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Participation of under-18-year-olds in the Private Pension System in Turkey: A Growth Estimation

Türkiye'de 18 Yaş Altındakilerin Bireysel Emeklilik Sistemine Katılımı: Bir Büyüme Tahmini

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ABSTRACT

While the private pension system in Turkey reached 14.5 million participants and 433.4 billion TL ($26.2 bn) assets by the end of 2022, the ratio of assets to GDP is only around 3%. The main reasons for the low asset/GDP ratio are the limited contributions and the low average seniority of contract. In 2021, Turkey implemented a regulation that allowed the participation of under-18-year-olds in private pension plans. The main purpose of the regulation was to increase the coverage rate of the system and to get people to save for longer. Although the regulation enabled the number of participants to increase in the short term, its long-term effects on private pension assets are uncertain. The aim of the study is to measure the effect of the participation of under-18-year-olds on private pension assets in Turkey. The univariate time series method was used to predict the growth of the private pension system in Turkey for the next ten years. The prediction relied on the data of the private pension system's asset size, annual net annual contribution, growth rate, and rate of return between 2003 and 2021 in Turkey. The results showed that by the end of 10 years, the assets of under-18-year-olds would account for 7% of the total private pension assets and that 22% of the annual contribution would be paid by under-18-year-olds.

Keywords: Private pension in Turkey, under-18-year-olds private pension, pension asset forecast, univariate time series
Jel Code: J32, J26, E27

ÖZ

Türkiye'de bireysel emeklilik sistemi, 2022 yıl sonu itibariyle 14.5 milyon katılımcıya ve 433.4 milyar TL'lik (26.2 milyar dolar) fon büyüklüğüne ulaşırken, fon varlıklarının GSYH'ye oranı yalnızca %3 civarındadır.

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Varlık/GSYH oranının düşük olmasının ana nedenleri, katılımcıların ödedikleri katkı payının ve sistemde geçirdikleri sürenin düşük olmasıdır. Türkiye, 2021 yılında 18 yaş altındakilerin bireysel emeklilik planlarına katılımını sağlayan bir düzenlemeyi hayata geçirmiştir. Düzenlemenin temel amacı, sistemin kapsama oranını artırmak ve insanların daha uzun süre tasarruf etmesini sağlamaktır. Düzenleme kısa vadede katılımcı sayısının artmasını sağlamışsa da bireysel emeklilik fon varlıkları üzerindeki uzun vadeli etkileri belirsizdir. Çalışmanın amacı, Türkiye'de 18 yaş altındakilerin bireysel emeklilik sistemine katılımının fon varlıkları üzerindeki etkisini ölçmektir. Türkiye'de bireysel emeklilik sisteminin gelecek on yıldaki büyümesini tahmin etmek için tek değişkenli zaman serisi yöntemi kullanılmıştır. Fon büyüklüğü tahmin edilirken, Türkiye'de bireysel emeklilik sisteminin 2003 – 2021 yılları arasındaki fon büyüklüğü, yıllık net katkı payı tutarı, büyüme hızı ve getiri oranı verilerinden yararlanılmıştır. Sonuçlar, önümüzdeki on yılın sonunda, 18 yaş altı katılımcıların varlıklarının toplam varlıkların %7'sini oluşturacağını ve yıllık net katkı payının %22'sinin 18 yaş altındakiler tarafından ödeneceğini göstermektedir.

Anahtar Kelimeler: Türkiye'de bireysel emeklilik, 18 yaş altı bireysel emeklilik, emeklilik fon büyüklüğü tahmini, tek değişkenli zaman serisi

Jel Kodları: J32, J26, E27

1. Introduction

Over the last few decades, declining fertility rates and increasing life expectancy have put significant pressure on public pension systems. The world's demographic transformation trend has resulted in the increasing need for shared resources for financing social security systems in developed and developing countries (Clements et al., 2018). The increase in public expenditures will bring reform needs such as reducing the benefits of public pension systems or increasing the retirement age. As a result, people, who have just joined the workforce, need to work much longer and save more to achieve welfare, like today's retirees (Amaglobeli et al., 2019).

