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1. Overview and data description

Human development has always been one of the important and prioritized goals in the socio-economic development policies of all countries. Measures related to human development are often overarching indicators and tend to be influenced by many different factors (Boroumand et al. 2022; Rughiniș et al. 2022). Today, one of the most commonly used general indicators of human development is the Human Development Index (HDI) calculated and published annually by UNDP.

Studies on the subject often examine the relationship between economic freedom and one or more aspects of human development, typically health, education, and income. First, in terms of health, Ladi et al. (2021) concluded that citizens in countries with higher levels of economic freedom achieve higher life expectancy, infant mortality rates as well as higher mortality rates. The author argues that economic freedom has a positive effect on health for a number of reasons, such as a strict rule of law with guaranteed property rights, which provides an impetus for medical research and development and increases the efficiency of public spending on health. The removal of trade barriers makes it easier for individuals (patients) and businesses (health care providers) to access a wide range of medical products at low prices. For developing countries, however, the results are mixed. Djokoto‘s study (2022) using a dataset of 34 sub-Saharan African countries from 2005 to 2016 supports the above conclusions, but Copeland (2008) gives the opposite result when affirming that free trade has can lead to concentration of polluting industries in underdeveloped countries with weak environmental policies.

The objective of the Grimm et al. (2008) study is to ascertain the many elements that influence the Human Development Index (HDI) within the regencies and cities of Indonesia. According to statistics provided by BPS (Statistics Indonesia), the human development index (HDI) of each regency/city in Indonesia exhibits a diverse range of achievement values, spanning from low to intermediate to high categories of HDI. This observation suggests the presence of persisting undeveloped regions and disparities in human development within Indonesia. In the interim, there is a notable upward trend in the annual growth of regional government spending on education, health, and economic initiatives. The employed methodologies encompassed panel data regressions, utilizing both time series data spanning from 2001 to 2007 and cross-sectional data encompassing 465 regencies/cities in Indonesia. The econometric analysis reveals that several

variables exhibit a statistically significant positive impact on the Human Development Index (HDI). These variables include government expenditure on education, health, and economic activities, Gross Regional Domestic Product (GRDP), and the presence of infrastructure in public services such as public hospitals and schools. Although poverty is associated with bad consequences, it appears that infrastructure, specifically road length, does not have a significant impact. In order to mitigate the impact of inequality on human development in Indonesia, it is imperative for the government to assume responsibility for prioritizing human development in regencies or cities that exhibit low or underdeveloped Human Development Index (HDI) values. The regional budget can be allocated in a manner that prioritizes expenditure on health, education, and economic functions, thereby making significant contributions in these areas.

Ravallion (2012) conducted a study that examined the significance of the Human Development Index (HDI) in evaluating the Indian economy. The objective of this research is to analyze the variations in trends seen in the Human Resource Development Index during a 30-year period, specifically from 1980 to 2010. In the present scholarly study, he examines the correlation between the GDP and three specific indicators pertaining to human resources within the context of India. This article assesses the interrelationship and reciprocal impacts of the three indices of human resource development in the Indian economy, employing the most recent formula published by the United Nations. The research model includes GDP or income as the dependent variable, with three independent variables: long life, health, and education. The present article demonstrates that the Indian economy has experienced significant development in GDP per capita. However, the influence of this expansion on various indicators of HDI has been rather limited. In fact, several indices, such as life expectancy, have shown ineffectual improvements as a result of this economic growth. The findings indicate that the India's HDI is experiencing both positive and negative trends. The growth index exhibited a declining trajectory starting from the initial period of 2009, reaching its lowest point of 0.012. However, it experienced a rebound in growth by the year 2010.

Acknowledging the rising significance of the HDI in measuring the state of development, this report attempts to reexamine determinants of this index. A cross-sample analysis will be conducted on a dataset containing 86 middle and high-income countries. Table 1 provides descriptive statistics of selected variables that will be used in this report.

Table 1: Descriptive statistics of selected variables

Statistic	hdi	pop	growth	fdi	gini	gee
Nbr. of observations	86	86	86	86	86	86
Minimum	0.543	19,809.00	-5.887	-3,363,941,288.04	0.244	-1.465
Maximum	0.923	1,288,400,000.00	17.326	117,106,000,000.00	0.708	2.261
Median	0.743	4,610,299.00	3.582	795,718,046.13	0.405	0.410
Mean	0.754	37,864,023.85	4.039	7,155,014,127.16	0.416	0.504
Std. Dev	0.097	144,473,284.95	3.968	17,195,428,601.47	0.102	0.907

The average HDI is reported at a high level of 0.754. There is an economy that has a HDI of0.923, which is very close to the maximum level of 1. The standard deviation is 0.097, indicating a small dispersion of observations around the mean.

