

REGIONAL ANALYSIS OF POVERTY LINE BASED ON INCOME USING PURCHASING POWER PARITY THROUGH STATISTICAL METHODS: AN EXAMPLE OF TURKEY FOR THE YEARS 2014-2021

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Abstract – Purchasing power and the poverty line are different concepts, however, they are interrelated subjects. A comparison of purchasing power and the poverty line for Turkey can be made using statistical methods. The data used in this study are based on the Income and Living Conditions Survey, which was initiated by the Turkish Statistical Institute in 2006, and stratified, multistage, and cluster sampling methods, which are probability sampling methods, were used when collecting these data. The study initially examined the changes in the number of poor people and the poverty line, based on the fixed index method, taking 2014 as the base year, for the years 2014-2021. Subsequently, changes in the number of poor people and the poverty line were calculated for the same years using the variable index method. As the method used is based on the logic of the variable basis, the results were obtained by considering each calculated year as the base compared to the previous year. The findings obtained related to the considered period were presented with the help of graphs and tables.

Keywords – Poverty Line, Income, Purchasing Power, Türkiye, Statistical Analysis

I. INTRODUCTION

Purchasing power parity is a measure of the differences in price levels internationally and these differences indicate how valuable the currencies of different countries are to each other. Purchasing power parity takes into account not only the currency exchange rates between two countries but also the differences in the prices of goods and services between countries. Therefore, this parity helps to measure more accurately the trade in goods and services between countries based on mutual advantage. Many studies have been conducted on this parity, which includes many economic and economic concepts (Alba and Park, 2005; Büyükkantarıcı and Kula, 2019; Kumar Narayan, 2005). On the other hand, purchasing power parity is a method used to measure a country's purchasing power, and when a country's currency has purchasing power against other countries'

currencies, that country's currency is considered to have high value. For example, when a country's national income is measured with the purchasing power parity exchange rate, the real level of that country's economy can be measured more accurately. Many studies have been conducted comparing the purchasing power parities of countries (Dinç, 2019; Kasem and Al-Gasaymeh, 2022; Cuestas, 2013).

Furthermore, this parity is a method used to compare the prices of the same goods or services in different countries. In this respect, it reveals the differences between the prices in the domestic market of a country and the prices in the domestic markets of other countries. For example, the price of a mobile phone in one country may be higher or lower compared to the price of the same mobile phone in another country. These price differences

are taken into account in purchasing power parity calculations and help to measure the trade in goods and services between countries more accurately. In conclusion, purchasing power parity is a concept used to calculate price differences between countries and plays an important role in many areas such as international trade, investment, and macroeconomic policies. Also, it is used to measure the economic power of countries and is taken into account when making international financial decisions. On the other hand, these parity calculations also play an important role in determining the volumes of trade and investment between countries (Özkan, 2013; Nazlıoğlu et al., 2017).

In the broadest sense, poverty is defined as whether individuals have the resources (such as food, water, clothing, housing, health services, and security) and income necessary to sustain their lives (Oktik, 2008). Affecting many societies since past centuries, poverty has become a problem not only for underdeveloped countries or societies, but also for those referred to as developed. The concept of poverty is a broad and comprehensive concept that is dealt with not only in economic dimensions but also cultural, political, legal, ethnic dimensions. Since poverty is a complex concept when considered in all its dimensions, all definitions made remain insufficient. Therefore, the definition, causes, types of poverty, and methods of combating poverty can vary. Many concepts such as the development level of countries, social structure, and human characteristics affect the definition of poverty. The fact that the problem of poverty includes so many parameters and has turned into a global problem recently, many qualitative and quantitative researches have been conducted on this issue in recent years (Aydın, 2011; Atilla, 2020; Türk and Ünlü, 2016).

The poverty line, on the other hand, is the minimum level of income or consumption needed to meet the basic needs of an individual or family. The poverty line can vary depending on the cost of living and household size in a country. The poverty line is used to determine whether people have enough income to meet their basic needs to lead a healthy life. These basic needs include items such as food, housing, clothing, education, health services, and transportation.

The poverty line is scientifically determined and is usually calculated taking into account a country's national income level. In many countries, the poverty line is calculated based on household consumption expenditures. Accordingly, the poverty line is determined by calculating the cost of minimum food and other basic consumption items in a certain region of the country. There is a lot of research in the field literature related to this topic (Taş and Özcan, 2012; Yücel, 2017).

