

Endogenous Modeling of the Effect of Gender Development on Poverty in Indonesia in 2021

Nurhidayati¹, Dyah Purwanti², Sigit Budiantono³
Pardomuan Robinson Sihombing⁴, Ade Marsinta Arsani⁵

^{1,2,3}PKN-STAN

^{4,5}BPS-Statistics Indonesia

e-mail: ²dyahpurwanti@gmail.com, ⁴robinson@bps.go.id, ⁵ade.marsinta@bps.go.id

Diterima	Direvisi	Disetujui
02-08-2023	03-09-2023	04-09-2023

Abstract - Gender development and Poverty are two interrelated issues in the context of development. The study examined the effect of the Gender Development Index (GDI) on Poverty in 514 urban districts in Indonesia in 2021. The modeling uses the 2SLS method with IPG as the instrumented variable, gender empowerment index (GEI), the average length of schooling ratio as an instrumental variable, and Gross Regional Domestic Product (GRDP) as an exogenous variable. The results showed that the Gross Regional Domestic Product, Gender Empowerment Index, and Length of School Ratio significantly positively affected the Gender Development Index. On the other hand, the Gross Regional Domestic Product and Gender Development Index significantly negatively affect Poverty. Comprehensive and targeted policies are needed to increase gender equality in the economy and reduce Poverty.

Keyword: development; empowerment; gender; GRDP; poverty

INTRODUCTION

Poverty has long been a serious problem in many parts of the world, causing suffering and hardship for billions of people. Despite efforts to reduce Poverty, many challenges must be faced to achieve significant and sustainable results. In addition, the issue of gender inequality remains a real problem in many countries, affecting women's access to opportunities, resources, and human rights. In the development context, gender issues cannot be ignored because gender gaps can worsen poverty conditions. Gender injustice causes women and girls to experience barriers to education, health care, and access to decent employment. As a result, they become more vulnerable to poverty and, most of the time, experience greater suffering than men.

There are several reasons GDI can influence poverty rates in a region. First, through increasing gender equality in access to and participation in labor markets and economic opportunities, GDI can help increase family incomes. If women have better opportunities to work and contribute to the economy, it can help reduce household poverty rates.

In addition to access to Education: A good GDI can also reduce the education gap between men and women. With equal access to education, women have a better chance of getting better, higher-earning jobs, which can help lift their families out of poverty.

Some studies that measure the relationship between gender development and poverty include Pradhan (2018) and World Bank (2019). (World Bank, 2019) In this study, it was found that there is a close relationship between poverty and gender

development. Other studies also link poverty, gender development, and economic growth Caesaktiti et al., (2021). Where there is good economic growth will reduce poverty, increase gender development and again increase a region's economic growth.

On the other hand, a high GDI means more equitable access to health between men and women. Good health can improve productivity and quality of life, which can help reduce poverty. Participation in Decision-Making: When women have an active role in decision-making at the family and community level, they can contribute to better policies and programs addressing poverty and other social problems.

Based on the background above, this research aims to examine the relationship between GDI and poverty. As for the latest in this research, this research uses endogeneity treatment techniques where the GDI variable is also influenced by GEI and the economic capacity of a region as measured by local indigenous use. Research on the use of endogeneity models has not been carried out in other studies.

DATA AND METHODOLOGY

The data used in this study came from the publication of BPS-Statistics Indonesia. This research focuses on all city-regency in Indonesia with a research period 2021. The dependent and independent variables in this study can be seen in Table 1. The GRDP variable will use natural logarithmic transformations because the data units are in a million (nominal).

Table 1. Research Variable

Dependent Variables	Unit	Scale Data
Percentage of Poor People (Poverty)	Percent	Ratio
Independent Variables	Unit	Scale Data
Gross Regional Domestic Product	Million Rupiah	Ratio
Instrumented/ Endogen	Unit	Scale Data
Gender Development Index (GDI)	Points	Ratio
Length of School Ratio (LSR)	Point	Ratio
Gender Empowerment Index (GEI)	Point	Ratio

Modeling this study used endogeneity modeling using a 2SLS estimator. The author uses STATA 18 software in the data processing. The regression equation used is as follows:

$$Poverty = \beta_0 + \beta_1 GDI + \beta_2 GRDP + \varepsilon_1$$

$$GDI = \alpha_0 + \alpha_1 GEI + \alpha_2 LSR + \varepsilon_2$$

In endogeneity modeling that uses instrumental variables, several assumptions must be met, including data that there are instrumental variables and no overidentification in modeling. (Baum et al., 2003) The complete test can be seen in Table 2.