The mean population is around 37 million, however, this figure has a trivial meaning owing to the existence of outliers such as China (1.3 billion), India (900 million), United state (300 million), etc. The median, which has a value of 4.6 million, is perhaps a better measure of central tendency.

A similar pattern appears in FDI, also caused by outliers. Another point that should be noted is the negative value of FDI. In such cases, a negative FDI indicates that the capital is flowing out from that country; or that country invests abroad more heavily than receiving from foreign investors.

The average growth of middle- and high-income economies is recorded at 4.039 in 2003. A high standard deviation of 3.968 suggests a wide variation of observations. Indeed, while there are economies that enjoyed double-digits growth, some economies were suffering from negative growth.

The Gini index measures inequality and has an average value of 0.416. A moderate standard deviation coupled with a median of 0.416, very close to the mean value, indicates a normal distribution with the majority of observations located around the mean at small dispersion.

The government effectiveness index has a mean of 0.504 and a standard deviation of 0.907, suggesting a considerable level of variability. This is due to the fact that some countries do not have civic government (countries in Middle East still maintains monarchy political system), therefore receiving very low gee index.

2. Initial estimation

Since the first introduction of HDI, numerous studies have ventured in investigating factors driving this measure (Veisani et al. 2018; Long et al. 2020; Priyashadi et al. 2022). Among them, economic growth is, without doubt, the most frequently cited variable. The primary reason is because economic growth is directly associated to personal income, one of the three pillars constituting HDI. To a lesser extent, FDI is also a common variable that researchers often pay attention to. FDI refers to the level of physical capital, which will be used to fuel economic growth. Hence, FDI might have an indirect influence on FDI through transmission effect via economic growth. As a result, the author of this report expects positive influence (positive coefficient) of both economic growth and FDI on HDI.

Empirical literature regarding the impacts of government effectiveness on HDI is somewhat in shortage. Using a sample of emerging economies during the period 2006-2018, Masduki et al. (2022) found a positive association between government effectiveness and HDI. They argue that an efficient government is more superior in allocating public goods, thereby endorsing citizens with adequate capital to grow themselves. Additionally, effective governments are more transparent, meaning that the possibility of corruption is low (Masduki et al. 2022; Kaewnern et al. 2023). This ensures public expenditure is allocated efficiently and correctly without waste. As a result, citizens of these countries enjoy a higher level of public infrastructure. As a result, the author expects a positive coefficient of government effectiveness index on human development index.

The impacts of inequality have recently gained popularity given the persistently rising income gap among social classes. Frequently, scholars find a negative association of income inequality on sustainable development indexes (Masduki et al. 2022; Zheng and Wang 2022; Pham et al. 2023). Based on the available empirical evidence pertaining to the majority of economies, it can be observed that the association between inequality and economic growth is multifaceted. At lower income levels, the presence of inequality has been observed to stimulate economic growth through its positive impact on the investment in physical capital (Hicks 1997). As the levels of income rise, the significance of human capital surpasses that of physical capital, and the presence of inequality tends to hinder economic progress through impacting the accumulation of human capital (Noorbakhsh 1998). Inequality possesses the capacity to provide unfavorable political and social

outcomes, hence jeopardizing macroeconomic stability and sustained growth. The sample contains upper-middle- and high-income countries, thus the author expects a negative coefficient in Gini index.

The above arguments lead us to the following two models:

Model 1: dependent variable: Human development index (HDI); independent variables: Government effectiveness (gee).

$$Model\ 1: HDI_i = \alpha + \beta_1 * gee_i + \varepsilon_i$$

Model 2: dependent variable: Human development index (HDI); independent variables: Government effectiveness (gee), Inequality (gini), Economic growth (growth), Foreign direct investment (FDI).

$$Model\ 2: HDI_i = \alpha + \beta_1 * gee_i + \beta_2 * gini_i + \beta_3 * growth_i + \beta_4 * fdi_i + \varepsilon_i$$

Table 2: Regression outcomes of model 1 and 2

	Model (1)	Model (2)
VARIABLES		
gee (β_1)	0.085***	0.062***
	(0.007)	(0.006)
gini (β_2)		-0.412
		(0.054)
growth (β_3)		0.001
		(0.001)
fdi (β_4)		3.145e-13
		(3.036e-13)
Constant	0.711***	0.889***
	(0.007)	(0.025)
p-value	0.000	0.000
R-squared	0.646	0.797
Adjusted-R square	0.641	0.787

3. Interpretation

1.

