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# The Application of Plural Panelist Synthesis Method in Identifying Determinant Factors That Influence Economic Growth

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**Abstract**

This research aims to study intra-generational income mobility and poverty, and it also seeks to characterize and measure individual mobility by analyzing the duration of poverty, consecutive versus transient poverty, and the likelihood of re-entry. Researchers used a synthetic panel approach to estimate individual income in the second round based on data from the first round. This approach allows research to look at changes in individual income over time, even though actual panel data is unavailable. Based on research results, it show that the main factor influencing stagnation is the difficulty of leaving poverty, not the problem of entering poverty. In addition, analyses that consider the entire period also provide different results regarding the level of permanence in poverty. Synthetic panel analysis shows that the individuals who move out of poverty are those who were poor at the start of each period studied, not those who already had incomes above the poverty line. In addition, these results also show that the proportion of individuals who experience poverty in a shorter period is greater than that of those who experience poverty for four years. The analysis shows changes in poverty dynamics between the two periods studied. Successive poverty dominates, meaning that individuals who fall into poverty tend to remain poor over that period. However, the predominance is shifting towards transient poverty, where individuals experience poverty for shorter periods, moving in and out of poverty within that period.

**Keywords:** Study, Panels, Dynamic, Poverty, Income.



## 1. Introduction

In the first half of the 2000s, most countries experienced significant economic transformation, which occurred alongside an improvement in income distribution. Even though their achievements did not reach their highest peak, this economic progress had a significant impact [1]. After experiencing a macroeconomic crisis, the region's economy developed rapidly, reaching an annual growth rate of 10%. During this period, income inequality also decreased significantly. However, this positive trend then slowed, with economic growth slowing to just 0.8% per year and the decline in income inequality also tapering off. Nonetheless, these changes demonstrate the positive impact of economic recovery efforts and policy reforms implemented in most countries in the region. Slowing economic growth and a slower decline in income inequality could result in a smaller reduction in poverty levels. We estimate this poverty level using the international poverty line of US$5 per day, adjusted for purchasing power parity [2]. Although the pace of poverty reduction remains significant, it has slowed down from 40% to 20%, likely due to a slowdown in economic growth and a slower decline in income inequality. Apart from that, other factors such as government policy, political stability, and external factors can also influence poverty trends during this period. We need to conduct further investigation to comprehend the impact of each factor on poverty and devise effective strategies to surmount this challenge [3].

This research aims to study intra-generational income mobility and poverty, focusing on the reasons that might explain the observed stagnation in the rate of decline in poverty levels. To achieve this aim, this research will analyze the dynamics of income and poverty in two periods characterized by very different evolutions of poverty levels. A period of significant poverty reduction, characterized by high economic growth and a rapid decline in income inequality [3]. A period of stagnation and even a slight increase in poverty levels is characterized by a slowdown in economic growth and a slower decline in income inequality. We expect this research to provide better insight into the factors influencing poverty levels by analyzing intra-generational income mobility and other factors from a dynamic perspective. We hope that the results of this research will significantly enhance our understanding of poverty and its alleviation, thereby strengthening the foundation for public policies targeted at poverty reduction.

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Dynamic analysis in this context involves the study of the raw flow of individual movements over time, compared with typical poverty analysis, which focuses more on the net flows and trends of groups from different parts of the income distribution [4]. the number of individuals leaving poverty is greater than entering poverty. However, it is difficult to know whether the stagnation in poverty reduction is due to lower exit rates, higher entry rates, or a combination of both. Dynamic analysis also allows us to identify which individuals are moving along the income distribution and analyze how they move [5].

The main limitation that often arises in dynamic analysis is the lack of panel data. Panel data is difficult to manage because it requires collecting data from the same respondents periodically, which can be expensive and difficult to do. Moreover, panel data frequently fail to accurately represent a country's entire population, and their coverage typically spans only brief periods [4]. In addition, panel data is also susceptible to non-random sample loss, which can affect the validity of the analysis results. To overcome this limitation, tools or methods are needed that can replace panel data or at least successfully overcome its limitations. Using longitudinal data, which tracks individuals or households over time but not always at the same intervals as panel data, is one viable approach. Longitudinal data can provide useful insights into changes in an individual's behavior or condition over time [5]. In addition, researchers can utilize analysis techniques like event history analysis or survival analysis to address the issue of limited panel data. This technique allows researchers to analyze changes in circumstances or events that occur in individuals or other units over time, even if panel data are not available. By considering the limitations of panel data, research can combine different approaches and exploit the advantages of each approach to gain a better understanding of the dynamics of poverty and income mobility [6].