However, since the methods used to calculate the poverty line vary, it is not possible to make a direct comparison between purchasing power and the poverty line. Also, since poverty line calculations are made considering a certain household size and composition, it varies among different households.

In summary, there is a relationship between purchasing power and the poverty line in Turkey, and purchasing power parity calculations can be used as a data source to have an idea about the poverty line. However, since poverty line calculations are made using different methods, a direct comparison cannot be made (Özçelik, 2013; Memiş, 2014).

II. MATERIALS AND METHOD

The Income and Living Conditions Survey implemented by the Turkish Statistical Institute since 2006 serves as a significant data source for understanding income distribution and living conditions in Turkey. The research is conducted on a sample that represents 28064 households. Stratified, multi-stage, and cluster sampling techniques, which are probabilistic sampling methods, have been utilized during this sampling process.

In this research, the poverty line is defined as 50% of the median income per equivalent individual. This represents the minimum income level necessary for an individual or a household to maintain their livelihood. Individuals or households falling below this threshold are considered poor. The number of poor individuals is determined as the number of people falling below this median value.

Indexes are statistical tools that indicate the proportional changes in an event over a specific time frame or within spatial limits. Their ability to express simple or complex events in percentage terms makes indexes a powerful analysis tool.

Percentage changes are usually used to understand and interpret the size or impact of an event. Thus, indexes are often preferred in the examination of economic and social phenomena. Specifically, they are widely used to measure and compare changes in economic indicators over time.

A. Fixed and Variable Base Index

This refers to an index obtained by dividing the price, quantity, or value of a single item (product~good~service) for a certain period by the price, quantity, or value for a base period that has been taken as a reference, and then multiplying it by 100. In the calculations, the average of one or more years can be used as the base (reference) period. For ease of calculation, the prices are assumed to be unchanged for any given period. If this assumption cannot be made, an appropriate average price for the given time is taken (Akdeniz, 1984).

p_0 represents the base period of the item, while p_n represents the prices corresponding to a given period for the item, so we have

$$Fixed\ Base\ Index = \frac{p_0}{p_n} \times 100.$$

The variable base index, unlike the fixed base index, calculates the change each year by comparing it to the previous year. In the fixed base index, one year is considered as the starting value, while in the variable base index, there is no fixed year. It changes continuously as the previous year. The calculation method is given in the formula below.

$$Variable\ Base\ Index = \frac{p_i}{p_{i+1}} \times 100$$

III. RESULTS

The data of this study covers the years between 2014 and 2021. These data were compiled taking into account the purchasing power parity. All of the data used in the study were obtained from the official site of the Turkish Statistical Institute.

