developing countries should also implement conditional cash transfers and food security programs. The immediate result would be poverty reduction and long-term human development gains.

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