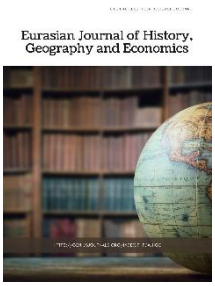

Analyzing Determinants of Household Poverty in Brazil: An Empirical Study Using Ordinary Least Square Regression.

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ABSTRACT

Nowadays, household poverty is becoming one of the sharpest problems all around the world. To analyze the determinants of household poverty, significant family welfare factors were identified using Ordinary Least Square regression. Consumer expenditure was shown to be a credible welfare indicator for families and the first step in measuring poverty. In linear regression, the independent variable was logarithmically transformed. Brazil was investigated for the study. The study used 2000–2020 yearly time-series data. Household size was found to be a major factor affecting average household consumption. Education (especially literacy) and unemployment also reduce spending. Even with high independent variable significance, numerous additional factors can affect family poverty. Further research is needed to develop more effective home poverty programs.

Keywords: Household Poverty, Ordinary Least Square Regression, Consumer Expenditure, Welfare Indicators, Household Size, Education, Literacy, Unemployment, Time-Series Data, Poverty Reduction Programs

Introduction

Today, poverty remains to be one of the greatest problems in the world. According to the World Bank, 689 million people, or 9.2% of the world's population, live in severe poverty for less than $1.90 a day (Worldbank, 2020). Lack of access to education, food, healthcare, and stable employment are just a few of the many negative effects of poverty. Poverty, at its core, means a lack of opportunity to improve one's livelihood and take charge of one's future. This coursework aims to analyze the factors of household poverty in developing countries all over the world. The results of this study will have a significant impact on the understanding of the sharp problem of poverty. They will help economic policymakers and decisionmakers of the world to eliminate poverty.

Literature Review

When it comes to the works related to household poverty, Worldbank had a great contribution. According to their studies held in 2005, there are several causes of poverty. The key reasons are categorized into three groups:

- Regional level(climatic conditions, remoteness, property rights and how they are kept, governance quality);
- community level(infrastructure, services, proximity to marketplaces, social relationships);
- household and individual:

1. demographic(household size, age, dependency, gender);
2. economic(employment, work hours, property owned);
3. social(health, education, shelter)

In general, the average age of family members, education, the gender of the head of the household, and the level of labor force participation are a few of the crucial factors in this category. Moreover, household structure and size tend to be significant as there is a potential link between household structure and poverty levels. For example, the size of the

family and the ages of its members are usually different for non-poor and poor households. The survey held in Cambodia shows that poor people are likely to live in big households with around 6.6 people, while for the rich this number is equal to 4.9 (Knowles, 2006). Another factor that might affect the poverty levels is the dependency ratio(family members that are unable to work/family members that work). It is also believed that the higher the dependency ratio, the greater the poverty is (Worldbank, 2005).

In the survey in Cambodia, the literacy rate among adults older than 15 was equal to 67%. Moreover, the gap in literacy between the poor and the rich was large(58% for the poorest 20% and 77% for the richest 20%) (Knowles, 2006).

Based on a survey from 1990, Coulombe and Mckay (1996) did a multivariate analysis to examine the variables that lead to poverty in Mauritania. According to demographic and economic explanatory factors, they constructed a multinomial logit model for the possibility of being poor. The authors discovered that poor education and residing in a remote region considerably raise the likelihood that the household will be poor.

Using data from 1980, 1985, 1992, and 1996 for Nigeria, Okojie (2002) went deeper into the characteristics of educational levels affecting human poverty and income poverty. The logistic regression method was used to build the poverty model, and it was discovered that all educational levels—primary, secondary, and tertiary—are relevant in lowering the likelihood of the household's poverty. According to the findings, female-headed households had a higher likelihood of being poor than male-headed households, as the females are generally showed little educational level In the model, there was the mean per capita spending as the dependent variable and educational variables as the independent. Furthermore, it was also discovered that educational variables had a substantial impact on the household's per capita expenditure growth.