The literature has found alternatives to overcome the limitations of panel data, starting with studies that develop pseudo-panel techniques from multiple rounds of cross-sectional data [7]. This method allows the study of income and poverty dynamics based on at least two rounds of cross-sectional surveys. These pseudo-panel or synthetic panel methods take a similar approach to panel data but use cross-sectional data to produce groups of pseudo-individuals or pseudo-households that follow the same trajectory over time [8]. This approach allows researchers to produce more accurate estimates of changes in income and poverty over time, despite using limited cross-sectional data. By using this method, research can gain deeper insight into intra-generational income mobility and factors influencing poverty from a dynamic perspective. This can help in the development of more effective policies for reducing poverty, taking into account the true dynamics of changes in individuals' incomes and living conditions over time [9].

On the other hand, most studies using synthetic panels tend to analyze mobility between two distant points in time, which omits income dynamics in the years in between. This can cause difficulty in seeing income changes that occur over shorter time periods, such as changes that occur sporadically [8]. It is important to remember that within those two years, some individuals may remain in poverty for long periods of time, while others may move in and out of poverty sporadically. This suggests that the duration of poverty can vary among individuals, even within groups that have the same level of poverty in aggregate [9]. Two countries with the same level of aggregate poverty can also have different mobility patterns. For example, the same group of individuals may be persistently poor in one country, while in another country, such people may experience poverty only temporarily or move in and out of poverty at different times of the year [10]. The implications of these different experiences may also differ, as may the policy implications. Therefore, it is important to consider more detailed income dynamics and longer periods in analyzing income mobility and poverty to better understand the challenges individuals and households face in overcoming poverty.

## 2. Research Methods

We developed a synthetic panel methodology to overcome the limitations of panel data. This method uses at least two rounds of cross-sectional data to create a synthetic panel that allows analysis of poverty dynamics. This synthetic panel method can provide good estimates of transitions out of and into poverty. However, it is important to note that these methods should not be considered a replacement for panel data but rather a complement to it. In some cases where panel data is not available, this method makes it possible to study relevant phenomena such as social mobility. Conversely, if existing panel data is available, this method can broaden the sample to encompass individuals not part of the panel structure, thereby offering a more comprehensive understanding of poverty dynamics. Synthetic panel methods can significantly enhance the analysis of poverty and income mobility, particularly in situations where panel data is scarce. With this approach, research can better understand changes in individual socio-economic conditions over time, which can provide a stronger foundation for the development of policies that are effective in reducing poverty. To obtain income estimates for individuals in the second round, the authors propose the following approach randomly select individuals from cross-sectional data in the first round. Use a statistical model to estimate individual earnings in the first round using data from the first round. Apply the residual estimates from the model to the individual data selected in the first step to obtain the predicted income in the first round. Assign the predicted income in the first round to the same individuals in the second round. By taking these steps, the authors were able to use a synthetic panel approach to

estimate individual earnings in the second round based on the data from the first round. This approach allows research to look at changes in individual income over time, even though actual panel data is not available.

## 3. Results and Discussion

To analyze income dynamics, individual data covering at least two time periods is required. In this case, the data does not need to be anonymous. Panels A and B show the data structure showing the growth of per capita family income per decile, respectively. In the context of panel data, we typically calculate variations in median income based on the average income per decile using cross-sectional data. This data structure shows that the income variations between deciles in the two periods are not significantly different. This may be due to the fact that individuals in a particular decile in one year are not necessarily the same as individuals in another year, so the income distribution is anonymous. In the context of income mobility analysis, it is important to understand that true panel data, which follows individuals over time, will provide a better understanding of changes in individual income over time. However, if panel data are not available, approaches such as those described above can provide useful estimates of income dynamics in the population.

Panel data is required to explain the need for non-anonymous distributions. In this context, we can calculate changes in average income in two forms an anonymous form, like cross-sectional data, and a non-anonymous form, which represents the growth in average income for each decile. Using non-anonymous panel data, we can see how average income per decile changes over time. This provides a more complete picture of income dynamics in society because we can see changes in income not only overall but also per decile. In this way, we can understand how economic changes affect different income groups in society. The panel data structure is especially important in this regard, as it allows a more detailed analysis of changes in income over time. In this way, we can better understand poverty trends, income mobility, and income distribution in society. By using non-anonymous panel data, we can gain deeper insight into the economic and social dynamics within a country, which can be the basis for more effective policies in addressing problems of poverty and income inequality.

