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Model Proposal for Investigating and Increasing The Social Security Administration's Premium Collection Revenue

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Abstract

This study is an attempt to analyze the insurance premium rate/load as a factor that influences the premium collection revenues for the Social Security Administration by using the Laffer curve logic and to identify the premium load that maximizes premium revenues and the improvement it would bring to the Administration.The monthly data for the period between October 2008 and December 2012 were used in the study. The results of the analysis revealed a significantly parabolic relationship between the Administration's premium revenues and insurance premium load, which is similar to the Laffer curve. The insurance premium rate that would maximize the Administration's premium revenues was found to be 39.6% and it was determined that an improvement amount of 9.4 billion TL would have been obtained for the premium revenues in 2012 if this rate had been applied.

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*Keywords:*Premium Rate, Premium Revenue, Earnings Based On Premium , The Laffer Curve.

1. Introduction

The Social Security Administration is one of Turkey's government agencies with the highest budget. Its 2012 budget of around 160 billion TL exceeds the sum of the budgets of 10 ministries of state. While insurance premiums constitute the main source of revenue for the agency, their greatest expense item includes pensions and health payments. So since the agency's revenues do not meet its expenditures, large sums are transferred to the Administration from government budget each year; in other words, the Administration's deficits are closed by

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treasury funds.

This fiscal deficit of the Administration is mainly caused by very high number of pensioners when compared to the number of the actively insured, informal employment or non-covered employment, under declaration of wages, late payment of insurance premiums, and corruption in the health sector. Under such circumstances, it is crucial to increase premium revenues in the long term or to reduce expenditures.

This study attempted to identify the premium rate/load that maximizes the premium revenues of the Social Security Administration and to calculate the amount of its contribution to the Administration's premium revenues if this rate is applied. The study is divided into two sections. The first section models the relationship between the Social Security Administration's premium revenues and premium rate; identifies the premium rate that maximizes the Administration's premium revenues; and determines the financial improvement that application of the rate would bring to the Administration on a monthly and yearly basis. The second section interprets the analysis results and offers some suggestions.

2. Model Construction and Estimation

This study draws upon a study conducted by Beenstock (1979) and another one by Doğan (2002), which is based on the former. In the first of these studies, Beenstock (1979) estimated the relationship between tax revenues (R) and tax rate (T) for the period between 1946 and 1977. Tax rate was calculated as the ratio of tax revenues to GDP. An equation that includes the time factor (t), which represents the development rate enabled in an economy by factors that are independent from the tax system such as social improvements, technical advancement, etc., was constructed as follows:

$$R= \alpha + (\beta+t)\, T- \lambda\, T^2 \quad (1)$$

In this equation, one can obtain the rate that ensures maximum tax revenue in the form of$dR/dT=0$ $T_{max} = (\beta+t)/2\lambda$

In another study, Seyhun (2002) investigated whether actual tax rates were above or below the tax rate that would maximize revenues and constructed the following model:

$$\text{Log } R= (\alpha+\beta t)T-\lambda T^2 \quad (2)$$

Here, R represents tax revenues, T represents the tax rate, and t represents trend. By adding variable (y) that represents the GDP for the previous period to model (2), model (3) was obtained.

$$\text{Log } R= (\alpha+\beta y)T-\lambda T^2 \quad (3)$$

As is well-known, the Laffer curve, which represents the relationship between tax revenues and tax rates, propounds that an increase in tax rates could reduce tax revenues or a decline in tax rates could result in an increase in tax revenues. The Laffer curve postulates that as tax rates increase from zero to 100%, the tax revenue will first be maximized and then will fall back to zero again. Thus, it is assumed that there will be no tax revenues if tax rate is 0% and 100%.

In this study, the researcher attempted to identify the insurance premium rate that would maximize the premium revenues of the Social Security Administration on the basis of model (3) shown above. Because insurance premiums are also deducted from gross earnings and constitute a burden on real earnings just like the tax burden. Therefore,tax revenues that are a burden on gross paywere replaced by insurance premium revenue (PI) and tax rate was replaced by insurance premium rate (PR); and by assuming that insurance premium revenue would approach zero when insurance premium rate is 0% or 100% and maximize at some value between the two extremes as is the case in the Laffer curve, a similar parabolic model was used. In the constructed model, the insurance premium rate is defined as the ratio of the Social Security Administration's monthly insurance premium revenues (PI) to the sum of the earnings subject to premiums (PBE) from which the Premium Revenues are collected (PR=PI/PBE). So this value that represents the premium rate in the model covers the "insurance premium load", not the rates applied directly. Furthermore, the sum of the earnings subject to premiums for the previous period (PBE_{t-1}) was added to the model as a variable to arrive at model (4).

$$\text{Ln } PI_t= (\alpha+ \beta(PBE_{t-1}))\, PR_t - \lambda PR_t^2 \quad (4)$$

The premium rate that maximizes premium revenues was calculated by using the formula $PR_{max}= (\alpha+\beta(PBE_{t-1}))/2\lambda$.

Premium revenues increase with increasing premium rates. However, after a certain point, the increase in premium rates will lead to increased informal employment rates or more employees preferring rest to work. Therefore, it is believed that a parabolic correlation exists between premium revenues and premium rates, just like the correlation between tax revenues and tax rates. The model yielded no significant results when earnings subject to premiums were used, but significant results were obtained when the earnings subject to premiums for the previous period were used, which could be attributed to the fact that structural characteristics of a preceding year determine those of the following year in an economy. For instance, financial authorities take account of the changes in the tax revenues for the previous year and a higher tax rate is required to meet increasing public expenditures with an increase in the GDP of the previous year.