There was another observation that evaluated household and personal determinants of poverty in Pakistan (Majeed and Malik, 2015). The Federal Bureau of Statistics (FBS) of Pakistan's Household Income and Expenditure Survey (HIES) 2001–2002 provided the information for this study. This study used the Logistic Regression Technique to find specific factors that contribute to poverty in Pakistan at the household level. Their results stated that all educational variables of the head of the family were important in reducing household poverty. To be more precise, in comparison to the reference category-"no education" the primary, middle, matriculation, intermediate, bachelor and higher degrees of the household head reduces the probability of the household's poverty by 22%, 54%, 64%, 87%, respectively. Another finding was that the more people in the family the higher the likelihood of the household being poor. One more member of the family might raise the likelihood of poverty in the home by up to 22% (Majeed and Malik, 2015).

Methodology

The study focused primarily on consumption expenditure as a good welfare indicator for families, defining welfare indicator as the first stage in measuring poverty. Based on the notion that consumption is more closely tied to a person's well-being and may better reflect a household's real level of living to satisfy fundamental necessities, consumption spending was given priority as an indicator of household well-being. Ordinary Least Square regression was used in the study to find statistically significant factors influencing household welfare. Linear regression log-lin was used. The dependent variable in this situation is the logarithm-transformed value of consumer spending per adult equivalent each day, while the independent variables in this situation are socioeconomic factors and access to various resources and services. To moderate the distribution of the dependent variable, which is one of the OLS assumptions, the log-transformed dependent variable was mostly employed.

The regression is built on the following model:

$$\ln Expenditure_i = \ln \beta_0 + \beta_1 \quad literacy_i + \beta_2 \quad unemployment_i + \beta_3 \quad hh\ size_i + u_i$$

β_0-intercept, value of the dependent variable, constant number in the model, when independent variables are equal to 0
β_1-β_3 – coefficients demonstrating percentage change of the Y variable, when the independent variable changes by 1 unit
u- shows all residuals that are not covered by variables.

Data interpretation

The country of Brazil was chosen as an area for research. The reason for this particular decision was that the republic of Brazil is a country with one of the highest GDPs in the world. Despite this fact, multiple surveys, and observations showed that Brazil is struggling with the issue of poverty. All the information was gained from datasets that Worldbank, along with national institutions and other development organizations is collecting since 1990. Other agencies like UNESCO Institute for Statistics and GlobalData also gave valuable data on our topic. Moreover, datasets from International Labour Organization were useful to study unemployment rates (ILOSTAT, 2022). The study used time-series data, which covers the period of 21 years from 2000 to 2020. Respectively, the number of observations is equal to 21. The choice can be explained by the fact that time-series data is helpful when examining the dynamics of variables and how they are changing over time. After reviewing empirical studies that were conducted previously, 4 variables were chosen for the regression mode:

- Expenditure(dependent) - Households and NPISHs(Non-profit institutions serving households) Final consumption expenditure per capita, PPP (current international $, in thousands)
- Literacy - Literacy rate, adult total (% of people ages 15 and above)
- Unemployment - Unemployment, total (% of total labor force)
- Hh size - Average Household Size (number of people per household)

To enable normal distribution, households and NPISHs Final consumption expenditure, which is normally measured in U.S. dollars, was converted to log form.
Before performing the regression, our variables were also verified against OLS assumptions. The results are available in the "Assumptions" chapter.

Interpretation of results and discussion

	(1)
VARIABLES	ln_expenditure
literacy	-0.0406***
	(0.0103)
unemployment	-0.0255***
	(0.00263)
hh_size	-0.761***
	(0.0709)
Constant	14.89***
	(1.149)
Observations	21
R-squared	0.980

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

To acquire regression results, the code "reg" was used. The table above represents all the necessary results. In order to import the results of the regression, the command "outreg2" was

used. As it is seen there are 21 observations in the model. The value of R-squared is equal to 0.980, meaning that 98% of variations in households and NPISHs final consumption expenditure per capita can be explained by 3 chosen independent variables. This result is very close to the perfect fit, as to create a good fit, the value of R-squared must be at least more than 0.5.