Table 2. Assumption In Endogeneity Modeling

Test assumptions	Null Hypothesis	Alternative Hypotheses
Stock and Yogo Test (Stock et al., 2002)	Weak Instruments	Strong/ Fit Instruments Variable
F Wu-Hausman(Hausman, 1978)	There is no Endogeneity	There is endogeneity
Sargan Test (Sargan, 1958)	No Overidentifying	Model Overidentifying

Once the best Model is selected and meets the assumptions, the next step is to test the goodness of the Model (Walpole, 2012). The goodness of the model test can be seen in Table 3. After all, the test

criteria of the Model are met, and the interpretation of the formed regression equation is carried out.

Table 3. The Goodness of Fit Model

The goodness of Fit Test	Null Hypothesis	Alternative Hypotheses	Reject Ho
Test Coefficient of Determination / adjusted R square	R square > 0.5		
Simultaneous Test / F Test/ Chi-Square	Model Not fit/ All variables have no effect	Model fit/minimum one variable has a significant effect	Prob. Value < 0.05
Partial Test / T Test	Certain independent variables have no effect	Independent variables have an effect	Prob. Value < 0.05

RESULTS AND DISCUSSION

The average poverty score of 514 urban districts in Indonesia in 2021 is 12.27 percent, with the lowest value of 2.38 percent in Sawah Lunto City and the highest of 41.66 percent in Intan Jaya Regency. The average school length ratio of 514 urban districts in Indonesia in 2021 is 0.90 points, with the lowest value of 0.37 points in Intan Jaya Regency and the highest of 1.12 points in Bone Bolango Regency. The average Gender Development Index value of 514 urban

districts in Indonesia in 2021 is 89.87 points, with the lowest value of 53.72 points in Ogan Hilir Regency and the highest of 99.09 in Ogan Hilir Regency. The average value of the Gender Empowerment Index from 514 urban districts in Indonesia in 2021 is 64.53 points, with the lowest value of 34.54 points in Tambaruw Regency and the highest of 88.71 points in Gunung Mas Regency.

Table 4. Research Variable Descriptive

Variable	Obs	Mean	Std. dev.	Min	Max
Percentage of Poor People (Poverty)	514	12.27	7.46	2.38	41.66
Length of School Ratio (LRS)	514	0.90	0.09	0.37	1.12
Gender Development Index (GDI)	514	89.87	6.02	53.72	99.09

Variable	Obs	Mean	Std. dev.	Min	Max
Gender Empowerment Index (GEI)	514	64.53	9.70	34.54	88.71
Gross Regional Domestic Product (GRDP)	514	29.83	1.27	25.72	33.76

Several assumption checks were carried out before further interpreting regression modeling with instrument variables. The assumptions tested are endogeneity testing, overidentification, and instrumental suitability of variables. The first test is Stock and Yogo, with null hypothesis tests that the set of instruments is weak. Table 2 shows the probability value = $0.00 < \alpha = 0.05$, so it says reject H_0 , and the selection of instrumental variables is correct. Furthermore, endogeneity testing was carried out on

the Gender Development Index variable. From the results, it can be seen that the probability value of Wu Hausman's test is $0.00 < \alpha = 0.05$, so it is said to reject H_0 , and it is concluded that there is endogeneity in modeling. The final step is to ensure that there is no overidentification in modeling. Based on Sargan's test, the probability value = $0.289 > \alpha = 0.05$, so it is said not to reject H_0 , and it is concluded that the Model is not overidentifying.