Private pension, which is complementary to public pension systems, plays a vital role in increasing the national savings level and compensating for the welfare that has decreased during the retirement period. By the end of 2020, private pension plans worldwide reached an asset size of $56 trillion. Countries such as the USA, Canada, and the Netherlands have high coverage rates and assets relative to their GDP. In other countries, such as Turkey, Greece, and Hungary, coverage rates and assets are limited, even though private pension plans have been used for a long time (OECD, 2021).

Turkey's private pension system (BES) reached 14.5 million participants and 433.4 billion TL ($26.2 bn) assets by the end of 2022 (PMC, 2023a). BES was positioned as complementary to the public pension in Turkey; consequently, individual plans were initiated in 2003, and occupational plans were introduced in 2015 (IPRSA, 2022). Although the number of participants in BES has reached a considerably big size, the ratio of assets to GDP is only around 3%. The main reasons for the low asset/GDP ratio are the limited contributions and the low contract terms of the participants. The average seniority of contracts is 4.9 years for active participants and 11.4 years for retirees. Considering that the retirement age is 56 in BES and life expectancy after retirement is 30.9 years, it can be understood that BES savings are not high enough to increase welfare in the retirement period (PMC, 2023b; TURKSTAT; 2020).

The Turkey Insurance and Private Pensions Regulation and Supervision Agency (IPRSA) implemented a regulation in 2021, enabling under-18-year-olds to participate in individual private pension plans. Thus, 23 million children were included in the target group of the system. At the end of one and a half years, over 590 thousand participants under 18 joined BES. This is approximately 66% of the increase in total participants in the same period. The average age of the participants who are under 18 years old in BES is 7.3, indicating that parents perceive 'BES for under-18-year-olds' as an investment tool rather than a pension system where they use it to save for the future needs of their children (PMC, 2023c). Even

though this approach is not in line with the general philosophy of private pensions, it appears to have a practical contribution to the financial results of the system.

Although the BES regulation for under-18-year-olds significantly impacts the number of participant growths, growthism and long-term effects on assets are uncertain. The study will estimate the long-term effects of the pension regulation for under-18-year-olds on private pension assets. This study differs from its predecessor, as no study in the literature measures the impact of the participation of under-18-year-olds in a private pension system. In this context, the aim of the study is to measure the effect of the participation of under-18-year-olds on private pension assets in Turkey.

2. Literature Review

Forecasts for the future of private pension systems are generally made to estimate potential assets or participants that the system can reach in a specific term or measure the effects of the reform initiated in the pension system. The early study of forecasting private pensions was conducted to estimate the size of personal pension assets in ten years in the USA. The time series forecasting method was used in the study, and annual contributions and return rates were taken as growth indicators (Smirlock, 1980). Härdle and Mysickova (2009) used a time series model with demographic restriction to describe immigration, mortality, and fertility rates in Germany. Then, they used these models to simulate the future levels of the public pension premium in order to maintain the actual pension level. They estimated that the old age ratio would be doubled and that the premium level would be raised by 50% in 2050. In another recent study, Maccioni and Bitinas (2013) estimated the impact of the private pension reform on the Lithuanian pension system. They argued that the reform would allow the system to close its budget deficits in the long run. Tomaš (2020) used stochastic forecasting methods to analyze the financial sustainability of the Croatian pension system after the new reform adopted in 2019. Three alternative scenarios were analyzed according to the competitiveness of the second pillar of the pension system. Only the third scenario, which assumed that the pension system was financed 75% by the first pillar and 25% by the second pillar, demonstrated that the country's pension system would be financially sustainable by 2060.

Forecasts in the relevant field in Turkey started after 2003 when the private pension system was initiated as the third leg of the public pension system (Zor & Aslanoğlu, 2005; Müminoğlu & Teker, 2005; Elveren & Hsu, 2007; Bayrakçı & Aksoy, 2019). In one of the early studies, Zor and Aslanoğlu (2005) used time series regression analysis to estimate the private pension contribution amount in the future using 49 weeks of existing contribution data. Müminoğlu and Teker (2005) estimated the future assets of the private pension system

in Turkey using the time series method and the historical data of Chile and Mexico. Bayrakçı and Aksoy (2019) made a four-year forecast for PPS's future performance using the gray estimation method and several participants and contribution amount indicators. Elveren and Hsu (2007) made a forecast on assets and the monthly pension amount according to the gender gap in the private pension system in Turkey. They estimated that women would have significantly lower assets and pensions than men.