All the variables are significant at 0.01 level, which means that the reader can be confident for 99% that all 3 factors indeed influence the final expenditures of households.

When it comes to hypothesis testing, in accordance with the general rule of thumb claiming that the alternative hypothesis is accepted if the absolute value of F is equal to or greater than 5, the null hypothesis is rejected, as the absolute value equals 272.14 .

After the regression analysis, the OLS model appears as follows

$$\ln Expenditure_i = 14.89 - 0.0406\, literacy_i - 0.0255\, unemployment_i - 0.761\, hh\ size_i + u_i$$

According to the model, it can be concluded that all the variables have a negative impact on the household's consumption expenditures. When it comes to the parameters, it is seen that household size is the biggest influencer on the consumption expenditures of households. According to the results, it can be estimated that if the household size in Brazil increases by 1 member, the consumption expenditures per capita decrease by 76.1 %. This outcome is similar to the one that was made by Knowles in 2006. As well as this, the unemployment rate had little impact on the dependent variable. If the unemployment rate increases by 1 %, then the consumption expenditures decrease by 2.55 percent. Finally, if the literacy rate increases by 1 %, the dependent variables decrease by 4.06 %. In particular, the effect of literacy rate on household consumption was expected to be much higher. This result is completely different from the findings of other researchers that were mentioned in the literature review. They all were claiming that educational characteristics are among the most important ones to reduce household poverty. It can be explained by the fact that the majority of households in Brazil live in rural areas. As we all know, education in rural areas has little impact on the well-being of the person or household.

OLS assumptions

• zero conditional mean of the error term

This assumption states that the population mean of error terms must be equal to 0. To check this assumption, the code "predict" was used. Then the summary of the new variable(residuals) was calculated by using "summarize". Finally, it is seen that the population mean is equal to 2.38e^-10 which is very close to 0. Therefore, we can accept the data.

• homoscedasticity

OLS states that residuals' variance should be constant for the whole dataset. The Breusch-Pagan test was used to check the homoscedasticity. The code "hettest" was used and it was shown that there is no heteroscedasticity, as Prob>chi2=0.5982 which is greater than 0.05.

• no autocorrelation

As independent variables cannot be correlated with one another. As the data used for the estimation is time series data, the code "estat bgodfrey" was used to check the autocorrelation. The independent variables are not correlated as Prob>chi2 = 0.0000\

• no perfect multicollinearity

Before running the regression, we checked if there is any multicollinearity between independent variables. The command "vif" was used to check the multicollinearity. The results stated that there is very little collinearity between variables. Even if the minor multicollinearity between independent variables exists, it can be concluded that the assumption is followed.

Conclusion

In summary, the research examined consumer spending as a reliable welfare indicator for families, describing it as the first step in assessing poverty. Consumption expenditure

was prioritized as an indicator of household well-being due to its strong connection to a person's overall welfare and its ability to represent a household's true standard of living more accurately in meeting basic needs. The research used Ordinary Least Square regression to identify statistically significant variables impacting family wellbeing. Logarithmic transformation was applied to the independent variable in a linear regression model. Brazil was selected for investigation. All data was collected by Worldbank, national institutions, and other development groups from 1990. UNESCO Institute for Statistics and GlobalData also provided useful data. International Labour Organization databases helped investigate unemployment rates. The annual time-series data from 2000 to 2020 was utilized in the research. To sum up, it can be stated that household size is one the most important variables that affect the average household consumption expenditures. Other factors like education (literacy rate in particular) and unemployment are shown to have a negative impact on consumption expenditures. Even if the significance level of independent variables is high, there are many other factors that may influence household poverty. As well as this, the results may vary from country to country, as we examined the determinants of household poverty in Brazil only. In conclusion, more studies should be conducted in this field in order to come up with more efficient policies to fight household poverty.

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