Table 5. Test of Assumption Endogeneity Model

Tests of assumption	Name of the Test	F Stat.	P.Value	Conclusion
Weak instruments	Stock and Yogo	86.412	0.000	Strong Instrument
Endogeneity	F Wu-Hausman	126.713	0.000	There is endogeneity
Overidentifying	Sargan	1.122	0.289	No Overidentifying

The first step in modeling is to progress the influence of all exogenous and instrumental variables on instrumented variables (Gender Development Index). In Table 4, it can be seen that the value of the coefficient of determination is 0.2918. This result means that the variables Gross Regional Domestic Product, Gender Empowerment Index, and Length of School Ratio can explain the variation in the Gender Development Index by the remaining 29.18 percent by other variables outside the Model. While simultaneously, the value of Prob F stat = $0.00 < \alpha = 0.05$, so it says reject H_0 and all the variables together have a linear and significant effect on the Gender Development Index. Partially, the Gross Regional Domestic Product, Gender Empowerment Index, and Length of School Ratio significantly positively affect the Gender Development Index because the value of prob T stat $0.000 < \alpha = 0.05$.

Table 6. First Stage Regression

GDI	Coef	T stat	Prob.
GRDP	0.004	2.090	0.037
GEI	0.071	2.880	0.004
LSR	0.304	11.750	0.000
Constanta	0.462	8.670	0.000
F Stat	71.45	Prob F Stat	0.000
R2-adj	0.2918		

The second step in modeling is to progress the influence of all exogenous and instrumented variables on the dependent variable. In Table 4, it can be seen

that the value of the coefficient of determination is 0.2513. This result means that the variables of the Gross Regional Domestic Product and Gender Development Index can explain the variation in Poverty by the remaining 29.18 percent by other variables outside the Model. While simultaneously, the value of Prob F stat = $0.00 < \alpha = 0.05$, so it says reject H_0 and all the variables together have a linear and significant effect on Poverty. Partially, the Gross Regional Domestic Product and Gender Development Index significantly negatively affect the Percentage of Poor People because the value of prob T stat $0.000 < \alpha = 0.05$.

Table 7. Second Stage Regression

Poverty	Coef.	Z Stat	Prob.
GDI	-1.155	-10.260	0.000
GRDP	-0.018	-6.160	0.000
Const.	1.694	16.920	0.000
Chi2 stat	246.73	Prob F Stat	0.000
R2-adj	0.2513		

Discussion

GRDP has a significant positive with a coefficient of 0.004 with a value of $t\text{-stat}=2.090 > t\text{-table}=1.96$ and a value of prob. value= $0.037 < \alpha=0.05$. This result means that a 1 percent increase in GRDP will increase GDI by 0.004 points, assuming constant other variables. A study conducted in Central Java, Indonesia, found that the gender gap moderates the relationship between PDRB, public spending, and the dependency ratio on the Human Development Index (HDI) (Caesaktiti et al., 2021).

The same thing was also obtained by Padang et al. (2019), where economic growth will increase gender development,

GEI has a significant positive with a coefficient of 0.071 with a value of $t\text{-stat} = 2.880 > t\text{-table} = 1.96$ and a value of $\text{prob. value} = 0.004 < \alpha = 0.05$. This result means that a 1 POIN increase in GEI will increase the GDI by 0.071 points, assuming constant assumptions of other variables. This result aligns with research (Dijkstra, 2017), which states that GEI significantly influences a country's GDI. GEI measures the level of involvement, participation, and accessibility of women in various aspects of social, economic, and political life. The higher the GEI value of a country, the greater the contribution of women to the country's development and the lower the gender gap (Ibrahim & Alkire, 2007).

LSR has a significant positive with a coefficient of 0.304 with a value of $t\text{-stat} = 11.750 > t\text{-table} = 1.96$ and a value of $\text{prob. value} = 0.000 < \alpha = 0.05$. This result means that 1 percent GRDP will increase LSR by 0.304 points, assuming constant other variables.