In the literature, there are also studies on the macro and micro economic determinants of the performance of the private pension system in Turkey (Kılıç, 2014; Selim & Çelik, 2014; Açıkgöz, Uygurtürk & Korkmaz, 2015; Çemrek & Demir, 2021; Karataş & Dalkilic, 2022). Kılıç (2014) measured the effect of leading economic indicators in Turkey on the number of private pension participants using various statistical methods and found that the increase in household expenditures positively impacted the number of participants. In contrast, the increase in savings had a negative effect. Selim and Çelik (2014), in their panel data analysis study on the private pension asset sizes of 32 OECD countries, including Turkey, found that the increase in household expenditures negatively affected the extent of private pension assets. According to these two studies, the study conducted on OECD countries differs from the study specific to Turkey. Acıkgöz et al. (2015) analyzed the relationship between the growth rate of pension assets and the number of participants, the actual rate of return, and the operating expense ratio. They showed that the variables other than the operating expense ratio had a significant relationship with the assets growth rate. Çemrek and Demir (2021) estimated the return performance of private pension assets in Turkey using the artificial neural network model and CPI, PPI, exchange rate, and gold rate indicators. Karataş and Dalkılıç (2022) applied causality analysis to examine the relationship between inflation and assets size and concluded that there was a bidirectional causality relationship between the variables.

In this context, the time series forecasting method, which is frequently used to estimate the future growth of private pension assets, will be applied in the research.

3. Methodology

We used linear and nonlinear financial time series to predict the growth of assets after under-18-year-olds were allowed to participate in a private pension in Turkey. More specifically, we calculated univariate time series by creating the function for forecasting the growth of the private pension assets in Turkey. The formula provided below was used for forecasting purposes (Baaquie, 2007):

$$TPA = IPA(1 + r)^T + \int C(1 + g)^t e^{r(T-t)} \tag{1}$$

TPA here shows the total pension assets in the private pension system. IPA is the initial value of the total assets in the private pension system in year one. In addition, r represents the average rate of return of pension assets in the years considered. t represents the beginning year, whereas T represents the last year. C is the annual net contributions in year one. Lastly, g is used for the growth rate of the annual net contribution.

In order to check for the appropriateness of the methods on how well the continuous income stream predicted the actual stream, we had to run a statistical test to show if there was a statistically significant difference between the two. Since there was not much data on the total assets, we compared the last ten years of TPA and our forecast for the same years. Wooolson (2007) explains that the Wilcoxon Ranked Sign Test is a non-parametric test to check differences for matched data with small sample sizes and matched paired data with independent samples. The main motivation beyond this choice was that our data did not have a normal distribution and a tiny sample size and that the variances were not equal. Thus, it did not meet the assumptions of parametric tests (e.g. t-test), and the non-parametric test could be accepted as a better alternative here.

Since the income stream is continuous within the current system, accumulating the total amount with an integral rather than a discrete summation method looked like a better choice for the sake of the recent study. We will present the results from the current forecast in the results section.

4. Results

We used the data from the private pension system in Turkey between the years 2003 and 2021(PMC, 2023c). Occupational plans were excluded from the data because they were not in the scope of the regulation for under-18-year-olds. Since we did not have much information on how the integration of under-18-year-olds would affect the whole system, we combined the calculations to forecast the system. We began with the analysis of the data on the overall growth rate of the private pension assets in the previous ten years (2012-2021) to predict how over-18-year-olds' pensions would grow. To ensure the operation of the continuous income stream model, we calculated the average $g=0.1594$ growth rate, and the associated rate of return with the same data was $r=0.17$. Then, to check the feasibility of the model, we ran a Wilcoxon Signed Rank test between the first ten years of the TPA and our forecast (Woolson, 2007). Our null hypothesis for this test (H_0) was that there was no statistically significant difference between the actual growth of TPA and our forecast. The alternative view (H_A) was that there was a substantial difference between the forecast and the real TPA growth.