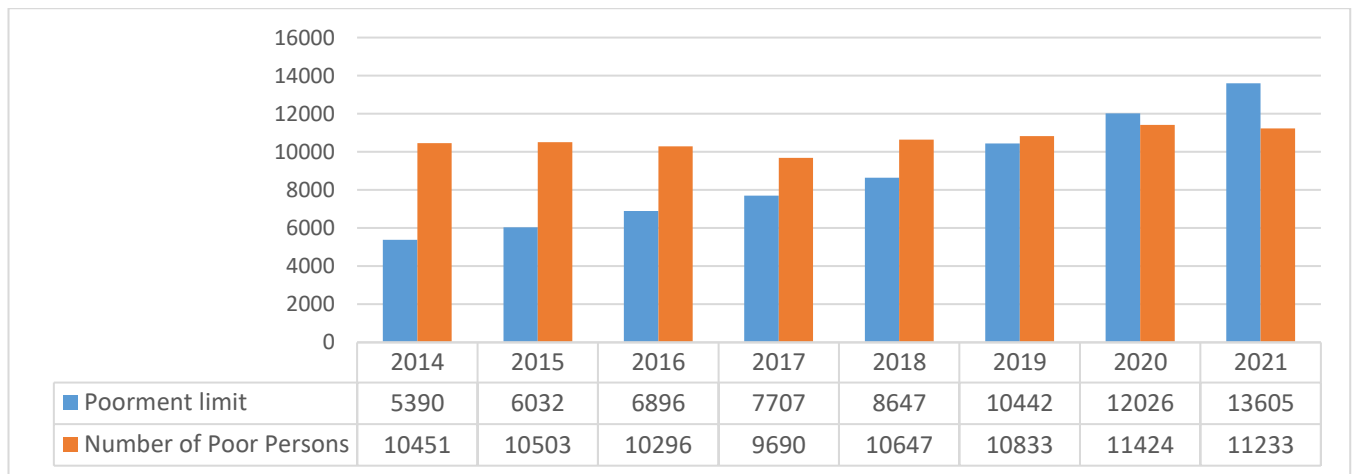


Fig 1. Poverty line and number of poor individuals over the years

According to Figure 1, the poverty line (TL) and the number of poor individuals (x1000 people) are presented for the years between 2014 and 2021. According to the mentioned graph, the poverty line was determined as 5390 TL in 2014 while the total number of poor individuals was identified as 10451. Similarly, in 2019, the poverty line almost doubled, being determined as 10442 TL, and the number of poor individuals was identified as 10833. In 2021,

the poverty line was set at 13605 TL while the number of poor individuals was identified as 11233. Other years are included in the related graph. When the mentioned graph is evaluated in a general sense, while there isn't much variability in the number of poor individuals, it is observed that the determined poverty line is more than twice as much in 2021 compared to 2014.

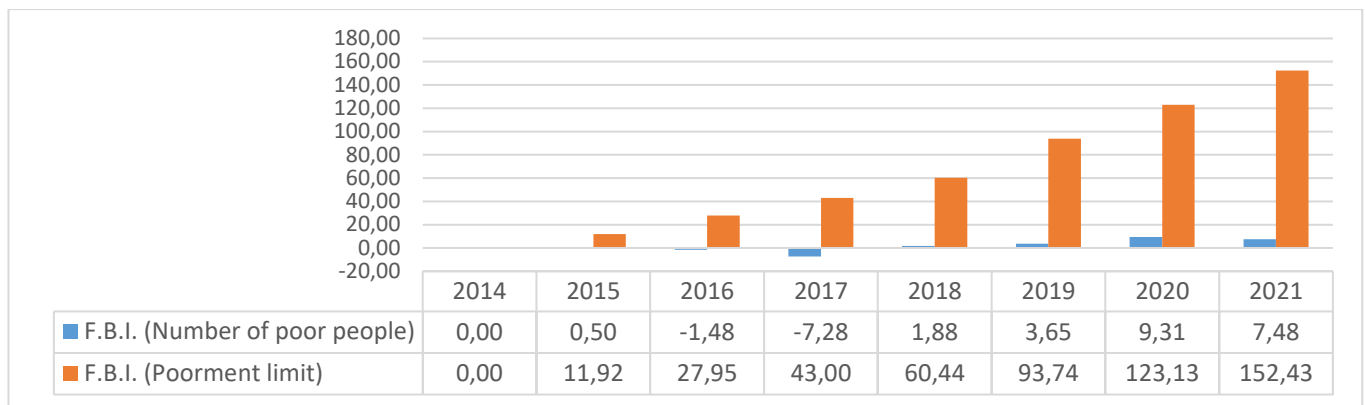


Fig 2. Comparison of the number of poor individuals and poverty line over the years calculated with fixed base index

According to Figure 2, between the years 2014-2021, the changes in the number of poor individuals and the poverty line were demonstrated using the fixed-base index method, with 2014 as the base year. According to the mentioned graph, as 2014 is considered constant, the starting value is zero. When it comes to 2015, the change in the number of poor individuals is approximately 12%. That is, the poverty line in 2015 has increased by 12% compared to 2014. The number of poor individuals has increased by 0.5%. This situation has been negative in 2016 and 2017. That is, compared to 2014, the number of poor individuals decreased by 1.48% and 7.28% respectively in 2016 and 2017. The poverty line in the same years, however, has

moved in a positive direction. That is, it has been determined that there was an increase of 27.95% and 43% compared to 2014 in 2016 and 2017 respectively. In the following years, both the number of poor individuals and the poverty line have been seen to increase compared to 2014. For example, in 2021, while the poverty line showed an increase of 152.43% compared to 2014, the number of poor individuals also increased by 7.48% compared to 2014. When evaluated generally, while the poverty line increased in 2016 and 2017, the number of poor individuals decreased compared to 2014. However, in the remaining years, the situation has been the opposite.