GDI has a significant negative with a coefficient of -1.155 with a value of $|z\text{-stat}| = 10.260 > z\text{ table} = 1.96$ and a value of $\text{prob. value} = 0.000 < \alpha = 0.05$. This result means that a 1 percent increase in GDI will reduce Poverty by 1,155 percent, assuming constant assumptions of other variables. This research aligns with Pradhan's (2018) research which states that increasing GDI will improve the economy and reduce poverty. The link between poverty and gender inequality has also been discussed in the World Bank data, where the two variables have a close relationship. (World Bank, 2019)

GRDP has a significant negative with a coefficient of -0.018 with value $|z\text{-stat}| = 6.160 > t\text{-table} = 1.96$ and value $\text{prob. value} = 0.000 < \alpha = 0.05$. This result means that an increase of 1 percent GRDP will reduce Poverty by 0.018 percent with the assumption of other variables constant. Increasing GRDP will increase the economic strength of a region to improve facilities, facilities, and infrastructure to increase the community's economy and ultimately reduce poverty (Mustika, 2011). On the other hand, a high GDP can create more job opportunities for locals. With adequate employment, the unemployment rate can decrease, reducing the number of people living below the poverty line (Sumarto et al., 2018) (Suryahadi & Widyanti, 2020)..

CONCLUSION AND ADVICE

In modeling the effect of the gender development index on Poverty, there is an endogeneity effect. Modeling using the model empowerment index and the average length of

schooling ratio was instrumental in gender development index variables. The Model used already meets the assumptions of endogeneity, suitability of instrumental variables, and not overidentification. Partially, the Gross Regional Domestic Product, Gender Empowerment Index, and Length of School Ratio significantly positively affect the Gender Development Index. On the other hand, the Gross Regional Domestic Product and Gender Development Index significantly negatively affect Poverty.

Based on the results of this study, comprehensive and targeted policies are needed to increase gender equality in the economic, educational, and other fields to increase economic growth and reduce Poverty. Suggestions for future research can add variables that can potentially affect Poverty, such as the Gini ratio, investment, regional income, and others. From the modeling side, the author can use panel data with instrumental variables.

REFERENCE

- Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *Stata Journal*, 3, 13–31.
- Caesaktiti, W. H. A., Rusdarti, R., & Oktavilia, S. (2021). Peran Gender gap Memoderasi Rasio Ketergantungan, PDRB, Belanja Publik Terhadap IPM Jawa Tengah 2016-2020. *Business and Economic Analysis Journal*, 1(2), 122–133.
<https://journal.unnes.ac.id/nju/index.php/beaj/article/view/33591>
- Dijkstra, A. G. (2017). The Effect of Women's Economic Power in Society on Gender Inequality. *World Development*, 91, 178–192.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46, 1251–1271.
- Ibrahim, S., & Alkire, S. (2007). Agency and Empowerment: A Proposal for Internationally Comparable Indicators. *Oxford Development Studies*, 35(4), 379–403.
- Mustika, C. (2011). PENGARUH PDB DAN JUMLAH PENDUDUK TERHADAP KEMISKINAN DI INDONESIA PERIODE 1990-2008. *Jurnal Paradigma Ekonomika*, 1(4), 12–23.
- Padang, Mariaty, D., Anis, A., & Ariusni. (2019). Analisis Pengaruh Kesetaraan Gender Terhadap Pertumbuhan Ekonomi Di Sumatera Barat. *Jurnal Kajian Ekonomi Dan Pembangunan*, 1(3), 69–76.
- Pradhan, M. (2018). Gender Development and Poverty in Indonesia. *Jurnal Ekonomi Dan Studi Pembangunan*, 19(2), 115–130.
- Sargan, J. D. (1958). The estimation of economic relationships using instrumental variables.

- Econometrica*, 26, 393–415.
- Stock, J. H., Wright, J. H., & Yogo., M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business and Economic Statistics*, 20, 518–529.
- Sumarto, S., Suryahadi, A., & Widyanti, W. (2018). PDRB dan Kemiskinan di Indonesia: Analisis Spasial di Tingkat Kabupaten/Kota. *Jurnal Ekonomi Dan Pembangunan Indonesia*, 19(2), 138–155.
- Suryahadi, A., & Widyanti, W. (2020). PDRB, Ketenagakerjaan, dan Kemiskinan di Indonesia. *Jurnal Ekonomi Pembangunan*, 21(2), 137–152.
- Walpole, R. E. (2012). *Probability & Statistics for Engineers & Scientists*. Pearson.
- World Bank. (2019). *Gender Equality and Poverty in Indonesia*.