The monthly values covering the period between October 2008 and December 2012 were employed for the variables to estimate model (4). Stationarity of the series was tested by ADF (Augmented Dickey-Fuller) test. Table 1 shows the results of the ADF test.

Table 1. Results of the ADF Test

Variables	Level		First Order Difference	
Ln PI	0.21	k=4	- 4.91*	k=9
$(PBE_{t-1})*(PR_t)$	1.31	k=3	-3.83*	k=6
PR^2	-3.54	k=0	-6.36 *	k=9
PBE	-0.98	k=1	-10.20*	k=1
PR	-3.55	k=3	-6.44*	k=7

* Rejection of the unit root hypothesis at the 1% level. k is the chosen lag length.

As is clear from Table 1, all of the variables are stationary at first order difference. So model (4) was estimated using Engle- Granger Two-Step Estimation procedure. The estimated model is as follows:

$$\text{Ln PI}= 42.58\ PR + 0.000000000124(PBE_{t-1})*PR - 56.40\ PR^2 \quad (5)$$
$$(0.40) \qquad (0.0000000000154) \qquad (1.16)$$
$$R^2=0.80 \quad dw=2.23 \quad ADF_{(U)} = -7.91 \quad F_{white}=0.025$$

As is seen in model (5), premium revenues (PI) increased with increasing premium rate (PR) and decreased with an increase in the premium rate squared. All the coefficients in the model are statistically significant and have a high explanatory power (R^2). Moreover, the model does not present any problems of autocorrelation, multicollinearity, and heteroscedasticity. All these factors make the estimated model a good model.

By using the coefficients in model (5), the rate that maximizes premium revenues was calculated for the periods between October 2008 and December 2012 with the help of the formula $PR_{max}= (\alpha+\beta(PBE_{t-1}))/2\lambda$. The analysis results yielded a rate ranging between 39% and 40% with an arithmetic mean of 39.65% for the rate that maximizes the premium revenues for the Administration[1†].This means that the Administration suffers losses at premium rates above or below this rate. Because this is the approximate premium load that maximizes premium revenues and premium revenue collection is reduced above and below this rate.[1‡] The 50 months' data we have suggests that the rate that maximizes premium revenues cannot fall below 39.54% and rise above 39.75%. As a matter of fact, the legal premium rate ranges between 33.5% and 42.5%.Table 2 presentsthe premium revenues calculated for 2009-2012 by using model **(**5).

[1]By testing the rate that maximizes Premium revenues with Z test, we accepted the hypothesis H_0:μ=0.396. The sample standard error is 0.003695. It ranges between $0.3954< \mu <0.3975$(at 95% confidence level).

Table 2. Premium Revenues Calculated for 2009-2012

Years	Realized Premium Load (%)	Realized Premıum Revenue (TL)	Maximum Premium Revenue (TL)	Difference (TL)
2009	0.32801052	52.881.307.326,63	69.472.520.055,79	16.591.212.729,16
2010	0.33454199	66.763.422.823,15	81.619.209.706,32	14.855.786.883,17
2011	0.35920765	81.788.804.629,40	91.430.669.917,19	9.641.865.287,79
2012	0.37131378	96.402.052.786,42	105.847.718.105,44	9.445.665.319,02

In Table 2, the yearly premium revenue to be obtained was calculated by substituting the rate that maximizes premium revenues with 39.6% and a total positive difference of 9.445.665.319,02 TL was found from the realized premium revenues. If the premium load had been 39.6%, then an extra premium revenue amount of 9.445.665.319,02 TL (9.4 quadrillion in the former Turkish currency) could have been collected in 2012.

3. Conclusion and Suggestions

The driving idea behind this study was the question of what can be done to increase premium revenues, which constitute the main revenue source for one of the public agencies with the highest budget; i.e., the Social Security Administration. Given that the current premium revenues fall short of meeting the pensions in the Social Security Administration, it is vital to increase premium revenues for a sustainable social security system.

In the study, the relationship between the premium revenue collection and premium rate/load for the Social Security Administration was analyzed on the basis of the Laffer curve's logic, one of the important tools of supply-side economics. Monthly data covering the period between October 2008 and December 2012 were used in the study. The model was estimated using Engle-Granger Two-Step Estimation Procedure. As a result of the analyses, the hypothesis that "the relationship between the premium revenues and premium rates of the Social Security Administration is compatible with the Laffer curve" was validated in a statistically significant way and the premium rate that maximizes the Administration's premium revenues was found to be 39.6%. This rate is above the realized premium rates; in other words, the premium load should be increased to be closer to 39.6% so that premium rates can be maximized according to the Laffer curve. It was found that once this rate is applied, the premium revenues would be higher than those realized in 2012 with an extra premium revenue amount of around 9.4 billion TL. Moreover, the yearly changes in realized premium load clearly show that there is a trend toward the rate that maximizes premium revenues.

A logical suggestion to increase the Administration's premium revenues would be to raise the current premium rate legally ranging between 33.5% and 42.5% up to or near 39.6%. Another suggestion could be to gain stricter administrative control over informal employment and to try to reach this rate through fines.

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