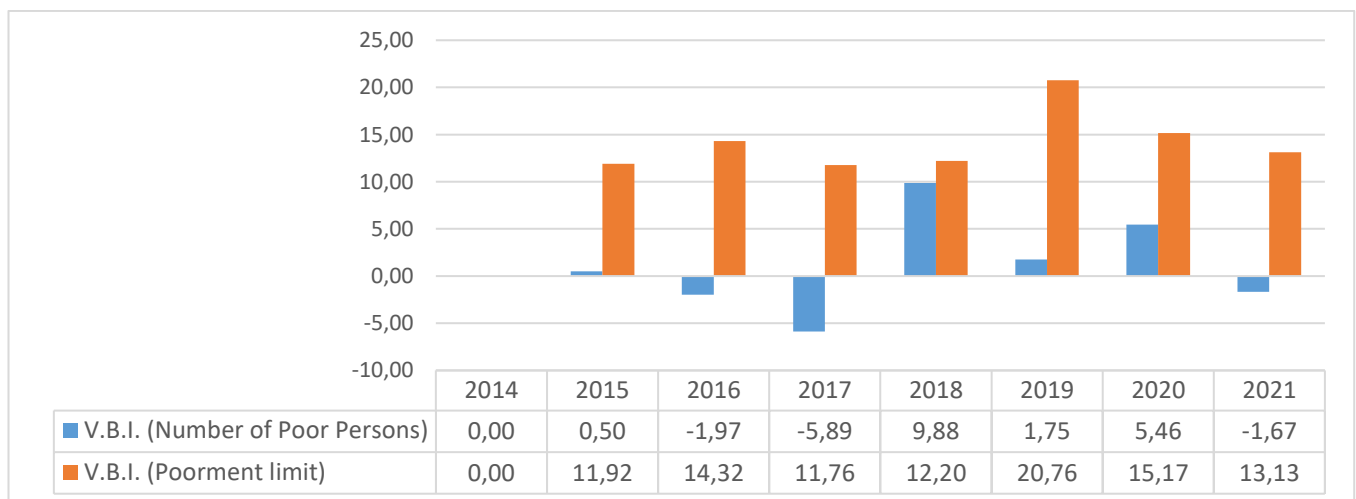


Fig 3. Comparison of the number of poor individuals and poverty line over the years calculated with chain base index

According to Figure 3, changes in the number of poor individuals and the poverty line were demonstrated for the years 2014-2021 using the chain-based index method. According to the graph, the base year is 2014, therefore the starting value is zero. As the calculation is based on the chain-based

index principle, each year is calculated in comparison to the previous one. Therefore, in 2016, the number of poor individuals decreased by 1.97% compared to 2015. On the other hand, the poverty line increased by 14.32%. Similarly, in 2017, the number of poor people decreased by 5.89%

compared to 2016, while the poverty line increased by 11.76%. The positive progression seen in 2016 and 2017 followed a negative trend in 2018, 2019 and 2020. However, in 2021, the number of poor individuals decreased by 1.67% compared to 2020, while the poverty line increased by 13.13%. Thus, the positive trend seen in 2016 and 2017 was also observed in 2021.

IV. DISCUSSION

The evaluation of the poverty line and the number of poor people in Turkey between the years of 2014-2021 provides significant findings. Based on the information in Figure 1, it can be observed that there hasn't been much change in the number of poor people, but it has been determined that the set poverty line is more than double in 2021 compared to 2014. This situation shows the general inflation and the increase in the cost of living in the economy, and it reveals the various aspects of poverty and the impact of general economic conditions on poor individuals and families.

The fixed and chain-based index methods in Figures 2 and 3 provide a more in-depth analysis. In particular, the separate evaluation of the poverty line and the number of poor people reveals the complex effect of economic variables and policies on poverty. While the poverty line has increased each year compared to 2014, the number of poor people has decreased in some years (2016 and 2017) and increased in others (2018-2021). These findings indicate that the relationship between poverty rates and the poverty line is not a simple correlation, but rather has complex dynamics under the influence of economic and social policies, economic conditions, and perhaps social assistance programs.