Table 2 summarizes regression output of model 1 and 2. R-squared measures the goodness of fit. Put differently, it measures the explanatory power of the model. The first model has a R-squared

of 0.646, indicating that 64.6% variations in the dependent variable (HDI) is explained by the independent variable (government effectiveness). To a greater extent, R-squared of model 2 is 0.797. This impressive figure implies that four independent variables (government effectiveness, gini, economic growth, and FDI) together can explain approximately 80% variability of HDI.

The utilization of adjusted R-squared is considered to be a more prudent choice in comparison to R-squared. Similar to the concept of R-squared, this particular index evaluates the degree of fit, taking into consideration the suitability of the independent variables. In numerous instances, the inclusion of additional variables has the potential to enhance the R-squared value, even though these variables exert minimal influence on the outcome variable. The adjusted R-squared, as its nomenclature implies, takes into consideration this undesired effect and is thus occasionally regarded as a more reliable indication. When comparing the two models, it can be observed that model 2 exhibits higher values for both R-squared and adjusted R-squared, in contrast to model 1.

2.

Hypotheses development:

Null hypothesis (ho): Model 2 has little or no predictive power on the Human Development Index of countries in the given sample.

Alternative hypothesis (ha): Model 2 has significant predictive power on the Human Development Index of countries in the given sample.

The significant level is set at 0.05. The p-value of model 2 is 0.000, which is lower than the significant level. Hence, the null hypothesis is rejected. There is indeed a predictive relationship between the four independent variables and HDI in the sample.

3. Government effectiveness and Gini were found to have significant effects on HDI. Therefore, the hypothesis testing for the two variables are stated below:

Government effectiveness (gee)

Null hypothesis (ho): Government effectiveness has little or no predictive power on the Human Development Index of countries in the given sample ($\beta_1=0$).

Alternative hypothesis (ha): Government effectiveness has significant predictive power on the Human Development Index of countries in the given sample ($\beta_1 \neq 0$).

Table 2 shows that the p-value=0.000<0.005, hence the null hypothesis is rejected. There is indeed a predictive relationship between the government effectiveness and HDI in the sample. Given the coefficient is 0.085, a unit increase in gee will add 0.085 unit on the average HDI.

Gini coefficient

Null hypothesis (ho): Gini index has little or no predictive power on the Human Development Index of countries in the given sample ($\beta_2 = 0$).

Alternative hypothesis (ha): Gini index has significant predictive power on the Human Development Index of countries in the given sample ($\beta_2 \neq 0$).

Table 2 shows that the p-value=0.000<0.005, hence the null hypothesis is rejected. There is indeed a predictive relationship between the Gini index and HDI in the sample. Given the coefficient is -0.412, a unit increase in gini will lower the average HDI by 0.085.

4.

In summary, economic growth, FDI, and government effectiveness exhibit positive coefficients, indicating positive impacts on HDI. By contrast, the coefficient of Gini is negative, reflecting a negative association between this variable and HDI of countries in the sample. These findings are perfectly aligned with the previously formed expectation of the author as well as universal consensus of other scholars.

5.

Model 2 has a better R-squared, indicating a superiority in predicting HDI. As such, it should be selected. However, it is essential to review whether this model satisfies OLS assumptions.

Test of Muticollinearity

Table 3 shows VIF ratios of four independent variables. No variables have a VIF ratio larger than 5, thus there is no observed association between a specific predictor variable and any other predictor variables included in the model.

Table 3: VIF test of model 2

gee	gini	growth	fdi
1.514	1.288	1.081	1.161

Test of homoscedasticity

Figure 1 displays the distribution of model 2's residuals. The distribution is close to a normal distribution. Thus, the variance has a constant zero mean.

