



Monetary approach to poverty measurement using the foster-Greer-Thorbecke (FGT) methodology

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Abstract

This paper examines the application of the Foster-Greer-Thorbecke (FGT) methodology to assess poverty through the lens of the monetary approach. The study focusses on the rural context of India, utilising the poverty line established by the Planning Commission. Through the computation of the headcount ratio, poverty gap index, and squared poverty gap index, the paper explores the extent, depth, and severity of poverty in rural areas. The findings offer insights into the effectiveness of the FGT method in understanding the monetary dimensions of poverty, highlighting its implications for policy development and poverty alleviation efforts. Additionally, the study compares the results obtained using the FGT methodology with other poverty assessment tools to provide a comprehensive analysis of poverty in rural India. The research also discusses potential limitations of the FGT approach and suggests areas for further investigation to enhance its accuracy and applicability in different contexts.

Keywords: Monetary Approach, Foster-Greer-Thorbecke, Poverty Line, Rural India, Poverty Measurement

Introduction

Overview of Poverty Measurement in India

Poverty measurement has been a central focus of economic and social policy in India, a country where a significant proportion of the population lives below the poverty line. The measurement and understanding of poverty are crucial for framing policies that aim to alleviate it. In the context of India, poverty has often been measured using monetary approaches that focus on income or expenditure thresholds, typically defined by a poverty line. The poverty line demarcates the minimum income or consumption level needed to meet basic necessities. Traditionally, these measures have been crucial in assessing the effectiveness of economic policies and interventions aimed at reducing poverty. The introduction of various poverty measurement indices over time has allowed policymakers to track changes in poverty levels, providing a foundation for targeted interventions.

Importance of the Monetary Approach

The monetary approach to poverty measurement remains one of the most widely used methods globally, and it has particular relevance in the Indian context. This approach is primarily concerned with the income or consumption

capacity of individuals and households, using these metrics to determine whether they fall below a predefined poverty line. The importance of the monetary approach lies in its simplicity and directness, offering a clear-cut measure of economic deprivation. It enables the quantification of poverty in terms of absolute numbers, which can be easily communicated and used for policy formulation. Furthermore, the monetary approach provides a baseline for comparison across different time periods and geographic regions, making it an essential tool for both national and international poverty assessments.

Objectives of the paper: The primary objective of this paper is to explore the application of the Foster-Greer-Thorbecke (FGT) methodology in measuring poverty within the framework of the monetary approach. By applying the FGT indices-head count ratio, poverty gap index, and squared poverty gap index-this study aims to provide a comprehensive analysis of the extent, depth, and severity of poverty in rural India. Additionally, the paper seeks to compare the findings from the FGT method with other poverty measurement approaches, thereby contributing to the broader discourse on poverty measurement and its implications for policy and research.

Literature review

Historical context of poverty measurement in India

Poverty measurement in India has a long and evolving history, reflecting the country’s complex socio-economic landscape. The earliest attempts to measure poverty in India can be traced back to the 19th century, when British colonial administrators conducted rudimentary surveys to assess living standards. However, systematic poverty measurement gained momentum post-independence with the Planning Commission of India playing a pivotal role. The

Commission initially adopted calorie-based poverty lines in the 1960s, which later evolved into expenditure-based poverty lines. The introduction of the Tendulkar Committee report in 2009 marked a significant shift, redefining the poverty line and incorporating broader expenditure categories. The latest estimates, such as those from the Rangarajan Committee, continue to refine poverty measurement, highlighting the dynamic nature of this field in India.

Table 1: Evolution of Poverty Lines in India

Year	Methodology	Poverty Line Criteria	Key Features
1962	Calorie-Based	Caloric Intake (2,400 kcal for rural, 2,100 kcal for urban)	Focused on minimum calorie intake for basic subsistence
1979	Alagh Committee	Expenditure-Based	Included food and non-food expenditures based on calorie norms
1993	Lakdawala Committee	Mixed-Reference Year Expenditure	Updated basket of goods with fixed consumption quantities
2009	Tendulkar Committee	Mixed Reference Year	Shifted to all-India rural and urban poverty lines, adjusted for cost of living
2014	Rangarajan Committee	Mixed Reference Year	Broader definition including healthcare, education, and basic needs

Review of the FGT methodology

The Foster-Greer-Thorbecke (FGT) methodology, introduced in 1984, is one of the most influential tools in poverty analysis. The FGT indices are used to measure poverty in three dimensions: incidence (head count ratio), intensity (poverty gap index), and severity (squared poverty gap index). The Head Count Ratio simply calculates the proportion of the population living below the poverty line, providing an overview of the extent of poverty. However, it does not account for the depth of poverty, which is captured by the Poverty Gap Index, reflecting the average shortfall of the poor from the poverty line. The Squared Poverty Gap Index further extends this analysis by giving greater weight to those who are further below the poverty line, thus measuring the severity of poverty. The FGT methodology's flexibility allows for adjustments in the poverty line and for comparisons across different populations and time periods, making it a powerful tool in poverty research.

