ANALYZING THE IMPACT OF EXPENDITURE ON HEALTH AND EDUCATION, GROSS REGIONAL DOMESTIC PRODUCT, AND POVERTY ON HUMAN DEVELOPMENT INDEX IN THE SPECIAL REGION OF YOGYAKARTA

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DECLARATION OF AUTHENTICITY

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Yogyakarta, 15 September 2025

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APPROVAL PAGE

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MOTTO

"It is not about wanting to be better than others, but simply about wanting to be better than my past self."
— Ali ibn Abi Talib

"Nothing is impossible for the one who tries."
— Alexander the Great

"If what you love does not happen, then love what happens."
— Ali ibn Abi Talib

"Only the strong shall stand on their own."
— Fortis solus stabit

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With deep humility and gratitude, I dedicate this humble work to my beloved parents : Karyono and Sarmi, who are my greatest source of love and inspiration. To my father and mother, thank you for every sacrifice, prayer, and word of encouragement you have given me. Even when words remain unspoken, my heart always whispers prayers of love for you. I realize that I can never repay your sacrifices, and I ask Allah SWT to reward you with health, happiness, and endless blessings.

This thesis, entitled ***"Analyzing the Impact of Expenditure on Health and Education, Gross Regional Domestic Product, and Poverty on Human Development Index in the Special Region of Yogyakarta"*****,** can be completed. This thesis is a requirement to obtain a Bachelor's Degree (S1) in Economics from the Universitas Islam Indonesia.

During the writing process, the author realized the shortcomings and limitations of his knowledge. Therefore, guidance and assistance from various parties were very helpful in completing this thesis. With humility, the author would like to express his deepest gratitude to:

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the author wholeheartedly realizes that this thesis has not reached the level of perfection and still has shortcomings. Nevertheless, the hope is that this thesis can provide benefits and added value for readers. May the support, guidance, and prayers received by the author be well-received from Allah SWT.

Yogyakarta, 6 March 2024

Author,

Ardiyan Wira Yudha

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ABSTRACT

Human development has become a central focus in assessing the progress of regional development, where education, health, economic capacity, and poverty alleviation are crucial determinants of human welfare. This study examines the impact of government expenditure on education and health, gross regional domestic product (GRDP), and poverty rate on the Human Development Index (HDI) in the Special Region of Yogyakarta from 2017 to 2024. The analysis is motivated by persistent disparities in HDI levels among districts within the province, despite overall progress. Using panel data comprising five districts and municipalities, this research applies econometric estimation through Common Effect, Fixed Effect, and Random Effect Models. The Hausman and Chow tests indicate that the Fixed Effect Model (FEM) is the most appropriate estimator. The findings reveal that government expenditure on health has a significant and positive effect on HDI, suggesting that greater investment in healthcare contributes to a higher quality of life. Surprisingly, government expenditure on education shows a significant but negative effect on HDI, implying inefficiencies or delayed outcomes in the education sector. GRDP per capita exerts a strong positive influence on HDI, confirming that regional economic growth substantially enhances human development. Conversely, the poverty rate has a significant negative impact on HDI, indicating that higher poverty levels directly hinder access to health, education, and decent living standards.

Overall, the model demonstrates high explanatory power (R^2 = 0.9976), showing that nearly all variations in HDI are explained by the selected independent variables. These results highlight the importance of optimizing public spending effectiveness, fostering inclusive economic growth, and reinforcing poverty reduction programs as strategic approaches to improving human development outcomes in Yogyakarta.

CHAPTER I

INTRODUCTION

1.1 Research Background

According to the United Nations Development Programme (UNDP), human development is a process aimed at expanding people's choices through empowerment, with a focus on enhancing fundamental human capabilities. When individuals are equipped with these basic capabilities, they are expected to participate actively in all aspects of development (*Human Development Report,* 1990). To measure the progress and success of human development, the UNDP introduced the Human Development Index (HDI), which serves as a key indicator of a region or nation's overall well-being. The HDI encompasses three main dimensions: life expectancy at birth, literacy, average years of schooling, and purchasing power. Life expectancy reflects health status, literacy and education levels assess educational development, while purchasing power indicates living standards. In the UNDP development model, human beings are positioned at the core of all development processes(Bhakti et al., 2018.).

Indonesia's national development goals, as outlined in the Preamble of the 1945 Constitution, emphasize the aim of promoting the general welfare and educating the nation. To assess progress toward these goals, a more comprehensive and internationally recognized metric, HDI, is employed. The HDI consolidates health, education, and decent living standards as its core components.

In accordance with Law No. 21 of 2001 concerning the Special Region of Yogyakarta (DIY), the central government delegates authority to local governments to determine development strategies aligned with the aspirations of their citizens. Through various fiscal instruments such as General Allocation Funds (DAU), Special Allocation Funds (DAK), and Regional Own Source Revenue (PAD), the regional government allocates spending to improve the economy and, more critically, enhance human resource quality. This is primarily achieved through budget allocations for education and health in the Regional Budget (APBD). Therefore, in evaluating HDI levels across regions, it is important to examine the effectiveness of local government expenditure in improving human capital quality.

In the UNDP (1990) model of human development, the core elements clearly emphasize the objective of achieving a long and healthy life, acquiring education, and enjoying a decent standard of living. This indicates that human development is closely tied to improving individual and community well-being, placing human beings at the centre of the development process.

In this context, the Government of the Special Region of Yogyakarta, one of the provinces with the highest HDI scores in Indonesia, continues to prioritize human resource development. One of its key policy tools is public expenditure through the regional budget, particularly in the education and health sectors. Spending in the education sector is intended to improve average years of schooling and expected years of schooling, while health-related expenditures aim to increase life expectancy. These are essential elements contributing directly to the HDI. The implementation of fiscal decentralization provides local governments with greater autonomy to allocate funds based on local needs. Consequently, educational and health budget allocations represent concrete interventions by the local government to enhance the quality of life of its residents. The effectiveness of public spending in these sectors is reflected in the consistent improvement of HDI scores.

The UNDP further underscores that human development puts people at the forefront of all development efforts. In its model, indicators such as life expectancy, average years of schooling, and purchasing power are used as comprehensive measures of development progress. Therefore, to assess the quality of human development in regions such as Yogyakarta, it is vital to evaluate whether government spending in the education and health sectors has been effective in improving overall living standards.

The HDI serves as a long-term indicator of human development, where both the pace and level of achievement are important. In general, human development in the Special Region of Yogyakarta has steadily improved from 2017 to 2024. In 2024, all Indonesian provinces recorded positive HDI growth, though the rates varied. Nationally, Indonesia's HDI grew by 0.85 percent, reaching a value of 75.02. The province with the highest HDI growth was Papua Pegunungan at 1.83 percent, well above the national average, followed by West Papua at 1.27 percent, and North Maluku at 1.21 percent. In contrast, provinces such as Yogyakarta, Central Java (both at 0.65 percent), and Bangka Belitung Islands (0.62 percent) showed relatively slower HDI growth (BERITA RESMI STATISTIK, 2024). However, despite the slower growth, all provinces experienced improvement in human development throughout 2024.

In Yogyakarta, the HDI rose from 78.89 in 2017 to 81.62 in 2024, reflecting an average annual growth of 0.52 percent. Although the HDI continues to increase, disparities persist across the province's five districts and municipalities, particularly between urban areas such as Yogyakarta City and rural regions, such as Gunung Kidul and Kulon Progo. These disparities highlight the importance of conducting empirical analysis to understand the extent to which government expenditure in the education and health sectors influences HDI outcomes across different regions.

Table 1.1 Human Development Index (HDI) of Five Districts of the Special Region of Yogyakarta 2017-2024 (%)

	Year							
Region	2017	2018	2019	2020	2021	2022	2023	2024
Kulon Progo	73.23	73.76	74.44	74.48	74.73	75.48	75.82	76.18
Bantul	78.67	79.45	80.01	80.36	80.63	81.04	81.74	82.05
Gunung Kidul	68.73	69.24	69.96	70.18	70.37	71.18	71.46	72.14
Sleman	82.85	83.42	83.85	83.92	84.08	84.4	84.86	85.71
Kota Yogyakarta	85.49	86.11	86.65	86.93	87.5	88	88.61	89.1

Sumber: Badan pusat statistik DI Yogyakarta (BPS)

Based on Table 1, there is an observable increase in the Human Development Index (HDI) across the five districts and municipalities in the province. The highest HDI values are found in Bantul, Sleman, and Yogyakarta City, while the lowest are observed in Kulon Progo and Gunung kidul.

Several factors are presumed to influence HDI, one of which is Gross Regional Domestic Product (GRDP). Higher GRDP levels may shift consumption patterns within communities as they fulfil their needs. The purchasing power of the population, which directly relates to consumption behavior, is one of the composite components of HDI, specifically, the income dimension (Todaro, 2006).

Another set of influential factors includes government expenditures in the education and health sectors. Accessible and affordable facilities in these sectors are instrumental in boosting productivity, which in turn contributes to increased income levels (Lanjouw & Lanjouw, 2001) Additionally, the dependency ratio is considered a relevant variable. This ratio compares the number of individuals in non-productive age groups to those of productive age and reflects economic pressures within a population (Kuncoro, 2010).

1.2 Problem Formulation

Based on the background described above, this study seeks to address the following research questions:

1. How does local government spending on education through the regional budget (APBD) affect the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024?
2. How does local government spending on health through the regional budget (APBD) affect the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024?
3. What is the effect of Gross Regional Domestic Product (GRDP) on the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024?