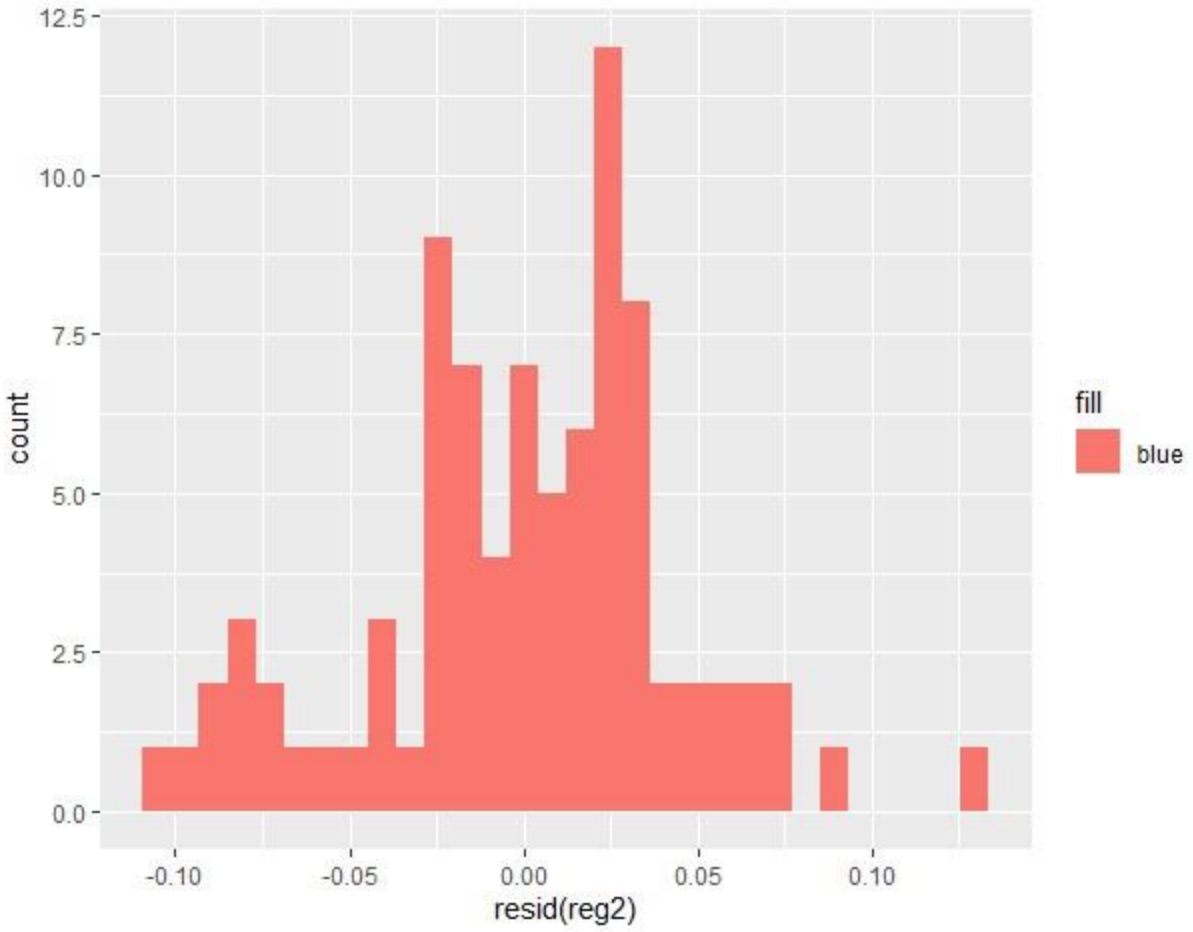

Figure 1: Histogram of model 2's residuals

Since model 2 satisfies all OLS assumptions, this model is preferable.

4. Further estimation

Table 4 summarizes regression outputs of three additional models:

Table 4: Regression outputs of 3 additional models

VARIABLES	Model (3)	Model (4)	Model (5)
gee (β_1)	0.063***	0.066***	0.044***
	(0.007)	(0.008)	(0.007)
gini (β_2)	-0.410	-0.418	-0.319***
	(0.055)	(0.055)	(0.053)
growth (β_3)	0.0006	0.0004	0.001
	(0.001)	(0.001)	(0.001)
fdi (β_4)			3.808e-13
			(2.747e-13)
highfdi (β_5)	0.008	0.029	
	(0.013)	(0.022)	
gee*highfdi (β_6)		-0.019	
		(0.016)	
developing ((β_7)			-0.059
			(0.013)
Constant	0.888***	0.892***	0.885***
	(0.026)	(0.026)	(0.023)
p-value	0.000	0.000	0.000
R-squared	0.796	0.799	0.837
Adjusted-R square	0.786	0.787	0.827

1. Hypothesis development for a dummy variable

Null hypothesis (ho): There is no significant difference in HDI between countries are classified as highfdi and those are not ($\beta_5 = 0$).

