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,PKN-STAN
³,BPS-Statistics Indonesia
e-mail: ²dyahpurwanti@gmail.com, ⁴robinson@bps.go.id, ⁵ade.marsinta@bps.go.id

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 instrumental 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 Word 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

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

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:

\[
\text{Poverty} = \beta_0 + \beta_1 \text{GDI} + \beta_2 \text{GRDP} + \varepsilon_1 \\
\text{GDI} = \alpha_0 + \alpha_1 \text{GEI} + \alpha_2 \text{LSR} + \varepsilon_2
\]

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

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

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

<table>
<thead>
<tr>
<th>Test</th>
<th>Null Hypothesis</th>
<th>Alternative Hypotheses</th>
<th>Reject Ho</th>
</tr>
</thead>
<tbody>
<tr>
<td>R square &gt; 0.5</td>
<td>Model fit/minimum one variable has a significant effect</td>
<td>Prob. Value &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td>Model Not fit/ All variables have no effect</td>
<td>Independent variables have an effect</td>
<td>Prob. Value &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td>Certain independent variables have no effect</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Poor People (Poverty)</td>
<td>514</td>
<td>12.27</td>
<td>7.46</td>
<td>2.38</td>
<td>41.66</td>
</tr>
<tr>
<td>Length of School Ratio (LSR)</td>
<td>514</td>
<td>0.90</td>
<td>0.09</td>
<td>0.37</td>
<td>1.12</td>
</tr>
<tr>
<td>Gender Development Index (GDI)</td>
<td>514</td>
<td>89.87</td>
<td>6.02</td>
<td>53.72</td>
<td>99.09</td>
</tr>
</tbody>
</table>
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 Ho, 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 Ho, 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 Ho, and it is concluded that the Model is not overidentifying.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender Empowerment Index (GEI)</td>
<td>514</td>
<td>64.53</td>
<td>9.70</td>
<td>34.54</td>
<td>88.71</td>
</tr>
<tr>
<td>Gross Regional Domestic Product (GRDP)</td>
<td>514</td>
<td>29.83</td>
<td>1.27</td>
<td>25.72</td>
<td>33.76</td>
</tr>
</tbody>
</table>

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 0.2513. 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 Ho 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>
<thead>
<tr>
<th>Table 5. Test of Assumption Endogeneity Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests of assumption</td>
</tr>
<tr>
<td>Weak instruments</td>
</tr>
<tr>
<td>Endogeneity</td>
</tr>
<tr>
<td>Overidentifying</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6. First Stage Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDI</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>GRDP</td>
</tr>
<tr>
<td>GEI</td>
</tr>
<tr>
<td>LSR</td>
</tr>
<tr>
<td>Constanta</td>
</tr>
</tbody>
</table>

F Stat | 71.45 | Prob F Stat | 0.000 |

R2-adj | 0.291 |

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 Ho 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>
<thead>
<tr>
<th>Table 7. Second Stage Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDI</td>
</tr>
<tr>
<td>GRDP</td>
</tr>
<tr>
<td>Const.</td>
</tr>
</tbody>
</table>

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-stat=2.090 > t-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-stat= 2.880 > t-table=1.96 and a value of 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-stat=11.750 > t-table=1.96 and a value of 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-stat= 10.260 > z table=1.96 and a value of 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 Pradhans 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-stat= 6.160 > t-table =1.96 and value 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


https://journal.unnes.ac.id/index.php/beaj/article/view/33591


http://ejournal.bsi.ac.id/ejurnal/index.php/perspektif


Econometrica, 26, 393–415.