V. CONCLUSION

In conclusion, this analysis provides a comprehensive view of the situation of poverty in Turkey. We see that the poverty line has continuously increased during the period of 2014-2021, but the number of poor people has decreased in some years and increased in others. This reveals the importance of large-scale and multi-faceted strategies in combating poverty. Moreover, investigating the reasons underlying the stability of the number of poor people despite the rapid increase in the poverty line could be addressed as another research question.

REFERENCES

- [1] Alba, J. D., and Park, D., (2005). An empirical investigation of purchasing power parity (PPP) for Turkey. *Journal of Policy Modeling*, 27(8), 989-1000.
- [2] Akdeniz, F. 1984, "İstatistik ve Olasılık", Ankara Üni. Fen Fak. Yayını No: 138, Ankara.
- [3] Aydın, K., and Güloğlu, T. (2011). Türkiye'de Nispi Yoksulluğun Sosyo-Ekonomik Analizi. In *Journal of Social Policy Conferences*, No.60, 89-118.
- [4] Atilla, Ü., (2020). Türkiye'nin Dezavantajlı Bölgelerinde Yoksulluk Olgusu. *The Journal of Social Science*, 4(7), 394-405.
- [5] Büyükkantarıcı Tolga, S. and Kula, F., (2019). Purchasing Power Parity Testing Unit Root Tests With Structural Break in Turkey. *Revista Economica*, 71(1).
- [6] Cuestas, J. C., and Regis, P. J., (2013). Purchasing power parity in OECD countries: Nonlinear unit root tests revisited. *Economic Modelling*, 32, 343-346.
- [7] Dinç, M., (2019). Testing Purchasing Power Parity For D-8 Countries. *Perspectives on Applied Economics and Politics: Cases from Turkey*, 33.
- [8] Frankel, J. A., and Rose, A. K., (1996). A panel project on purchasing power parity: mean reversion within and between countries. *Journal of International Economics*, 40(1-2), 209-224.
- [9] Kasem, J., and Al-Gasaymeh, A., (2022). a Cointegration Analysis for the Validity of Purchasing Power Parity: Evidence From Middle East Countries. *International Journal of Technology, Innovation and Management (IJTIM)*, 2(1).
- [10] Kumar Narayan, P., (2005). New evidence on purchasing power parity from 17 OECD countries. *Applied Economics*, 37(9), 1063-1071.
- [11] Kuş, A.Ş., (2019). Dünya Bankası'nın yoksulluk ve açlıkla mücadeledeki rolü, etkisi ve Türkiye örneği (Master's thesis, İstanbul Gelişim Üniversitesi Sosyal Bilimler Enstitüsü).
- [12] Memiş, H., (2014). Küreselleşme ve yoksulluk ilişkisi. *Akademik Yaklaşımlar Dergisi*, 5(1), 144-161.
- [13] Nazlıoğlu, Ş., Karul, Ç., Koncak, A., and Küçükkaplan, İ. (2017). On the purchasing power parity in Turkey: The Role of Structural Changes. In *International Conference on Eurasian Economies*, 32-35.
- [14] Oktik, N., (2008). Türkiye'de Yoksulluk Çalışmaları, İzmir: Yakın Kitabevi.
- [15] Özçelik, P. K., (2013). Neoliberal Küreselleşme Süreci ve Yoksulluk. *Sosyal ve Beşeri Bilimler Dergisi*, 5(2), 417-431.
- [16] Özkan, F., (2013). Comparing the forecasting performance of neural network and purchasing power parity: The case of Turkey. *Economic Modelling*, 31, 752-758.
- [17] Taş, H. Y., and Özcan, S., (2012). Türkiye'de ve Dünya'da yoksulluk üzerine bir araştırma. In *International Conference on Eurasian Economies (Vol. 423, p. 430)*.
- [18] Türk, T., and Ünlü, H., (2016). Yoksullukla Mücadele Politikaları: 2000 Sonrası Türkiye Örneği. *Süleyman Demirel Üniversitesi Vizyoner Dergisi*, 7(14), 92-104.

- [19] Yücel, C., (2017). Yoksulluk, yerel ve küresel eşitsizlikler. Elektronik Sosyal Bilimler Dergisi, 16(63), 1111-1126.
- [20] <https://data.tuik.gov.tr/Kategori/GetKategori?p=Gelir,-Yasam,-Tuketim-ve-Yoksulluk-107>