Alternative hypothesis (ha): There is significantly considerable difference in HDI between countries are classified as highfdi and those are not ($\beta_5 \neq 0$).

The coefficient is 0.08, indicating that a highfdi country generally has a HDI of 0.08 higher than others. However, table 4 shows that the p-value>0.005, hence the null hypothesis is not rejected. There is no difference between highfdi countries and the rest of the sample.

2. Hypothesis development for an interaction

Null hypothesis (ho): Being classified as a highfdi country has no impacts on the predictive relationship between government effectiveness and HDI ($\beta_6 = 0$).

Alternative hypothesis (ha): Being classified as a highfdi country has significant impacts on the predictive relationship between government effectiveness and HDI ($\beta_6 \neq 0$).

Table 4 shows that the p-value>0.005, hence the null hypothesis is not rejected. The predictive relationship between government effectiveness and HDI is not affected by the variable highfdi.

3.

Empirical evidence of Song and Tong (2022) shows that the initial development of the economy has determinant effects on HDI growth. They argue that emerging economies with higher marginal growth tend to enjoy a higher acceleration in HDI thanks to growing physical capital. However, as pointed out by Resce (2021), the law of diminishing return restricts the effect of physical capital in developed economies. Overall, it is essential to acknowledge the status of economic development as one of possible determinants of HDI. Following that, model 5 estimates the following model:

$$HDI_i = 0.885 + 0.044 * gee_i - 0.319 * gini_i + 0.001 * growth_i + (3.808e - 13) * fdi_i - 0.059 * developing + \varepsilon_i$$

With a p-value=0.00<0.05, the development status has significant impacts on the HDI.

Compared to the first four models, the last one emerges to be the most preferable model owing to the highest value of both the R-squared and adjusted R-squared (0.837 and 0.827). This model can predict as much as 83.7% variations of HDI. The impacts of each independent variables are discussed below:

- With a coefficient of 0.044, the expected HDI will increase by 0.044 if government effectiveness index increases by one unit
- With a coefficient of -0.319, the expected HDI will decline by 0.319 units for an additional unit increase in Gini coefficient
- No significant impacts of growth and FDI on HDI were found
- On average, a developing country has a HDI of 0.059 lower than other countries in the sample

5. Conclusion

The objective of this report is to conduct a reassessment of the factors that influence the Human Development Index (HDI). Based on a comprehensive examination of multiple studies conducted on a representative sample comprising 86 nations, the researcher observed substantial effects of government effectiveness and inequality on HDI. Nevertheless, the survey did not uncover any substantiating data to support the notion that economic growth or foreign direct investment (FDI) directly influence HDI. However, the development state has a substantial impact. In this scenario, it is observed that a developing nation typically exhibits a lower HDI in comparison to other countries within the sample. When considering the future, it is crucial for governments in these nations to prioritize the enhancement of government effectiveness (GEE) and reduction of inequality, as these factors significantly influence HDI.

The objective of human development is to promote individuals' ability to lead longer, healthier, and more productive lives, rather than solely focusing on the economic prosperity of their geographical location. It is imperative for governments to establish sustainable development objectives aimed at fostering conditions conducive to longevity, sound health, comprehensive knowledge, and heightened productivity, so yielding enduring advantages for the nation. Further, a comprehensive evaluation of social policies and allocating increased resources towards education, healthcare, and the promotion of social welfare programs is essential. These efforts aim to enhance human longevity, foster healthier lifestyles, improve living conditions, and elevate educational attainment. By doing so, nations can effectively ensure sustainable economic growth of a higher caliber. Simultaneously, it is imperative for households and individuals to prioritize expenditures on education, healthcare, income distribution, and other measures that effectively promote longevity, well-being, access to knowledge and wisdom, labor productivity, and ultimately foster genuine and sustainable prosperity within each nation.

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