Previous Studies Applying the Monetary Approach to Poverty

Numerous studies have applied the monetary approach to assess poverty, both globally and within India. Studies such as those by Ravallion (1994) [4] and Datt and Ravallion (1998) [1] have explored the relationship between economic growth and poverty reduction, using monetary metrics to evaluate poverty trends. In the Indian context, studies by Deaton and Kozel (2005) [2] have critically examined poverty estimates, questioning the reliability of monetary poverty lines and their adjustments over time. Additionally, the work of Sen and Himanshu (2004) [5] has provided insights into the spatial and temporal dynamics of poverty in India, using expenditure data to highlight regional disparities. These studies underscore the importance of the monetary approach in capturing the economic dimensions of poverty while also pointing to its limitations in addressing the multi-faceted nature of poverty.

Methodology

Description of the FGT Method

The Foster-Greer-Thorbecke (FGT) method is a widely recognised tool in poverty measurement, providing a

nuanced approach to assessing poverty through three key indices: the Head Count Ratio (HCR), the Poverty Gap Index (PGI), and the Squared Poverty Gap Index (SPGI). The HCR measures the proportion of the population living below the poverty line, offering a basic indication of poverty incidence. The PGI goes further by considering the average shortfall of the poor relative to the poverty line, thereby capturing the depth of poverty. Finally, the SPGI squares the poverty gaps before averaging them, giving more weight to those further below the poverty line, thus measuring the severity of poverty. The FGT indices can be represented mathematically as:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha}$$

Where:

- P_{α} is the poverty index.
- n is the total population.
- q is the number of poor individuals.
- z is the poverty line.
- y_i is the income of individual i .
- α determines the sensitivity of the index to poverty.

For specific values of α :

- When $\alpha = 0$, the index corresponds to the Headcount Ratio (H).
- When $\alpha = 1$, it represents the Poverty Gap Index (P).
- When $\alpha = 2$, it denotes the Squared Poverty Gap Index (SPGI).

Data sources and collection Methods

The data for this study were sourced from national surveys conducted by the National Sample Survey Office (NSSO), specifically the Consumption Expenditure Surveys, which provide detailed information on household income and expenditure. The most recent round of NSSO data, from 2011–12, was used to calculate the FGT indices. The choice of data is crucial, as the accuracy of poverty measurement

depends heavily on the quality and comprehensiveness of the data. The NSSO surveys are considered reliable and representative, covering a wide range of socio-economic variables across different states and regions of India. The poverty line used in this study is based on the Tendulkar Committee’s recommendations, adjusted for inflation to reflect the real value of the poverty line during the survey period.

Table 2: Data Sources Used in the Study

Data Source	Year	Key Indicators
NSSO Consumption Expenditure Survey	2011-12	Monthly per capita expenditure, household income
Census of India	2011	Population demographics, literacy rates, housing conditions
Planning Commission Reports	Various	Poverty line estimates, inflation adjustments

Application of the Poverty Line and Calculation of FGT Indices

The application of the FGT methodology involved several steps. First, the poverty line was applied to the NSSO data to identify households living below the threshold. The poverty line, expressed in terms of monthly per capita expenditure, was adjusted for rural and urban differences across states. Next, the head count ratio was calculated as the proportion of the population below this line. Following this, the Poverty Gap Index was computed by measuring the average shortfall of the poor from the poverty line, indicating the depth of poverty. Finally, the Squared Poverty Gap Index was calculated, providing a measure of the severity of poverty by giving more weight to those furthest below the poverty line. The results were analysed to understand the distribution and intensity of poverty across different regions and demographic groups in rural India.

Table 3: FGT Indices Calculation Steps

Step	Description
1	Application of the poverty line to NSSO data
2	Calculation of the Head Count Ratio (HCR)
3	Calculation of the Poverty Gap Index (PGI)
4	Calculation of the Squared Poverty Gap Index (SPGI)
5	Analysis of regional and demographic variations

Results

Presentation of the Head Count Ratio, Poverty Gap Index, and Squared Poverty Gap Index Results

The application of the FGT methodology yielded comprehensive results that offer insights into the poverty dynamics in rural India. The Head Count Ratio (HCR) for rural India was found to be 25.7%, indicating that nearly a quarter of the rural population lives below the poverty line. This figure reflects the widespread nature of poverty in rural areas, where access to basic needs such as food, healthcare, and education is limited. The Poverty Gap Index (PGI), which measures the depth of poverty, was calculated at 8.5%, suggesting that the average shortfall of the poor from the poverty line is significant, further highlighting the economic challenges faced by rural households. The Squared Poverty Gap Index (SPGI), which accounts for the severity of poverty, was found to be 3.2%, indicating that the poorest of the poor are in particularly dire

circumstances, with substantial deficits relative to the poverty line. These findings underscore the urgent need for targeted interventions and support for impoverished rural communities to address the systemic issues contributing to their economic hardships. Without effective measures to alleviate poverty and improve access to essential resources, the cycle of deprivation in these areas is likely to persist, perpetuating inequality and hindering overall development.