4. What is the effect of poverty levels on the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024?

1.3 Research Objectives and Significance

1.3.1 Research Objectives

Generally, this research aims to analyze the influence of government expenditure, specifically in the education and health sectors, as well as GRDP and poverty levels, on the Human Development Index in the Special Region of Yogyakarta from 2017 to 2024. More specifically, the objectives of this study are as follows:

1. To examine the effect of education expenditure through the regional budget (APBD) on the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024.
2. To examine the effect of health expenditure through the regional budget (APBD) on the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024.
3. To analyze the effect of Gross Regional Domestic Product (GRDP) on the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024.
4. To analyze the effect of poverty levels on the Human Development Index in the districts of the Special Region of Yogyakarta from 2017 to 2024.

1.3.2 Significance of the Study

1. **For the Researcher**

This research is expected to enrich the author's knowledge in the field of economics. It serves as a learning opportunity to apply theoretical knowledge gained during academic studies and develop critical thinking skills, particularly in the context of economic analysis and problem-solving.

2. **For the Academic Community**

The findings of this study are intended to provide insights and a clearer understanding of how regional government budgets allocated for education and health, along with GRDP and poverty levels, impact the Human Development Index in the districts of the Special Region of Yogyakarta.

3. **For Government Stakeholders**

This research may serve as a useful reference for regional policy makers and stakeholders in formulating more effective development policies. In particular, it can inform strategic decisions regarding budget allocations for education, health, regional economic development, and poverty reduction to enhance human development outcomes across the province.

CHAPTER II

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Literature Review

Several previous studies serve as references for this research. These studies were selected due to similarities in the dependent and independent variables, research objectives, analytical methods, and findings, which are relevant as foundational literature for this study.

Numerous studies have examined the relationship between government spending and HDI performance. Widodo et al., (2012) investigated the impact of government spending in the education and health sectors on poverty alleviation, emphasizing its role in enhancing human development in Central Java Province. The study concluded that government expenditure in these sectors can influence poverty levels if such spending is aimed at enhancing the quality of human development. Harahap (2017)found that local government spending, particularly through Special Allocation Funds (DAK) and General Allocation Funds (DAU), had a positive and significant effect on the Human Development Index (HDI) in North Sumatra Province. This indicates that increasing the education budget contributes directly to improving educational quality, which subsequently drives HDI growth. Furthermore, Regional Own Source Revenue (PAD) was also shown to support human development through financing basic services such as education and healthcare. Pratowo (2012) found that regional spending and the proportion of non-food consumption had a positive impact on HDI. Conversely, the Gini ratio and the dependency ratio were found to have a significant negative effect on HDI. Astri et al. (2013) demonstrated that local government expenditures in the education and health sectors influenced HDI performance. Kahang & budi Suharto (2016)investigated the impact of government spending in education and health on HDI in East Kutai Regency. Using secondary data from 2009 to 2014, the results indicated that educational expenditure significantly affected HDI, while health expenditure had no significant effect. The findings suggested that the health sector was not being managed effectively enough to make a strong contribution to human development in that region.

In addition to the variable government spending, several studies have examined other variables that influence the Human Development Index (HDI). (Khodabakhshi, 2011)found that Gross Domestic Product (GDP) had a positive influence on HDI. Economic growth, as reflected in the annual increase of national GDP and regional GRDP, should ideally be accompanied by corresponding improvements in human development. Nadia Ayu Bhakti et al. (2014) analyzed the factors influencing HDI in Indonesia using panel regression data from 33 provinces between 2008 and 2012. The dependent variable used was HDI, with independent variables including GRDP, dependency ratio, household food consumption, education budget, and health budget. The findings revealed that GRDP and the health budget had a significant positive effect on HDI, while the dependency ratio and household food consumption had a significant negative effect. Interestingly, the education budget did not significantly affect HDI.

The distinction of the current study compared to the previous ones lies in its focus on government expenditure variables through the regional budget for education and health, along with GRDP and the dependency ratio. This study analyzes the HDI across five districts of the Special Region of Yogyakarta using panel data regression, covering the period from 2017 to 2024.

2.2 Theoretical Framework

2.2.1 Human Development Index and Its Measurement

The United Nations Development Programme (UNDP) defines human development as a process of expanding the choices available to individuals. In this concept, people are viewed as the ultimate goal (the ultimate end) of development, while economic development serves merely as a means to achieve that goal. To ensure the success of human development, UNDP (1995) outlines four essential elements: productivity, equity, sustainability, and empowerment.

1. **Productivity**: Individuals must be enabled to increase their productivity and fully participate in income-generating activities. Therefore, economic development becomes an integral component of human development.
2. **Equity**: All individuals should have equal access to economic and social resources. Any barriers limiting access must be removed to ensure inclusive participation in productive activities that enhance quality of life.

3. **Sustainability**: Access to economic and social resources must be safeguarded for future generations. All physical, human, and environmental resources should be continuously renewed.
4. **Empowerment**: People should have the ability to participate in decisions and processes that shape their lives and to benefit from development outcomes.

According to Statistics Indonesia (BPS), human capital is the true wealth of a nation. Human development places people at the center of the development process, not merely as instruments of development. The UNDP asserts that the primary objective of development is to create an environment that enables individuals to live long, healthy, and productive lives.

In relation to regional HDI, the HDI of a region reflects how well it achieves predefined benchmarks, such as a maximum life expectancy of 85 years, expected years of schooling of 18 years, mean years of schooling of 15 years, and adjusted per capita expenditure. A region with an HDI value approaching 100 percent is considered to have a very high level of human development. It is likely to have the human capital necessary to support sustainable economic growth.

2.2.2 New HDI Calculation Method and Component Indexes

According to Statistics Indonesia (BPS), HDI is calculated based on three key components: the health dimension, the education dimension, and the expenditure dimension. It is computed as the geometric mean of the health index, the education index, and the expenditure index. This new methodology provides a more balanced and comprehensive assessment of human development by integrating multiple dimensions into a single indicator.

$$IPM = \sqrt[3]{Ihealth \times Ieducation \times Iexpenditure}$$

To calculate the component index, health dimension, education dimension, and expenditure dimension, the following formula is used

$$health = \frac{(AHH - AHH\_min)}{(AHH\_maks - AHH\_min)}$$

$$education = \frac{i_{HLS} + i_{RLS}}{2}$$

$$expenditure = \frac{\boldsymbol{ln}(pendapatan) - \boldsymbol{ln}(pendapatan\ min)}{ln(pendapatan\ maks) - ln(pendapatan\ min)}$$

2.3 Definition of Government Expenditure

According to Sukirno (2017) government expenditure is part of fiscal policy, an action taken by the government to regulate the economy by determining annual revenues and expenditures. These are reflected in the State Budget (APBN) for the national level and the Regional Budget (APBD) for the regional level. The objective of this fiscal policy is to stabilize prices, output levels, and employment opportunities, and to stimulate economic growth.

2.4 Perspectives on Government Expenditure

2.4.1 Views of W.W. Rostow and Musgrave

Rostow (1960), through his theory of stages of economic growth, argued that the role of government expenditure evolves in line with the phase of development. In the early stages, spending is heavily allocated to infrastructure, which serves as a foundation for productivity and private sector growth. As development progresses, government intervention remains essential to address market failures and later shifts toward social services such as education and health.

Similarly, Musgrave (1959), from a public finance perspective, emphasized three enduring functions of government: the allocation of public goods, the distribution of resources to promote social equity, and the stabilization of the economy to maintain economic balance. Taken together, Rostow and Musgrave highlight the evolving yet continuous importance of government expenditure in driving and sustaining economic development.

2.4.2 Keynesian Perspective

According to Dumairy (1996), Keynesian theory legitimizes government intervention in the economy through the national income equilibrium identity. Government spending must be strategically planned not only to achieve final goals such as increasing income or employment, but also to consider intermediary targets, such as which groups will benefit. Excessive government involvement, however, should not suppress private sector activities.

2.4.3 Government Expenditure in Education and Health Sectors

Azzahra et al., (2024) argued that investment in education is crucial. Government spending on education represents a tangible investment aimed at enhancing productivity. The spending includes infrastructure development and service delivery across Indonesia. The 20% education budget allocation in the national budget (APBN) is evidence of this commitment. According to Meier, government spending on education increases school completion rates and enhances technological adoption, improving national economic standards. Therefore, investment in education and healthcare is essential for development (Feniser et al., 2022).

Government expenditure on health is as crucial as spending on education, as both are fundamental to human development. Kuncoro (2010) stated that government health expenditure represents the fulfillment of citizens' rights to healthcare as mandated by Article 28H(1) of the 1945 Constitution and Law No. 23 of 1992. Similarly, (Indonesia, 2009)noted that Indonesian law, specifically Law No. 36 of 2009, mandates a minimum of 5% of the central government budget (excluding salaries) and 10% of regional budgets be allocated to health.

Health plays a central role in determining the quality of human resources and overall productivity. Astri et al. (2013) emphasized that poor health, often caused by malnutrition or disease, leads to a lower-quality workforce. This point is reinforced by Bloom et al. (2000), who argue that investment in health is a prerequisite for enhancing societal productivity, as unhealthy populations are less capable of contributing effectively to economic growth.