Figure 1: Mean differences box plot between forecast and actual TPA
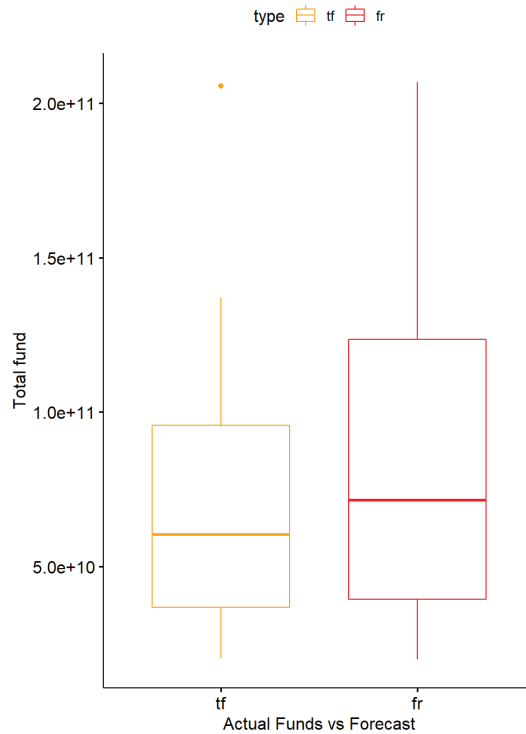

The results yielded a smaller rant total of W=56, with a significance level of p value=0.6787. This p-value was way over the rejection significance level of p=0.05. Thus, we failed to reject the null hypothesis. The main difference between the forecast and the actual TPA was very close (see boxplot, Figure 1), and it supported the result of the Wilcoxon Test. Moreover, the changes by years show different levels of deviations, and it became tough to explain by a linear model. When linear models are not enough to explain relationships for time series, nonlinear time series functions provide appropriate solutions (Kantz & Schreiber, 2003). Teraesvirta Neural Network Test for Nonlinearity (Teraevista, Lin & Granger, 1993) was used to determine if data looks linear or nonlinear. Results showed a p-value less than 0.01, which suggested using nonlinear time series. Hence, we showed the feasibility of the model; we also built the following graph showing the predictions of our model with the actual numbers between 2012 and 2021.

Graph 1: Comparison of the total assets vs. forecast (million TL)
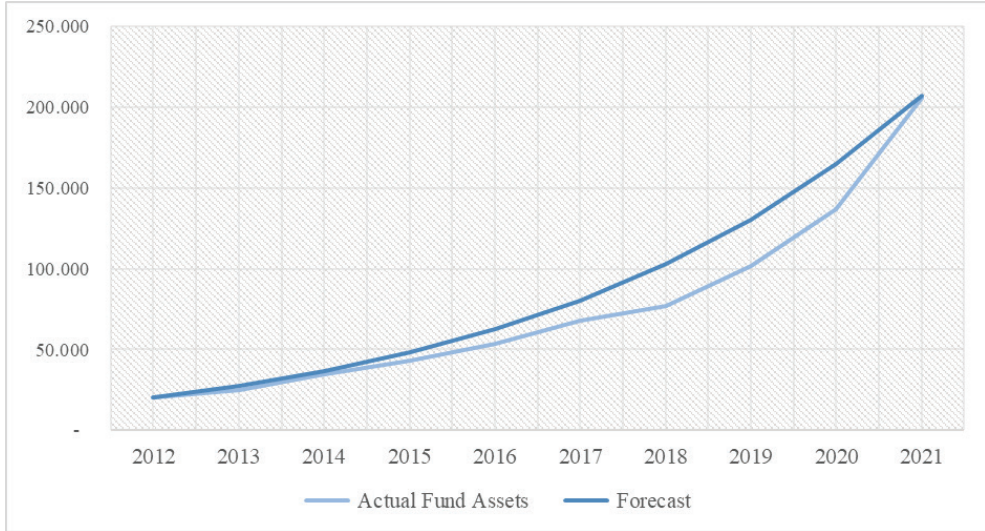
As seen from Graph 1, the substantial growth of the total assets aligned very closely with our forecast system. The absolute error of the integrand method (p-value) was statistically significant and lower than 0.01.