Whether we use non-anonymous or anonymous income distributions will largely determine the conclusions drawn from the analysis when using panel data. In both time periods, the non-anonymous incidence curve shows greater income growth for all deciles compared to the anonymous curve, especially in the lowest decile of the income distribution. This shows the importance of using non-anonymous data to study intra-generational income mobility. By using non-anonymous data, we can see changes in income in more detail across different income groups in society, allowing for a more accurate analysis of poverty dynamics. By using non-anonymous panel data, we can gain a better understanding of how economic changes affect different income groups in society. This allows us to see in more detail how individuals move in the income distribution over time, which in turn can help in designing more effective policies to reduce poverty.

Considering the behavior of poverty levels over the study period, there appears to be greater upward mobility. As many as 20% of the population got out of poverty in that period, while only 7% managed to get out of poverty in the following period. On the other hand, downward mobility was also the cause of a significant reduction in poverty, as well as the stagnation that occurred in the second period. It is important to note that only 1% of the population fell into poverty in the first period, while this figure increased to 2% in the second period. Additionally, it is worth noting that in the second period, the percentage of individuals who experienced displacement, both up and down, was smaller. This suggests a complex dynamic in income mobility over the period, with greater upward mobility at the start of the period, followed by increased downward mobility and stagnation in the later period. This analysis can provide valuable insights into the factors that influence poverty and income mobility, which can be used to design more effective policies in reducing poverty and improving societal well-being. By understanding the dynamics of income mobility, policies can be more targeted and have a greater impact on improving the socio-economic conditions of society.

An analysis of poverty mobility between the two periods shows differences in mobility patterns. Although the proportion of households remaining poor in the first period is greater, the probability of individuals escaping poverty is lower in the second period. Different economic conditions between the two periods may influence individuals' chances of escaping poverty. Thus, the lower mobility in the second period and the greater proportion of households remaining in poverty in the first period may be related to the poverty levels of each period. Therefore, the transition probability depends on the initial poverty status. Although the proportion of households remaining poor in the first period is greater than in the second period, the probability of remaining poor in the first period is lower than expected. Of the poor, 60% have the possibility of remaining so. In other words, the probability of escaping poverty is 50%, 6% points lower than the probability of leaving impoverishment. This analysis offers a comprehensive understanding of the dynamics of poverty and income mobility, enabling the development of more effective policies aimed at reducing poverty and enhancing community welfare. By understanding these mobility patterns, policies can be more targeted and have a greater impact on improving the socio-economic conditions of society.

While the low probability of escaping poverty may explain the stagnation in poverty reduction rates, the likely entry of the non-poor at the start of this period tells, albeit on a smaller scale, a similar story. The probability of entering poverty for individuals who were not poor in the early years of the period is higher. As many as 2% of individuals who were not poor. This suggests additional pressure on non-poor groups at the start of the period, which may explain why poverty reduction has stagnated despite efforts to increase outward mobility. poverty. Factors such as rising costs of living, economic uncertainty, or changes in employment structures may contribute to an increased risk of entering poverty for previously non-poor groups. This analysis highlights the importance of understanding income mobility from multiple perspectives, including exiting and entering poverty, to gain a more comprehensive understanding of poverty dynamics and the factors that influence them. Thus, this understanding can help design policies that are more effective in overcoming the problem of poverty and improving community welfare.

The data shows rates of entry into and exit from poverty from year to year for the individuals surveyed. The first thing to observe is that, in both periods, the entry rate increased and the exit rate decreased, although the exit rate was always higher than the entry rate. This is the reason for the decrease in poverty rates. However, the average gap between entry and exit rates in the second period was significantly lower than in the first period, which contributed to a smaller decline in poverty rates. In the case of these rates, the data shows that the average entry rate does not differ between the two periods, but the exit rate does differ significantly. The average entry rates in the first and second periods were 4.5% and 4%, respectively, while the exit rates were almost half that. The exit rate increased from 6% to 1.5%. This shows that there are different dynamics in income mobility between the two periods. Although the entry rate was relatively stable, a significant decline in the exit rate contributed to a slower decline in poverty in the second period. This analysis can provide valuable insights into the factors that influence poverty and income mobility, which can be used to design more effective policies in reducing poverty and improving societal well-being.

An analysis of poverty mobility in the long term highlights the importance of considering long-term dynamics in efforts to reduce poverty. Of the total number of poor people, it appears that 40% remained in poverty throughout the first four years of the period studied. This proportion then fell to 30% in the second period, indicating a change in poverty mobility from the short term to the long term between the two periods. Furthermore, analyzing the dynamics between the two years reveals a difference in the proportion of initially impoverished individuals during the four years. This indicates a difference in the pattern of poverty mobility between the two periods, where there is a higher conditional probability for the poor to remain poor. This analysis offers significant insights into the long-term factors influencing poverty mobility, enabling the development of more effective policies to combat persistent poverty. Thus, a better understanding of long-term poverty dynamics can help design more effective programs to fight persistent poverty.