Public services, including health and education, are essential in meeting societal needs and advancing human development. Mahmudi & Msi, (2005)defined public services as all services provided by public institutions to address societal needs and comply with regulatory mandates. These include basic services, such as health, education, and essential goods, as well as general services, including administrative, product-based, or service-oriented provisions. Access to health and education is, therefore, not only a basic right but also a key factor in breaking poverty cycles and enabling broader economic participation.

The role of government intervention in health and education is further justified by public finance theory. According to Musgrave (1959), markets alone cannot adequately address issues related to public goods, externalities, and income distribution. Failures in these areas necessitate government involvement in allocation, distribution, and stabilization. This is particularly relevant in education and health, where reliance on market mechanisms alone would result in inequality and inadequate provisions.

2.5 Gross Regional Domestic Product (GRDP)

Sabilla & Sumarsono (2022) described economic growth as an indicator of regional economic performance, measured by the growth of Gross Regional Product (GRDP). Gross Regional Domestic Product (GRDP) is the total value of all final goods and services produced within a region and is widely used as an indicator of regional economic performance. A higher GRDP reflects stronger economic activity, which ideally should be accompanied by improvements in human development. Human development, through better education, health, and skills, enhances labor productivity and creativity, thereby contributing to sustained economic growth and reinforcing regional economic performance.

Rahman et al., (2020) explained that human development contributes to economic growth by improving the quality of human capital. Emphasized that human capital can be produced, accumulated, and that investment in it yields future returns. Education and health are key determinants in enhancing human capital.

2.6 Poverty Rate

Poverty is a complex, multidimensional issue involving not only income, but also access to education, healthcare, and a decent standard of living. According to the Central Statistics Agency (BPS 2024), individuals are considered poor when their average monthly per capita expenditure falls below the poverty line, which includes food and non-food components. The food poverty line is based on a minimum daily intake of 2,100 kilocalories, while the non-food line includes essential needs such as housing, clothing, education, and health.

Scholars have provided broader conceptualizations of poverty. Todaro (2006) defined poverty as a condition in which individuals are unable to meet their basic needs, such as food, shelter, education, and healthcare. This condition constrains human potential and contributes to lower Human Development Index (HDI) scores. Similarly, Musgrave (1959) introduced the concept of the cycle of poverty, which suggests that poverty persists across generations due to inadequate access to essential services. Sen (2014) in Development as Freedom, stated that poverty is not merely a lack of income but a deprivation of freedom, as individuals without access to education and healthcare are denied opportunities to improve their lives.

The consequences of poverty are directly linked to human development outcomes. Poor individuals often have limited access to education and healthcare, which restricts their ability to escape poverty and negatively affects overall HDI performance. Thus, addressing poverty is not only about increasing income, but also about enhancing opportunities and expanding human capabilities.

Measuring poverty is crucial for assessing welfare and evaluating the effectiveness of social and fiscal policies. In Indonesia, programs such as Direct Cash Assistance (BLT), the Family Hope Program (PKH), and subsidies for education and health have been implemented to reduce poverty levels. However, success should not be measured only by the decline in poverty rates. Rather, it should also be evaluated through improvements in the quality of life, including higher life expectancy, better educational attainment, and greater purchasing power.

2.7 Hypotheses

1. Regional government education spending (APBD) has a significant and positive effect on the Human Development Index in districts within the Special Region of Yogyakarta.
2. Regional government health spending (APBD) has a significant and positive effect on the Human Development Index in districts within the Special Region of Yogyakarta.
3. Gross Regional Domestic Product (GRDP) has a significant and positive effect on the Human Development Index in districts within the Special Region of Yogyakarta.
4. Poverty rate is suspected to have a significant and negative effect on the Human Development Index in districts within the Province of DI Yogyakarta.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Type and Sources of Data

This study employs secondary data obtained from various official statistical sources. The primary data sources include the Central Statistics Agency (BPS) of Indonesia, BPS of DI Yogyakarta, BPS of Gunung Kidul, BPS of Sleman, BPS of Kulon Progo, and BPS of Yogyakarta City. The specific data used in this study include:

1. Human Development Index (HDI) data for five districts/cities in the Special Region of Yogyakarta from 2014 to 2024.
2. Budget allocation data from local government budgets (APBD) for the education sector in five districts/cities in DI Yogyakarta from 2017 to 2024.
3. Budget allocation data from APBD for the health sector in five districts/cities in DI Yogyakarta from 2017 to 2024.
4. Gross Regional Domestic Product (GRDP) at constant prices in five districts/cities in DI Yogyakarta from 2017 to 2024.
5. Poverty rate data in five districts/cities in DI Yogyakarta from 2017 to 2024.

3.2 Data Analysis Method

This study utilizes a quantitative research method with a secondary data analysis (SDA) approach. Secondary data analysis involves the use of data that has already been collected and published by recognized institutions. According to

Sugiyono (2010), quantitative research is based on positivist philosophy and is used to examine specific populations or samples. The data analysis process involves testing hypotheses using quantitative methods. The quantitative approach adopted in this research aims to measure the impact of government spending on education and health sectors on the Human Development Index. The constellation of influence in this study is illustrated as follows:

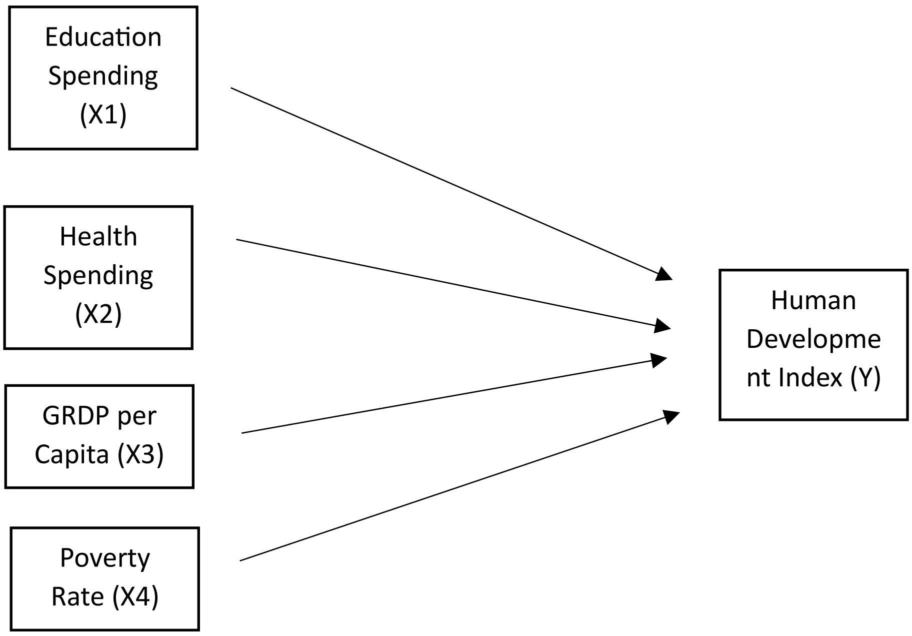


Figure 3.1 Research Framework

3.2.1 Panel Data and Analytical Framework

This study utilizes panel data, which combines both cross-sectional and time-series data. According to Gujarati (2021), panel data is a dataset that merges observations across time and entities. Time-series data refers to observations collected over a defined time period for a single entity, whereas cross-sectional data represents observations collected from one or more subjects at a specific point in time.

The title of this research is “Analyzing the Impact of Government Spending on Health and Education, Gross Regional Domestic Product, and Poverty Rate on the Human Development Index in the Special Region of Yogyakarta.” The study aims to evaluate the potential impact of government spending on health and education, gross regional domestic product (GRDP), and poverty levels on the Human Development Index (HDI). Secondary data are used, sourced from the Central Statistics Agency (BPS), Directorate General of Fiscal Balance, the Ministry of Finance, and other relevant institutions. These secondary data, which are indirectly obtained from reputable sources, cover the period from 2017 to 2024 across five regencies and municipalities in the Special Region of Yogyakarta. The variables used include HDI, government expenditure in health and education, GRDP, and poverty rate. All data were processed using EViews 12 software.

Widarjono (2013) explains that panel data methodology uniquely integrates two types of data: time series and cross-sectional data. Cross-sectional data comprises observations from various samples or units, while time-series data includes observations recorded sequentially over time, whether daily, monthly, quarterly, or annually. Panel data is created by combining these two dimensions over a specific time horizon. Compared to analyses that rely on either time series or cross-sectional data, panel data analysis offers several advantages. The integration of both dimensions results in a larger dataset, thereby enhancing the degrees of freedom and improving the statistical power of the model. Furthermore, combining time series and cross-sectional data helps mitigate omitted variable bias by capturing both temporal and individual variations.

3.2.2 Common-Effects Model (CEM)

The Common Effect Model is the most basic form of panel data estimation, assuming homogeneity across individual and time dimensions. Although the observed units differ, their characteristics are considered identical in terms of the model structure. This model is estimated using the Ordinary Least Squares (OLS) method by pooling time-series and cross-sectional data without accounting for individual-specific or time-specific variations.