Table 4: FGT Indices for Rural India

Index	Value (%)
Head Count Ratio	25.7
Poverty Gap Index	8.5
Squared Poverty Gap Index	3.2

Comparison with other poverty measurement Methods

When compared with other poverty measurement methods, the FGT indices provide a more nuanced understanding of poverty. For instance, while the Head Count Ratio gives a straightforward measure of poverty incidence, it does not account for the varying degrees of poverty experienced by different individuals or households. The Poverty Gap Index addresses this limitation by quantifying the extent of income shortfall among the poor, thus providing a more detailed picture of poverty. Moreover, the Squared Poverty Gap Index goes a step further by emphasising the severity of poverty, making it a valuable tool for identifying those who are most in need of assistance. In contrast, other methods, such as the simple poverty line approach, may overlook these critical dimensions of poverty, thereby limiting their effectiveness in informing policy decisions. In addition, the Squared Poverty Gap Index takes into account not only how far below the poverty line individuals or households fall but also the unequal distribution of income among the poor. This allows for a more nuanced understanding of poverty and can help target interventions more effectively towards those who are most vulnerable. Overall, using these more comprehensive indices can lead to more targeted and impactful poverty alleviation strategies.

Table 5: Comparison of Poverty Measurement Methods

Method	Strengths	Limitations
Simple Poverty Line	Easy to calculate, widely used	Does not account for depth or severity of poverty
FGT Head Count Ratio	Provides a clear incidence measure	Overlooks the intensity and severity of poverty
FGT Poverty Gap Index	Captures the depth of poverty	Does not account for the severity of poverty
FGT Squared Poverty Gap Index	Measures both depth and severity	More complex to calculate, requires detailed data

Findings and Discussion

Interpretation of the Results

The results obtained from the FGT methodology reveal the complex nature of poverty in rural India. The high head count ratio suggests that poverty remains a significant issue, affecting a large proportion of the rural population. This is consistent with the broader economic and social challenges faced by rural areas, where agricultural dependence, low productivity, and limited access to services contribute to widespread deprivation. The Poverty Gap Index further indicates that the depth of poverty is substantial, with the

poor experiencing considerable income deficits relative to the poverty line. This underscores the need for targeted interventions that address not only the incidence of poverty but also its intensity.

Significance of the FGT Indices in Understanding Poverty

The FGT indices are particularly valuable in that they provide a multi-dimensional view of poverty, encompassing its incidence, depth, and severity. This allows for a more comprehensive understanding of the challenges faced by the poor, enabling policymakers to design interventions that are better suited to the needs of different segments of the population. For example, while broad-based income support programs may be effective in reducing the Head Count Ratio, more targeted measures, such as conditional cash transfers or subsidies, may be necessary to address the deeper and more severe forms of poverty identified by the Poverty Gap and Squared Poverty Gap Indices. Moreover, the ability of the FGT indices to disaggregate data by region, demographic group, or other criteria provides additional insights into the spatial and social dimensions of poverty, which are critical for effective policy design.

Comparison with other studies

The findings of this study are consistent with previous research on poverty in India, which has similarly highlighted the prevalence and severity of poverty in rural areas. Studies by Ravallion (1994) [4] and Sen and Himanshu (2004) [5] have also underscored the importance of considering the depth and severity of poverty rather than focussing solely on its incidence. However, this study contributes to the literature by applying the FGT methodology to the most recent data, providing updated insights into the current state of poverty in rural India. The comparison with other studies also highlights the strengths and limitations of different poverty measurement approaches, with the FGT indices offering a more nuanced and detailed analysis than traditional methods.

Table 6: Key Findings from Comparative Studies

Study	Focus	Key Findings
Ravalli on (1994) [4]	Economic growth and poverty	Emphasized the importance of growth in poverty reduction, but noted persistent poverty in certain regions
Sen and Himanshu (2004) [5]	Regional poverty in India	Highlighted disparities in poverty across states, with significant rural-urban differences
Deaton and Kozel (2005) [2]	Poverty line estimates	Questioned the reliability of poverty lines, called for a broader view of poverty including non-monetary aspects
Current Study	FGT indices in rural India	Provided a detailed analysis of the incidence, depth, and severity of poverty using the FGT methodology

Conclusion

Summary of Key Findings

This paper has demonstrated the effectiveness of the Foster-Greer-Thorbecke (FGT) methodology in measuring poverty through the monetary approach. The results indicate that poverty remains a significant challenge in rural India, with a

high incidence, substantial depth, and considerable severity. The FGT indices provide a comprehensive view of poverty, capturing its multiple dimensions and offering valuable insights for policy formulation. The study underscores the need for targeted interventions that address the specific needs of different segments of the population, particularly those who experience the deepest and most severe forms of poverty.

Implications for Policy and Future Research

The findings of this study have important implications for policy and future research. Policymakers should consider using the FGT methodology to inform the design and implementation of poverty alleviation programs, as it provides a more detailed understanding of poverty than traditional methods. Additionally, future research should explore the application of the FGT indices in different contexts, such as urban areas or specific demographic groups, to gain a more comprehensive understanding of poverty in India. Moreover, there is a need for further investigation into the factors that contribute to the depth and severity of poverty, as well as the effectiveness of different policy interventions in addressing these dimensions of poverty.

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