Using the current forecast system, we simulated the data about how it would be in the next ten years (2023-2032) for the individual private pension plan assets in Turkey. We separately calculated the under-18-year-olds and over-18-year-olds net worth in the system. We used another rate of return (r=0.37), which is the first ten-year annual growth rate of the private pension, to predict the growth of the under-18-year-olds assets. Then, the initial pension asset (IPA) and the net contributions in year 1 (C) were used to forecast the growth of under-18-year-olds in the system. We used the same return rate (r=0.17) for each portfolio. In Graph 2, we can see what it looked like:

Graph 2: 10-year growth prediction of individual private pension plan assets in Turkey (million TL)
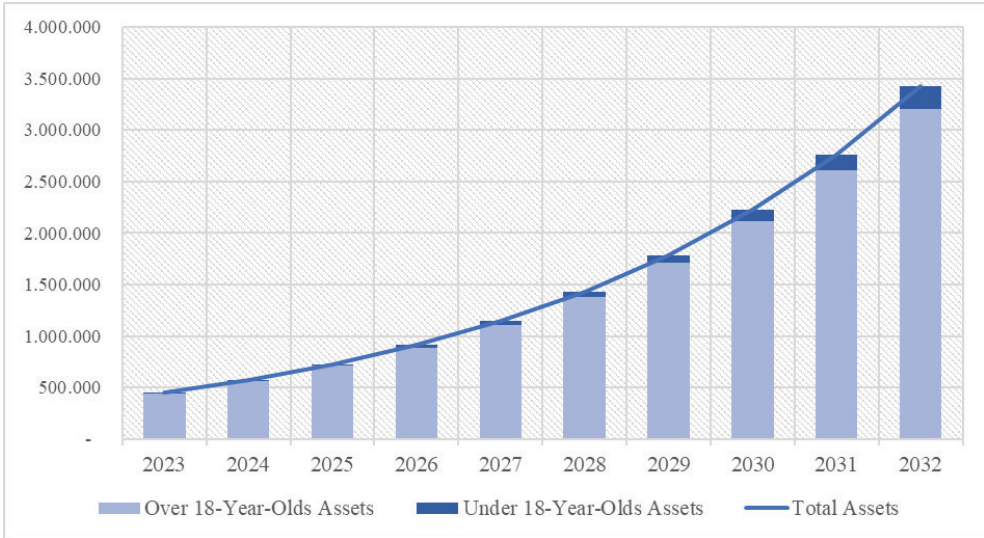
Our prediction showed that the individual private pension plans in Turkey would have a total asset value of 3,427,831 million TL by the end of the next ten years. It showed tremendous growth in the pension system by integrating under-18-year-olds.

Graph 3: 10-year growth prediction of under-18-year-olds' annual contribution and total assets (million TL)
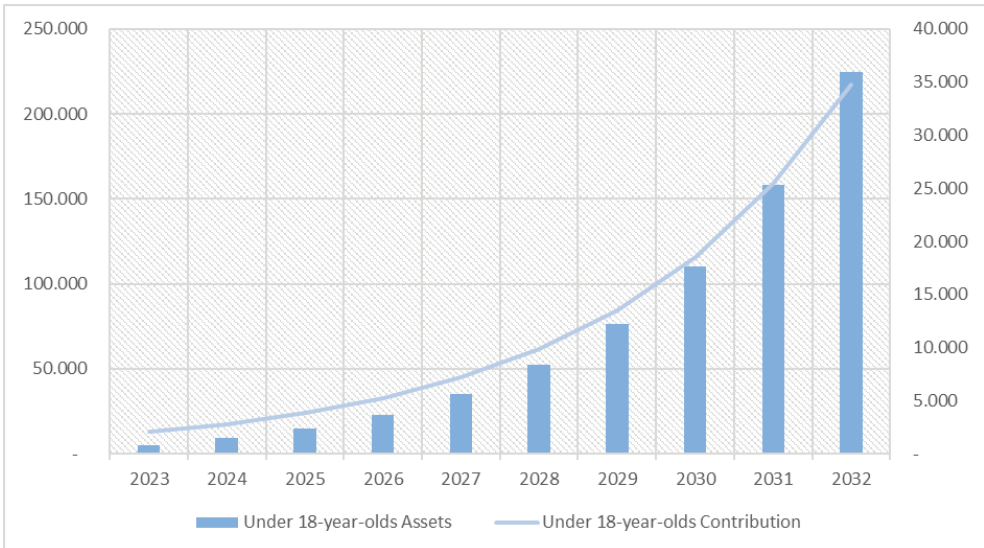
Our forecasting model predicted that by the end of the ten years, the assets of those under 18 years old would have a net worth of 225,012 million TL. This amount means that approximately 7% of the individual private pension plan assets would belong to those participants who are under 18 years old. Moreover, and more importantly, about 22% of the net annual contribution would be paid by under-18-year-olds.