CEM assumes the existence of a uniform or constant effect that influences all units in the population. This approach is suitable when the primary assumption is that these general effects are the main drivers of variation within the panel data. However, it does not capture the heterogeneity among individual entities or over time, which may limit its explanatory power in more complex settings.

$$Y_{it} = \beta_0 + \beta_1 \ln X_{1it} + \beta_2 \ln X_{2it} + \beta_3 \ln X_{3it} + \beta_4 \ln X_{4it} + \epsilon_{it}$$

Where:

Y_{it}	= Human Development Index
β_0	= Intercept
$\boldsymbol{\beta_1\ \beta_2\ \beta_3\ \beta_4}$	= Coefficient regression of X1, X2, X3, X4
$\ln X_{1it}$	= Log of Government Expenditure on Health
$\ln X_{2it}$	= Log of Government Spending on Education Sectors
$\ln X_{3it}$	= Log of Gross Regional Domestic Product

$\ln X_{4it}$ = Log of Poverty Rate

i = Cross-section

t = Time Series (2017-2024)

eit = error term or residual

3.2.3 Fixed-Effects Model (FEM)

The fixed-effects model is a panel data estimation technique that employs dummy variables to capture differences in intercepts. It is based on the idea that while intercepts vary between firms, they remain constant over time. Furthermore, this model assumes that the regression coefficient (slope) is constant across individuals and over time. This estimation technique is often referred to as the least squares dummy variable (LSDV) technique.

$$Y_{it} = \beta_0 + \beta_1 \ln X_{1it} + \beta_2 \ln X_{2it} + \beta_3 \ln X_{3it} + \beta_4 \ln X_{4it} + \alpha_1 \ln D_{1it} + \cdots + \alpha_{40} \ln D_{40it} + \varepsilon_{it}$$

Y_{it} = Human Development Index

β_0 = Intercept

$\boldsymbol{\beta_1}\ \boldsymbol{\beta_2}\ \boldsymbol{\beta_3}\ \boldsymbol{\beta_4}$ = Coefficient regression of X1, X2, X3, X4

$\ln X_{1it}$ = Log of Government Expenditure on Health

$l\,n\,X_{2it}$ = Log of Government Spending on Education Sectors

$\ln X_{3it}$ = Log of Gross Regional Domestic Product

$\ln X_{4it}$	= Log of Poverty Rate
$\beta_5\ \beta_6\ \beta_n$	= Intercept Dummy
$D_{1\ldots\ldots}, D_{40}$	= Dummy variables
i	= Cross-section
t	= Time Series (2017-2024)
eit	= error term or residual

3.2.4 Random-Effects Model (REM)

Random-effects model is an approach used to address uncertainty surrounding the actual model in the context of panel data. As an alternative to using dummy variables in the fixed-effects model, the random-effects model uses error terms as an estimation method. This model assumes that the disturbance variables (error terms) are interconnected across time and individuals. Applying generalized least squares (GLS) to the random-effects model can help improve the accuracy and precision of the regression estimates.

$$Y_{it} = \beta_{oi} + \beta_1 ln\, X_{1it} + \beta_2 ln\, X_{2it} + \beta_3 ln\, X_{3it} + \beta_4 ln\, X_{4it} + \alpha_1 ln\, D_{1it} + \cdots + \alpha_{40} lnD_{40it} + e_{it}$$

Y_{it} = Human Development Index

$\beta_{0i} = \bar{\beta}0 + \mu i$

$\bar{\beta}$o = the mean of the population for which the parameter is unknown

$\beta_0\ \beta_1\ \beta_2\ \beta_3\ \beta_4$ = Coefficient regression of X1, X2, X3, X4

$\ln X_{1it}$ = Log of Government Expenditure on Health

$l\,n\,X_{2it}$ = Log of Government Spending on Education Sectors

$\ln X_{3it}$ = Log of Gross Regional Domestic Product

$\ln X_{4it}$ = Log of Poverty Rate

μ_i = error terms between individuals but the same in time

i = Cross-section

t = Time Series (2017-2021)

eit = error term or residual

3.3 Model Selection for Estimation

Panel data regression can be estimated using three different approaches: the Common-Effects Model (CEM), the Fixed-Effects Model (FEM), and the Random-Effects Model (REM). To obtain efficient and statistically sound estimations, it is essential to determine the most appropriate analysis model. Several statistical tests are commonly employed to support this decision:

1. **Chow Test**

The Chow test is used to determine whether the Fixed-Effects Model or the Common-Effects Model is more appropriate. The hypotheses tested are:

1. H_0: The Common-Effects Model (CEM) is appropriate

2. H_1: The Fixed-Effects Model (FEM) is appropriate

The decision is based on the p-value. If the p-value is statistically significant (less than 1%), the Fixed-Effects Model should be used. Conversely, if the p-value is not significant (greater than 1%), the Common-Effects Model is considered more appropriate.

2. **Lagrange Multiplier (LM) Test**

The LM test is applied when the Chow test suggests that the Common-Effects Model is appropriate, but a Hausman test may indicate a preference for the Random-Effects Model. The LM test evaluates the following hypotheses:

1. H_0: The Common-Effects Model (CEM) is appropriate
2. H_1: The Random-Effects Model (REM) is appropriate

If the p-value is significant (less than 1%), the Random-Effects Model should be used. If the p-value is not significant (greater than 1%), the Common-Effects Model remains appropriate. However, if the Chow test already supports the Fixed-Effects Model, the LM test can be disregarded.

3. **Hausman Test**

The Hausman test is used to determine whether the Fixed-Effects Model or the Random-Effects Model provides a better fit for the data. This test uses a Chi-square distribution as the basis for decision-making and is conducted under the assumption that individual errors are uncorrelated and that no systematic error component exists. The hypotheses are formulated as follows:

1. H_0: The Random-Effects Model (REM) is appropriate

2. H_1: The Fixed-Effects Model (FEM) is appropriate

If the p-value is significant (less than 1% or 0.01), the Fixed-Effects Model should be selected. If the p-value is not significant (greater than 1%), the Random-Effects Model is more suitable.

3.4 Statistical Testing

The purpose of statistical testing in this study is to interpret and validate the regression output. The statistical tests employed include the **coefficient of determination (R^2)**, the **simultaneous F-test**, and the **partial T-test**.

3.4.1 Coefficient of Determination (R^2)

The coefficient of determination (R^2) measures the proportion of variance in the dependent variable that is explained by the independent variables included in the model. The unexplained portion of the variance is attributed to factors outside the model or to variables not captured in the analysis. The formula to calculate R^2 is as follows:

$$R^2 = 1 - \frac{RSS}{TSS}$$

Where:

R^2 = The Coefficient of Determination

TSS = Total Sum of Squares

RSS = Residual Sum of Squares

Based on the value of the adjusted R-squared, the value of the CAP R^2 lies between zero and one ($0<R^2<1$). The closer the value of R^2 is to one, the greater the proportion of the dependent variable's variation that can be explained by the independent variables in the model.

3.4.2 F-Test (Simultaneous Test)

The F-test is conducted to examine whether the independent variables collectively have a significant effect on the dependent variable. This test is performed by comparing the calculated F-value with the critical F-value. The critical F-value is obtained from the F-distribution table based on the chosen significance level (α) and degrees of freedom (df).

The hypotheses for the F-test are as follows:

1. H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ (The independent variables have no joint effect on the dependent variable)
2. H_1: At least one $\beta \neq 0$ (The independent variables jointly affect the dependent variable)

The decision rule is:

1. If the calculated F-value > critical F-value, then **reject H_0** and accept H_1. This implies that the independent variables have a significant simultaneous effect on the dependent variable.

2. If the calculated F-value < critical F-value, then **fail to reject H_0**, meaning the independent variables do not significantly influence the dependent variable collectively.

Alternatively, the F-statistic can also be evaluated using its p-value. The p-value is compared against a predefined level of significance (α = 1%, 5%, or 10%).

1. If the p-value < α, then the null hypothesis is rejected, indicating that all independent variables jointly have a statistically significant influence on the dependent variable.
2. If the p-value > α, the null hypothesis cannot be rejected, suggesting no significant simultaneous effect.

3.4.3 T-Test (Partial Test)

The t-test is used to assess the individual significance of each independent variable in the regression model — in other words, whether each independent variable has a partial effect on the dependent variable.

This test is conducted by comparing the calculated t-value with the critical t-value obtained from the t-distribution table, based on a chosen significance level (α = 1%, 5%, or 10%) and degrees of freedom calculated using the formula: **df = n – k**, where *n* is the number of observations and *k* is the number of estimated parameters.

The hypotheses tested are as follows:

1. H_0: $\beta = 0$ → The independent variable has no partial effect on the dependent variable
2. H_1: $\beta < 0$ → The independent variable has a significant negative effect on the dependent variable
3. H_1: $\beta > 0$ → The independent variable has a significant positive effect on the dependent variable

Decision-making is based on either:

1. **t-value comparison**: If the calculated t-value > critical t-value, **reject H_0**. This means the independent variable has a significant effect on the dependent variable.
2. **p-value approach**: If the p-value < α, **reject H_0** and accept H_1, indicating a significant influence.
3. However, if the p-value > α, the null hypothesis cannot be rejected, suggesting that the independent variable does not significantly affect the dependent variable.

CHAPTER IV

DATA ANALYSIS AND DISCUSSION

4.1 Data Description

This study investigates the impact of government spending on health and education, along with gross regional domestic product (GRDP) and poverty rate, on the Human Development Index (HDI) across five regencies in the Special Region of Yogyakarta for the period 2017 to 2024. The five regencies examined represent the administrative regions within the province of Yogyakarta.

The explanatory variables used in this research include government spending on health (X1), government spending on education (X2), gross regional domestic product (X3), and poverty rate (X4). The dependent variable is the Human Development Index (Y). To analyze the panel data, this study employs the Pooled Least Squares (Common Effect Model), Fixed Effect Model, and Random Effect Model. To determine the most suitable model, Chow and Hausman tests are applied as part of the model selection process. The statistical analysis was performed using EViews 12, which facilitated the regression of the panel data.