Although the aim of this study was not specifically to analyze chronic poverty, it is important to note that in the second period of the study, this type of poverty remained high, although lower than in the first period. More than a quarter of the poor population at the beginning of the period did not succeed in getting out of poverty. The proportion of poor people at the beginning of the period who had only lived in poverty for one year had a higher poverty rate, but this proportion did not differ significantly from the first period. However, the number of individuals who experienced poverty for two or three years was greater in the second period than in the first period. While 50% of individuals were in poverty for two or three years, only 45% were in a similar situation in the first period. This shows that, although there has been a reduction in chronic types of poverty, there are still challenges in overcoming sustainable poverty. This analysis provides a more complete picture of income mobility and poverty, which can provide a basis for designing more effective policies to address persistent poverty.

Conversely, individuals who were not poor at the beginning of the period may fall into poverty. The number of years spent in poverty for individuals with incomes above the poverty line depends on the period in question. At the start of the first and second periods, respectively, 96% and 97% of this group had never experienced poverty. Although smaller, these percentages are not significantly different and reflect the lack of downward mobility recorded in both periods. Given these results, subsequent analyses will focus only on individuals experiencing poverty at the start of each period. It shows the proportion of individuals who were poor at the start of the period and whether they were in poverty sequentially or temporarily. This analysis reveals that during this period, poverty tends to be a continuous condition, whereas, most individuals experience poverty only temporarily. 30% of poor individuals remained in poverty continuously, while 20% experienced temporary poverty. However, the proportion of initially poor individuals who were successively in poverty fell to 17%, while transient poverty reached 37% of the poor population at the start of the period.

Analysis of individuals who emerged from poverty in subsequent years shows that some of them fell back into poverty. The odds of reentering and living in poverty more than doubled. This suggests that, although at the start of the period there was a greater proportion of individuals who spent four years in poverty without successfully escaping, those who managed to escape poverty had a lower chance of returning to poverty. This explains the

decline in poverty levels in that period, as well as why poverty reduction slowed, as individuals who emerged from poverty quickly returned to poverty in greater proportions. This analysis shows the importance of not only focusing on efforts to lift individuals out of poverty but also paying attention to steps that can prevent them from falling back into poverty. This may include programs that help individuals maintain a more stable economic position after emerging from poverty, such as access to education, job training, or ongoing financial assistance.

## 4. Conclusion

Analysis involving more than two years is important to understand poverty dynamics more comprehensively. In this case, analysis considering the entire period suggests that the stagnation in poverty reduction is due to lower exit rates from poverty, not just entry. This shows that the main factor influencing stagnation is the difficulty of leaving poverty, not the problem of getting into poverty. In addition, analyses that consider the entire period also provide different results regarding the level of permanence in poverty. This shows the importance of looking at income dynamics over a longer period of time to gain a better understanding of the problem of poverty. Synthetic panel analysis shows that the individuals who move out of poverty are those who were poor at the start of each period studied, not those who already had incomes above the poverty line. This indicates that individuals who began the period in poor conditions primarily drive mobility out of poverty. In addition, these results also show that the proportion of individuals who experience poverty in a shorter period of time is greater than that of those who experience poverty for four years. This shows that, although there is mobility out of poverty, many individuals experience poverty only temporarily, not over a longer period of time. The analysis shows changes in poverty dynamics between the two periods studied. Successive poverty dominates, meaning that individuals who fall into poverty tend to remain poor over that period. However, the predominance is shifting towards transient poverty, where individuals experience poverty for shorter periods of time, moving in and out of poverty within that period. This shows that the second period had greater dynamics in terms of mobility in and out of poverty. Individuals tend to experience poverty temporarily, exiting, and then reentering at certain times during the period. The probability of re-entering poverty and remaining poor at the end of the period was higher, indicating greater economic instability during the period. This summary describes the three main contributions of this work. First, this work helps understand stagnation in poverty alleviation through a dynamic analysis of intra-generational mobility. Second, this work identifies individuals moving in and out of poverty by creating several synthetic panels. Finally, this paper adds to the body of research on synthetic panels by proving the method and finding the upper and lower bounds for mobility, as well as the inter-residual correlation coefficients of the models found in both rounds. Other research in countries with similar welfare structures can utilize these findings.

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