5. Discussion

5.1. Conclusion

Many advanced and emerging economies are facing demographic changes with the aging population. This demographic change not only disrupts the active-passive balance of public pension systems but also depresses the private savings of households. Turkey could be shown advantageous among OECD countries with a relatively young population, but forecasts predict that this difference will close in the next forty years (OECD, 2021). In this respect, it is necessary to encourage private savings to decrease socio-economic risks and financial fragility in the country.

The private pension system in Turkey, which was initiated in 2003, has reached a significant coverage rate among the working population. However, the private pension asset size is relatively low when compared to the country's GDP. Limited contributions and the low average seniority of contracts stand out as the major problems of the system. To increase private pension assets, participants should be encouraged to save for a more extended period in the system. For this purpose, the pension regulation for under-18-year-olds was implemented in 2021, and more than 590 thousand children were included in private pension plans. Although under-18-year-olds participation is not a common practice in private pension systems, it is consistent with the systems' aim to encourage long-term savings.

In addition to the fact that the pension regulation for under-18-year-olds increases participation in the private pension system, its effect on the system's total assets is worth examining. Since this regulation allows the participation of a new population in the private pension, it is expected to support the asset growth of the system. In the study, the effect of the participation of those under 18 years old on the growth of private pension assets in Turkey was examined. The results showed that 7% of the individual private pension plan assets would belong to under-18-year-olds by the end of the next ten years. The results also indicated that 22% of the net annual contribution would be paid by under-18-year-olds. These two indicators support that under-18-year-olds' assets in the private pension system would continue to grow exponentially in the following years and make a significant contribution to the overall growth of the system. To the knowledge of the authors, there were not any studies in the literature that specifically measures the impacts of the

participation of under-18-year-olds in the private pension system. However, some researchers examined the effects of pension reforms on private pension assets. The findings of this particular study support results obtained by Tomaš (2020), Müminoğlu and Teker (2005), and Acıkgöz et al. (2015) in terms of the positive impact of an increase in the coverage rate, the number of participants, and the contribution rate on the total private pension assets.

5.2. Limitations and Future Research

This study has some limitations with respect to available data and forecasting conditions. The study relies on the data on the private pension system's asset size, net annual contribution amount, growth rate, and rate of return between 2003 and 2021 in Turkey. Although the under -18-year-olds private pension system started to be utilized in 2021, there was only limited data for six months in this year; hence, we decided to move forward with the whole year data of 2022. Since the data of those under 18 years old were limited to only one year, over-18-year-olds' historical data were used to forecast the growth. If under-18-year-olds behave differently in terms of saving and investment, this study could not measure this effect. Another limitation of the study is using limited indicators to forecast asset growth. In addition to the indicators considered in the study, more specific data, such as average contribution per participant, new contract growth rate, opt-out rate, and withdrawal pension amount, can be used to make more accurate predictions. Finally, the estimations for the private pension assets were not adjusted for inflation since there was no adequate forecast of the inflation rate over the next decade.

This study is a pioneering study with some limitations in terms of showing the effect of the participation of under-18-year-olds on private pension assets. We recommend that future research examine the participation of under-18-year-olds in the private pension system with a more comprehensive indicator set, different models, and a broader perspective. Consequently, the findings have practical implications for regularity authorities. Participation of under-18-year-olds in private pension is an important step but ensuring that they remain in the system for a long period of time is crucial. Regulatory authorities should implement incentives to ensure that those under 18 years old stay in the system until their retirement. This would not only support the coverage rate of the private pension in Turkey but also increase the pension replacement rate and the ratio of pension assets to GDP.

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