This study aims to identify and explain the factors influencing the Human Development Index. Descriptive statistics are employed to provide an overview of the variables used, offering a comprehensive summary of the dataset. These statistics include measures such as the mean, standard deviation, median, maximum, and minimum values.

Descriptive statistics serve to summarize the distribution and characteristics of each variable involved in the analysis. The variables Government Spending on Health, Government Spending on Education, Gross Regional Domestic Product (GRDP), Poverty Rate, and Human Development Index (HDI) are analyzed using secondary data obtained from official publications of Badan Pusat Statistik (BPS) and the Directorate General of Fiscal Balance (DJPK). The descriptive statistical results for each variable are presented in Table 4.1.

Table 4.1 Results of Descriptive Statistical Variable Analysis

Variable	N	Mean	Maximum	Minimum	Std. Dev
Human Development Index	40	79.42	89.10	68.73	6.30
Government Expenditure on Health	40	6.07E+08	9.47E+08	84727986	1.83E+08
Government Expenditure on Education	40	3.80E+08	6.15E+08	1.16E+08	1.06E+08
Gross Regional Domestic Product	40	21480.00	41559.54	6973.410	10112.63
Poverty Rate	40	12.39	20.03	6.26	4.52

4.2 Regression Results

4.2.1 Common Effect Model (CEM)

The results of the Common Effect Model (CEM) regression analysis, examining the influence of Gross Regional Domestic Product, Government Spending on Education, Government Spending on Health, and Poverty Rate on the Human Development Index from 2017 to 2024 across the regencies and cities within the Special Region of Yogyakarta, are presented in Table 4.2.

Table 4.2 *Common Effect Model* Test Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.50301	4.393348	20.60001	0.0000
HEALTH	1.81E-05	3.74E-06	4.834579	0.0000
EDUCATION	-1.34E-05	2.70E-06	-4.952479	0.0000
GRDP	0.000108	0.000105	1.028914	0.3106
POV	-0.981492	0.225021	-4.361777	0.0001
R-squared	0.940668			
F-statistic	138.7258			
Prob(F-statistic)	0.000000			

Data source: Data processed using EViews 12

4.2.2 Fixed Effect Model (FEM)

Fixed Effects Model is a statistical technique for analyzing data in which the effects of several variables are assumed to be constant and unchanged across observations. The results of the Fixed Effects Model analysis are shown in Table 4.3. This study examines the relationship between the Human Development Index and the variables of Government Expenditure on Health, Government Expenditure on Education, Gross Regional Domestic Product, and Poverty Rate for each Regency in DI Yogyakarta between 2017 and 2024

Table 4.3 Fixed Effect Model Test Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	77.82919	1.362930	57.10434	0.0000
HEALTH	2.71E-06	1.26E-06	2.150985	0.0394
EDUCATION	-2.59E-06	1.08E-06	-2.395110	0.0228
GRDP	0.000319	3.36E-05	9.491389	0.0000
POV	-0.380845	0.071084	-5.357659	0.0000
R-squared	0.997680			
F-statistic	1666.506			
Prob(F-statistic)	0.000000			

Data source: Data processed using EViews 12

4.2.3 Random Effects Model (REM)

Across all regencies in the Special Region of Yogyakarta (DI Yogyakarta) from 2017 to 2024, the variables Government Expenditure on Health, Government Expenditure on Education, Gross Regional Domestic Product, and Poverty Rate were statistically analyzed using a Random Effects Model to determine how these factors affect the Human Development Index. The results are shown in Table 4.4.

Table 4.4 Result of Random Effect Model Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.50301	0.923067	98.04597	0.0000
HEALTH	1.81E-05	7.87E-07	23.01023	0.0000
EDUCATION	-1.34E-05	5.68E-07	-23.57137	0.0000
GRDP	0.000108	2.21E-05	4.897128	0.0000
POV	-0.981492	0.047278	-20.75993	0.0000
R-squared	0.940668			
F-statistic	138.7258			
Prob(F-statistic)	0.000000			

Data source: Data processed using EViews 12

4.3 Estimation Model Selection

The Common Effect Model, Fixed Effect Model, and Random Effect Model are three distinct approaches that constitute the panel data regression framework. To determine the most appropriate model for the analysis, model selection tests were conducted following the estimation of each model.

The following tests were employed for model comparison and selection:

1. The Chow Test was used to compare the Common Effect Model with the Fixed Effect Model.
2. The Hausman Test was applied to evaluate the difference between the fixed-effect model and the Random Effect Model.

3. The Lagrange Multiplier (LM) Test was used to compare the Random Effect Model with the Common Effect Model.

These diagnostic tests guide the selection of the most efficient and consistent model for interpreting the panel data regression results.

4.3.1 Chow-Test

The Chow Test is a statistical procedure used to determine whether a time series regression model contains structural breaks. In the context of panel data estimation, the selection between the Fixed Effect Model (FEM) and the Common Effect Model (CEM) is based on the results of this test.

Model selection is guided by the p-value obtained from the Chow Test:

1. If the p-value is less than the 10% significance level ($p < 0.10$), the Fixed Effect Model is considered more appropriate, indicating significant structural variation across entities.
2. Conversely, if the p-value exceeds 0.10, it suggests no statistically significant differences, and the Common Effect Model is deemed sufficient.

In cases where the p-value is highly significant (e.g., below 1%), the Fixed Effect Model is strongly preferred. On the other hand, when the p-value is greater than 1%, the Common Effect Model becomes the more suitable choice due to the absence of substantial fixed effects.

The results of the Chow Test are presented in Table 4.5, which displays the F-statistic and the associated p-value to guide model determination.

Table 4.5 Result of F-Test

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	**190.463245**	**(4,31)**	**0.0000**
Cross-section Chi-square	**129.666024**	**4**	**0.0000**

Data sourced: Data processed using EViews 12

Based on the estimation results of Table 4.5 using the Chow test, there is a Cross-section F probability value of 0.0000, which indicates that the probability value is smaller than the alpha used (0.0000 < ∝1%). Based on the results of the Chow test, the conclusion that can be drawn is to reject the null hypothesis (H0) and accept Ha, which means the most appropriate model to use in this study is the Fixed Effect Model.

4.3.2 Lagrange Multiplier Test

The Lagrange Multiplier Test, developed by Breusch-Godfrey, is a common method for detecting autocorrelation problems. The LM test ensures appropriate model selection, especially when test results for fixed and random models are inconsistent. For example, the Chow test may be appropriate for a fixed-effects model, but the Hausman test may be appropriate for a random model. In such situations, the LM test is used to determine which model is more appropriate.

Table 4.6 Result of LM – Test

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	50.68896	1.705957	52.39492
	(0.0000)	(0.1915)	(0.0000)

Data sources: Data Processed using Eviwes 12

The results of the LM test show a Breusch-Pagan probability value of 0.0000, which is lower than the significance level alpha (α) of 0.01. Therefore, it can be concluded that the decision is to reject the null hypothesis (H0). This indicates that the panel data estimation model using the random effects model is considered more appropriate than the model expected to use the OLS method.

4.4 Hausman Test

The appropriate fixed-effects or random-effects model for regression analysis can be determined through a statistical test known as the Hausman Test. The Hausman Test is used to identify the optimal model, either a Fixed-Effects Model or a General Effects Model, for estimating panel data. The p-value can be used to compare estimates from the fixed-effects and general effects models. The Fixed-Effects Model is considered better if the p-value is less than 0.01. However, the General Effects Model is best suited if the p-value is greater than 0.01 and is therefore not statistically significant. Table 4.7 shows the Hausman test.

Table 4.7 Result of Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	761.852980	4	0.0000

Data sources: Data Processed using Eviwes 12

Table 4.7 presents the results of the Hausman Test, which yields a probability value of 0.0000 < $\alpha = 0.01$. Therefore, the null hypothesis (H_0) is statistically rejected, and the alternative hypothesis (H_1) is accepted, as the p-value falls below the specified alpha level. This outcome indicates that, based on the Hausman Test, the Fixed Effect Model (FEM) is the most appropriate. Taking into account the results of the Chow Test, Lagrange Multiplier (LM) Test, and the Hausman Test, the researcher concludes that the Fixed Effect Model is the best estimator for analyzing the panel data in this study.

4.5 Regression Analysis

As demonstrated in Table 4.7, the Fixed Effect Model is identified as the most suitable regression model for examining the relationship between government spending on health and education, Gross Regional Domestic Product (GRDP), poverty rate, and the Human Development Index (HDI) across the five regencies of the Special Region of Yogyakarta during the period 2017–2024. The estimation results of the Fixed Effect Model are detailed in Table 4.8

Table 4. 8 Result of Panel Regression with *Fixed Effect Model*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	77.82919	1.362930	57.10434	0.0000
HEALTH	2.71E-06	1.26E-06	2.150985	0.0394
EDUCATION	-2.59E-06	1.08E-06	-2.395110	0.0228
GRDP	0.000319	3.36E-05	9.491389	0.0000
POV	-0.380845	0.071084	-5.357659	0.0000

R-squared	0.997680
F-statistic	1666.506
Prob(F-statistic)	0.000000

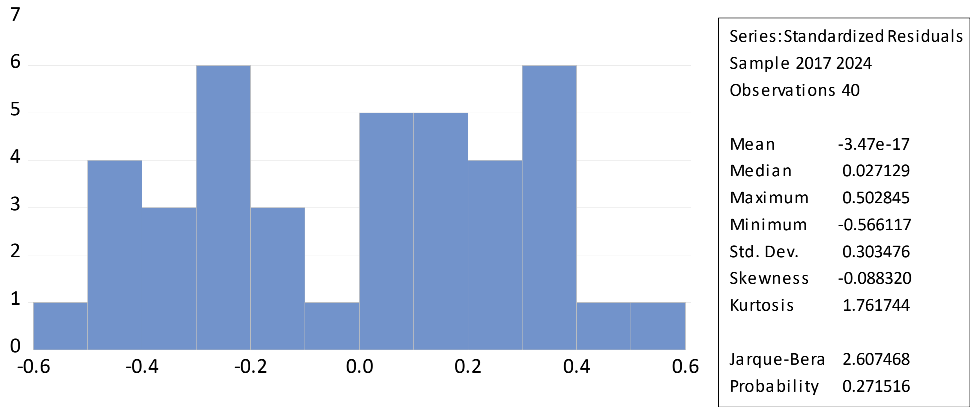
Data source: Data processed using EViews 12

Based on the results of data processing, the coefficient of determination (R^2) is reported to be 0.997680. This indicates that approximately 99.7% of the variability in the dependent variable can be explained by the independent variables included in the model. The remaining 0.3% is attributed to other factors not captured by the model.

4.6 Classic Assumption Test Result

The selected model is FEM; therefore, classical assumption tests must be conducted. The classical assumption tests used are normality and heteroscedasticity (Basuki & Yuliadi, 2014)

4.6.1 Normality Test



Data source: Data processed using EViews 12

A normality test is conducted to determine whether the residuals in the regression model are normally distributed. Based on the histogram output and the Jarque-Bera statistical test, it can be concluded that the model's residuals approximate a normal distribution. The histogram shows a symmetrical pattern around zero, indicating that the residuals do not deviate significantly from the normal distribution. The skewness value of 0.088220 indicates that the residual distribution is nearly symmetrical, as it is close to zero. Meanwhile, the kurtosis value of 1.761744 is below 3, indicating that the residual distribution tends to be flatter (platykurtic) than the standard normal distribution.

The Jarque-Bera test yielded a statistical value of 2.607468 with a probability value (p-value) of 0.271516. Because this probability value is greater than the 5% significance level (0.05), there is insufficient evidence to reject the null hypothesis (H_0) that the residuals are normally distributed. Thus, it can be concluded that the assumption of residual normality in the regression model has been met. This is important to ensure the validity of parameter significance tests, such as the t-test and F-test, in the regression model used.

4.6.2 Heteroscedasticity Test (Breusch-Pagan-Godfrey Test)

Heteroscedasticity testing in this study was conducted to determine whether the regression model contained non-constant residual variance or whether it was heteroscedastic. The test used was the Breusch-Pagan-Godfrey test with the aid of EViews software.

Table 4.9 Heteroskedasticity Test Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	0.985968	Prob. F(4,32)	0.4292
Obs*R-squared	4.059754	Prob. Chi-Square(4)	0.3980
Scaled explained SS	40.49984	Prob. Chi-Square(4)	0.0000

Data source: Data processed using EViews 12

Based on the test results shown in the output, the probability value (p-value) of the F-statistic is 0.4292, and the probability value of the Obs R-squared is 0.3980. Both probability values are greater than the 5% significance level ($\alpha = 0.05$). Therefore, H_0 cannot be rejected, indicating insufficient evidence to suggest heteroscedasticity in this regression model.

Therefore, it can be concluded that the regression model in this study does not experience heteroscedasticity, thus meeting the classical assumption of constant residual variance (homoscedasticity). This finding indicates that the model is suitable for further analysis as it satisfies one of the basic assumptions of linear regression.

4.6.3 Autocorrelation Test

Table 4.10 Autocorrelation Test (Breusch-Godfrey Serial Correlation LM Test)

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.524189	Prob. F(2,22)	0.2399
Obs*R-squared	3.529289	Prob. Chi-Square(2)	0.1712

Data source: Data processed using EViews 12

Based on the results of data processing using EViews 12, the autocorrelation test was carried out using the Breusch-Godfrey Serial Correlation LM Test method to determine the presence or absence of autocorrelation in the regression model. The null hypothesis (H_0) of this test states that there is no autocorrelation until the 2nd lag. The test results show a statistical value of Obs*R-squared of 3.529289 with a Chi-Square probability of 0.1712. As the probability value is greater than the 5% significance level ($0.1712 > 0.05$), the null hypothesis cannot be rejected, which means the regression model does not experience autocorrelation problems. Thus, the regression model used has met the classical assumption of being free from autocorrelation, thereby ensuring its reliability for further analysis.

4.7 F-Test

The F-statistic test is conducted to assess the overall significance of the independent variables and their collective impact on the dependent variable. In this study, Government Spending on Health, Government Spending on Education, Poverty Rate, and Gross Regional Domestic Product (GRDP) are statistically proven to influence the Human Development Index (HDI) across the five regencies in the Special Region of Yogyakarta (DIY).

The F-statistic value obtained is 1666.506, with a probability value of 0.00000, which is lower than the significance level applied (α = 1% or 0.01). Since the p-value falls below this threshold, the null hypothesis (H_0) is rejected. Thus, it can be concluded that, based on the Fixed Effect Model estimation, all independent variables jointly and significantly affect the Human Development Index in the observed regions.

4.8 T-Test

Table 4.11 presents the outcomes of the T-test conducted on the following variables: Government Expenditure on Health, Government Expenditure on Education, Gross Regional Domestic Product, and Poverty Rate. These factors impacted the Human Development Index for the years 2017–2021. Table 4.11 presents the t-test.

Table 4.11 T-Test (the significance test)

Variable	t-Statistic	t-Table	Prob.	α	Description
Government Expenditure on Health	2.150985	2.35493	0.0394	0.05	Significant
Government Expenditure on Education	-2.395110	2.35493	0.0228	0.05	Significant
Gross Regional Domestic Product	9.491389	2.35493	0.0000	0.05	Significant
Poverty Rate	-5.357659	2.35493	0.0000	0.05	Significant

Data source: Data processed using EViews 12

1. Based on the significance test, the probability value (p-value) obtained was 0.0394, which is smaller than the significance level of α = 0.05. Although the t-statistic value of 2.150985 is slightly smaller than the t-table value of 2.35493, the hypothesis is rejected because the p-value is <0.05, thus indicating a significant effect. The positive sign in the t-statistic indicates that government spending on health has a positive effect on the HDI. In other words, the greater the government spending in the health sector, the higher the HDI achievement across the five districts of the Special Region of Yogyakarta. This finding highlight the role of improved health services in enhancing the quality of life within the community.
2. The significance test showed a p-value of 0.0228, smaller than α = 0.05.The t-statistic value of –2.395110, when considered in absolute terms is greater than the t-table value of 2.35493. Therefore, the null hypothesis is rejected, indicating that the effect is statistically significant. The negative sign of the

t-statistic suggests that government spending on education has a negative effect on the HDI, based on the regression results for the observed period and region. Although this finding appears contradictory to theory, it may be attributed to ineffective budget implementation or the delayed impact of education spending on human resource quality. This result highlights the need for further qualitative study.

3. The p-value is 0.0000, significantly smaller than $\alpha = 0.05$, and the t-statistic is 9.491389, significantly greater than the t-table of 2.35493. This indicates that the null hypothesis is rejected, and the effect is highly significant. The positive sign of the t-statistic indicates that GRDP has a positive effect on the HDI. This means that the higher the GRDP, the higher the HDI, indicating that regional economic growth directly impacts the quality of life within the community.
4. The significant test yielded a p-value of 0.0000 and a t-statistic of – 5.357659, which is greater than the t-table of 2.35493. Accordingly, the null hypothesis is rejected confirming that the effect is statistically significant. The negative sign of the t-statistic indicates that the poverty level has a negative effect on the HDI. This suggests that the higher the poverty level, the lower the HDI achievement in the five districts in the Special Region of Yogyakarta. This aligns with the theory that poverty constrains access to education, healthcare, and a decent standard of living.

4.9 Discussion

4.9.1 Analysis of the Impact of Government Spending on Health on the Human Development Index

Based on the results of data analysis and hypothesis testing, the Government Spending on Health (HEALTH) variable shows a coefficient value of 2.71E-06 with a t-statistic of 2.150985 and a p-value of 0.0394. As the probability value is less than the 0.05 significance level, it can be concluded that this variable has a significant effect on the Human Development Index (HDI).

The positive sign on the coefficient indicates that increased government spending in the health sector has a positive impact on the HDI. This means that every 1 billion rupiah increase in government spending on health is estimated to increase the HDI by 0.00000271 points. Although the coefficient is small, the trend of the relationship remains positive.

This finding supports the research of Soleha and Fathurrahman (2017), which states that health is a basic need that is crucial for boosting community productivity.

4.9.2 Analysis of the Impact of Government Spending on Education on the Human Development Index

The coefficient of the Government Expenditure on Education (EDUCATION) variable is -2.59E-06 with a t-statistic of -2.395110 and a p-value of 0.0228, which is smaller than the 0.05 significance level. This means that this variable has a significant effect on the HDI. However, the negative sign on the coefficient indicates that higher education spending is associated with a decrease in the HDI. This unexpected result may stem from inaccurate distribution of spending or low program implementation efficiency. For example, a large budget may not be accompanied by improvements in education quality or equitable access.

This unexpected result may stem from inaccurate distribution of spending or low program implementation efficiency. For example, a large budget may not be accompanied by improvements in education quality or equitable access. This finding differs from most previous studies, such as research by Pratowo (2013) and Rahimah & Chandriyanti (2020), which found that education investment has a positive effect on the HDI. Nevertheless, this result aligns with the findings of Devarajan et al. (1996), who demonstrated that public expenditure in developing countries can have a negative impact on economic outcomes due to misallocation of resources. Furthermore, the World Bank's *World Development Report* (2018) emphasizes that increased spending does not automatically translate to better outcomes if there is a 'learning crisis' caused by governance inefficiencies and a dominance of routine expenditure over quality improvement. However, in the context of five districts in the Special Region of Yogyakarta, the results highlight the need for an in-depth evaluation of the effectiveness of education funding utilization.

4.9.3 Analysis of the Influence of Gross Regional Domestic Product on the Human Development Index

The Gross Regional Domestic Product (GRDP) variable has a coefficient value of 0.000319, a t-statistic of 9.491389, and a p-value of 0.0000, indicating significance at the 1% level. This indicates that an increase in GRDP significantly increases the HDI. The positive coefficient indicates that regional economic growth plays a significant role in improving the quality of life within the community. Every 1 billion rupiah increase in GRDP is estimated to increase the HDI by 0.000319 points.

This finding is consistent with the economic growth theory by Todaro and Kuznets, which states that increases in per capita output and purchasing power will directly impact the HDI.

4.9.4 Analysis of the Influence of Poverty Levels on the Human Development Index

The Poverty Rate (POV) variable has a coefficient of -0.380845, a t-statistic of -5.357659, and a p-value of 0.0000. This means that this variable has a very significant effect on the HDI. The negative sign indicates that an increase in the poverty rate negatively impacts the HDI. In other words, as the percentage of the poor increases, the quality of life, as reflected in the HDI, decreases significantly. Every 1 percent increase in the poverty rate decreases the HDI by 0.38 points.

This finding aligns with Todaro's theory of absolute poverty, which posits that the inability to meet basic needs directly undermines quality of life. Access to education, health care, and income opportunities becomes increasingly limited as poverty increases.

CHAPTER V

CONCLUSION

5.1 Conclusion

Based on the results of a panel regression analysis using the Fixed Effect Model on the data collected from the five regencies within the Special Region of Yogyakarta (DIY) during the period 2017 to 2024, several conclusions can be drawn. The analysis employed government expenditure on health, education, Gross Regional Domestic Product (GRDP) per capita, and poverty rate as the independent variables, while the Human Development Index (HDI) was used as the dependent variable.

1. Government expenditure on the health sector has a statistically significant and positive impact on HDI across the five regencies in DIY. The regression results suggest that an increase in health spending leads to an improvement in HDI. This implies that allocating more funds toward the healthcare sector can enhance the overall quality of life by improving access to and the quality of medical services, which in turn supports higher human development outcomes.

2. Contrary to theoretical expectations, education spending was found to have a significant but negative influence on HDI. This result indicates that higher allocations for education have not yet translated into improved educational quality that directly contributes to human development in the observed regions. The inefficiency in the utilization of educational funds or a mismatch between programs and local needs could be possible explanations. As such, a comprehensive evaluation of how education budgets are being managed and implemented is crucial.
3. GRDP per capita exerts a positive and significant effect on HDI, indicating that economic growth, as reflected in increased regional income per capita, plays an important role in improving community welfare. This finding is consistent with development theory, which posits that economic progress contributes significantly to the overall enhancement of quality of life and human well-being.
4. The poverty rate shows a significant and negative relationship with HDI. In other words, higher poverty levels are associated with lower human development. This highlights the vital role that poverty alleviation efforts play in boosting HDI, as economic constraints significantly limit people's access to education, healthcare, and decent living standards.

Overall, the regression model used in this study demonstrated a high explanatory power, with an R-squared value of 0.9976. This means that approximately 99.76% of the variation in HDI can be explained by the four independent variables. Furthermore, the statistically significant F-statistic confirms that the model is robust and appropriate for examining the relationship between these variables and HDI in the five regencies of the Special Region of Yogyakarta.

5.2 Suggestions

Based on the research findings on the influence of government spending in health and education, Gross Regional Domestic Product (GRDP) per capita, and poverty rate on the Human Development Index (HDI) in the five regencies of the Special Region of Yogyakarta (DIY) from 2017 to 2024, the following policy recommendations are proposed:

1. Given the significant and positive impact of government health expenditure on HDI, local governments in the DIY region are encouraged to increase and optimize budget allocations for the health sector. This enhancement may include expanding access to healthcare facilities, improving service quality, conducting public health education campaigns, and providing free medical services for low-income groups. Strengthening these aspects is expected to make a meaningful contribution to community welfare and productivity, thereby improving HDI levels in the region.
2. Since education spending was found to have a negative and statistically significant effect on HDI, it is essential for regional governments to reassess the efficiency and targeting of educational budgets. Funds should be

allocated more effectively to improve teacher quality, upgrade school infrastructure, and provide adequate learning resources. Furthermore, the provision of scholarships and financial aid for underprivileged students, as well as expanding educational access in rural areas, should be prioritized to ensure that educational investments yield tangible improvements in human development outcomes.

3. The significant positive relationship between GRDP per capita and HDI underscores the need to promote inclusive economic development. Local governments should strengthen key sectors such as tourism, agriculture, creative industries, and micro, small, and medium enterprises (MSMEs). Additionally, efforts should be made to enhance workforce skills through vocational training and ensure easier access to capital for local entrepreneurs. Regular monitoring and evaluation of the economic sector's contribution to human development will be essential to ensure that policy interventions are both targeted and effective.

4. This research has identified a significant negative effect of poverty on HDI, highlighting the urgent need to reinforce poverty reduction strategies at the local level. Governments across the five regencies should intensify the implementation of well-targeted social assistance programs based on accurate beneficiary data. Furthermore, integrating cross-sectoral policies combining education, healthcare, and economic empowerment initiatives can provide a more comprehensive and sustainable approach to poverty alleviation. Lastly, community-based empowerment programs, increased

access to essential services, and collaborative efforts with the private sector are critical for reducing poverty and enhancing human development in the region.

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APPENDICES

Appendix 1: The Human Development Index (HDI) for the Five Regencies of Yogyakarta throughout the period ranging from 2017 to 2024

No	Regency	2017	2018	2019	2020	2021	2022	2023	2024
1	**Kulon Progo**	73,23	73,76	74,44	74,48	74,73	75,48	75,82	76,18
2	**Bantul**	78,67	79,45	80,01	80,36	80,63	81,04	81,74	82,05
3	**Gunung Kidul**	68,73	69,24	69,96	70,18	70,37	71,18	71,46	72,14
4	**Sleman**	82,85	83,42	83,85	83,92	84,08	84,4	84,86	85,71
5	**Kota Yogyakarta**	85,49	86,11	86,65	86,93	87,5	88	88,61	89,1

Data sources: Badan Pusat Statistik

Appendix 2: Data of All Independent and Dependent Variables

Regency	Year	X1 (Billion)	X2 (Billion)	X3 (Billion)	X4 (Thousand People)	Y (%)
KULON PROGO	2017	474318835	254821858	6973,41	20,03	73,23
KULON PROGO	2018	486764,26	370736694	7728,41	18,3	73,76
KULON PROGO	2019	491310257	392122453	8770,75	17,39	74,44
KULON PROGO	2020	494474214	381627527	8468,29	18,01	74,48
KULON PROGO	2021	84727986	131992742	8838,14	18,38	74,73
KULON PROGO	2022	446571725	326336958	9419,36	16,39	75,48
KULON PROGO	2023	192376672	225354178	9951,95	15,64	75,82
KULON PROGO	2024	561750104	435098186	10426,23	15,62	76,18
BANTUL	2017	691265322	368899365	17209,87	14,07	78,67
BANTUL	2018	668991527	456491392	18150,88	13,43	79,45
BANTUL	2019	715069335	408431165	19155,27	12,92	80,01
BANTUL	2020	655136749	420809026	18839,37	13,5	80,36
BANTUL	2021	762553501	524569522	19781,89	14,04	80,63
BANTUL	2022	734439589	456440011	20809,22	12,27	81,04
BANTUL	2023	426042657	115695827	21861,77	11,95	81,74
BANTUL	2024	808145163	615234469	22964,66	11,66	82,05

GUNUNGKIDUL	2017	674790712	245750,77	12281,56	18,65	68,73
GUNUNGKIDUL	2018	672916991	238809711	12914,94	17,12	69,24
GUNUNGKIDUL	2019	721528543	338409607	13605,07	16,61	69,96
GUNUNGKIDUL	2020	683154572	339461561	13512,44	17,07	70,18
GUNUNGKIDUL	2021	694423976	365291088	14230,14	17,69	70,37
GUNUNGKIDUL	2022	728042582	367561378	14994,23	15,86	71,18
GUNUNGKIDUL	2023	656096177	327015386	15749,22	15,6	71,46
GUNUNGKIDUL	2024	769402757	356959466	16506,42	15,18	72,14
SLEMAN	2017	734055299	392622,81	31140,59	8,13	82,85
SLEMAN	2018	751714727	358574601	33138,26	7,65	83,42
SLEMAN	2019	739578831	392902975	35286,51	7,41	83,85
SLEMAN	2020	696108267	438522466	33857,33	8,12	83,92
SLEMAN	2021	803356116	484106302	35755,93	8,64	84,08
SLEMAN	2022	879177792	508589518	37596,42	7,74	84,4
SLEMAN	2023	821535226	497181983	39508,68	7,52	84,86
SLEMAN	2024	946985086	581912072	41559,54	7,46	85,71
KOTA YOGYAKARTA	2017	406123142	294878863	24768,43	7,64	85,49
KOTA YOGYAKARTA	2018	426172842	324469727	26127,22	6,98	86,11
KOTA YOGYAKARTA	2019	387811834	331877249	27685,29	6,84	86,65
KOTA YOGYAKARTA	2020	408695642	379239855	27016,5	7,27	86,93
KOTA YOGYAKARTA	2021	432580,93	411005473	28409,76	7,69	87,5
KOTA YOGYAKARTA	2022	463616128	415181,63	29863	6,62	88
KOTA YOGYAKARTA	2023	477292,88	409984907	31378,8	6,49	88,61
KOTA YOGYAKARTA	2024	613231,83	523153585	32964,35	6,26	89,1

Dependent Variable: HDI

Method: Panel Least Squares

Date: 07/24/25 Time: 00:48

Sample: 2017 2024

Periods included: 8

Cross-sections included: 5

Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.50301	4.393348	20.60001	0.0000
HEALTH	1.81E-05	3.74E-06	4.834579	0.0000
EDUCATION	-1.34E-05	2.70E-06	-4.952479	0.0000
GRDP	0.000108	0.000105	1.028914	0.3106

POV	-0.981492	0.225021	-4.361777	0.0001

Root MSE	1.515450	R-squared	0.940668
Mean dependent var	79.42025	Adjusted R-squared	0.933887
S.D. dependent var	6.300799	S.E. of regression	1.620084
Akaike info criterion	3.919301	Sum squared resid	91.86350
Schwarz criterion	4.130411	Log likelihood	-73.38603
Hannan-Quinn criter.	3.995632	F-statistic	138.7258
Durbin-Watson stat	0.650246	Prob(F-statistic)	0.000000

Appendix 3: Estimated Results from Common Effect Model (CEM) Regression

Appendix 4 Estimated Results from Fixed Effect Model (FEM) Regression

Dependent Variable: HDI

Method: Panel Least Squares

Date: 07/24/25   Time: 00:52

Sample: 2017 2024

Periods included: 8

Cross-sections included: 5

Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	77.82919	1.362930	57.10434	0.0000
HEALTH	2.71E-06	1.26E-06	2.150985	0.0394
EDUCATION	-2.59E-06	1.08E-06	-2.395110	0.0228
GRDP	0.000319	3.36E-05	9.491389	0.0000
POV	-0.380845	0.071084	-5.357659	0.0000

Effects Specification

Cross-section fixed (dummy variables)			
Root MSE	0.299658	R-squared	0.997680
Mean dependent var	79.42025	Adjusted R-squared	0.997082
S.D. dependent var	6.300799	S.E. of regression	0.340389
Akaike info criterion	0.877651	Sum squared resid	3.591799
Schwarz criterion	1.257649	Log likelihood	-8.553015
Hannan-Quinn criter.	1.015046	F-statistic	1666.506
Durbin-Watson stat	1.313970	Prob(F-statistic)	0.000000

Appendix 5 Estimated Results from Random Effect Model (REM) Regression

Dependent Variable: HDI

Method: Panel EGLS (Cross-section random effects)

Date: 07/24/25 Time: 01:44

Sample: 2017 2024

Periods included: 8

Cross-sections included: 5

Total panel (balanced) observations: 40

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.50301	0.923067	98.04597	0.0000

HEALTH	1.81E-05	7.87E-07	23.01023	0.0000
EDUCATION	-1.34E-05	5.68E-07	-23.57137	0.0000
GRDP	0.000108	2.21E-05	4.897128	0.0000
POV	-0.981492	0.047278	-20.75993	0.0000

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.340389	1.0000

Weighted Statistics

Root MSE	1.515450	R-squared	0.940668
Mean dependent var	79.42025	Adjusted R-squared	0.933887
S.D. dependent var	6.300799	S.E. of regression	1.620084
Sum squared resid	91.86350	F-statistic	138.7258
Durbin-Watson stat	0.650246	Prob(F-statistic)	0.000000

Unweighted Statistics

R-squared	0.940668	Mean dependent var	79.42025
Sum squared resid	91.86350	Durbin-Watson stat	0.650246

Appendix 6 Chow Test Estimate Result

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	190.463245	(4,31)	0.0000
Cross-section Chi-square	129.666024	4	0.0000

Cross-section fixed effects test equation:

Dependent Variable: HDI

Method: Panel Least Squares

Date: 07/24/25 Time: 02:12

Sample: 2017 2024

Periods included: 8

Cross-sections included: 5

Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.50301	4.393348	20.60001	0.0000
HEALTH	1.81E-05	3.74E-06	4.834579	0.0000

EDUCATION	-1.34E-05	2.70E-06	-4.952479	0.0000
GRDP	0.000108	0.000105	1.028914	0.3106
POV	-0.981492	0.225021	-4.361777	0.0001

Root MSE	1.515450	R-squared	0.940668
Mean dependent var	79.42025	Adjusted R-squared	0.933887
S.D. dependent var	6.300799	S.E. of regression	1.620084
Akaike info criterion	3.919301	Sum squared resid	91.86350
Schwarz criterion	4.130411	Log likelihood	-73.38603
Hannan-Quinn criter.	3.995632	F-statistic	138.7258
Durbin-Watson stat	0.650246	Prob(F-statistic)	0.000000

Appendix 7 Lagrange Multiplier Results

Lagrange Multiplier Tests for Random Effects

Null hypotheses: No effects

Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided

(all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	50.68896	1.705957	52.39492
	(0.0000)	(0.1915)	(0.0000)
Honda	7.119618	-1.306123	4.110762
	(0.0000)	(0.9042)	(0.0000)
King-Wu	7.119618	-1.306123	4.891869
	(0.0000)	(0.9042)	(0.0000)
Standardized Honda	13.80291	-1.133735	2.877710
	(0.0000)	(0.8715)	(0.0020)
Standardized King-Wu	13.80291	-1.133735	4.365842
	(0.0000)	(0.8715)	(0.0000)
Gourieroux, et al.	--	--	50.68896
			(0.0000)

Appendix 8 Hausman Estimation Result

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	761.852979	4	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
EDUCATION	-0.000003	-0.000013	0.000000	0.0000
HEALTH	0.000003	0.000018	0.000000	0.0000
GRDP	0.000319	0.000108	0.000000	0.0000
POV	-0.380845	-0.981492	0.002818	0.0000

Cross-section random effects test equation:

Dependent Variable: HDI

Method: Panel Least Squares

Date: 09/15/25 Time: 19:20

Sample: 2017 2024

Periods included: 8

Cross-sections included: 5

Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	77.82919	1.362930	57.10434	0.0000
EDUCATION	-2.59E-06	1.08E-06	-2.395110	0.0228
HEALTH	2.71E-06	1.26E-06	2.150985	0.0394
GRDP	0.000319	3.36E-05	9.491389	0.0000
POV	-0.380845	0.071084	-5.357659	0.0000

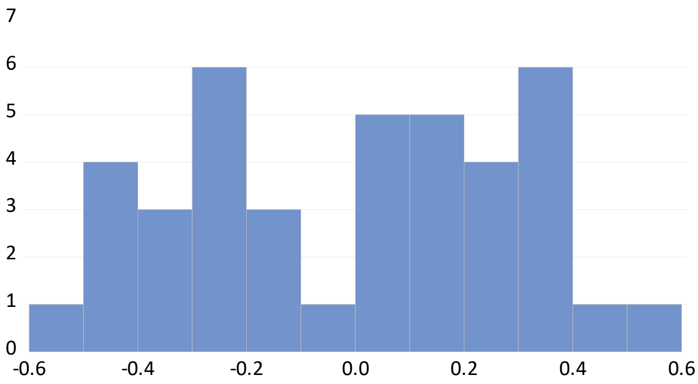
Effects Specification

Cross-section fixed (dummy variables)

Root MSE	0.299658	R-squared	0.997680
Mean dependent var	79.42025	Adjusted R-squared	0.997082
S.D. dependent var	6.300799	S.E. of regression	0.340389
Akaike info criterion	0.877651	Sum squared resid	3.591799
Schwarz criterion	1.257649	Log likelihood	-8.553015
Hannan-Quinn criter.	1.015046	F-statistic	1666.506
Durbin-Watson stat	1.313970	Prob(F-statistic)	0.000000

Appendix 9 Classical Assumption Test Results

Normality Test



Series: Standardized Residuals	
Sample 2017 2024	
Observations 40	
Mean	-3.47e-17
Median	0.027129
Maximum	0.502845
Minimum	-0.566117
Std. Dev.	0.303476
Skewness	-0.088320
Kurtosis	1.761744
Jarque-Bera	2.607468
Probability	0.271516

Appendix 10 Heteroskedasticity Test Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	0.985968	Prob. F(4,32)	0.4292
Obs*R-squared	4.059754	Prob. Chi-Square(4)	0.3980
Scaled explained SS	40.49984	Prob. Chi-Square(4)	0.0000

Appendix 11 Autocorrelation Test (Breusch-Godfrey Serial Correlation LM Test)

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.524189	Prob. F(2,22)	0.2399
Obs*R-squared	3.529289	Prob. Chi-Square(2)	0.1712