# METHODES OF ASSESSING THE COST OF SOCIAL SECURITY

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**Abstract**

*It is widely accepted that in the field of social security social policies must be consistent and coherent. Any discontinuity in the implementation and enforcement of social policies or an unfavorable approach to certain social categories will affect the security of income and health and education security of the target population categories.*

*In order for the fundamental right to social security to be guaranteed, the allocation of budgetary financial resources must ensure for all citizens an adequate minimum level of income and access to basic social services. As a result of the design of a social security scheme, a number of parameters are assessed, in relation to which the social security costs and benefits of the contributors are determined.*

*Even though the social security system operates on the principle of financial autonomy, the government subscribes to multiple risks and remains the* ***last guarantor*** *of national social security systems.*

*The government's intervention through its leverage, such as the contribution rate or through taxes and duties, has a certain limit due to the resilience to tax.*

*Social contributions can not increase anytime, if there is no increase in insurable earnings.*

*In this article I deal with the main methods of assessing the cost of social security and highlight the role of actuarial techniques for creating and reforming pension systems.*

**Keywords:** *pension calculation, actuarial methods, social security*
**JEL Classification: J21, J26, J61**

## Introduction

Subscribing to a social security system, public or private, is a contingent liability that can manifest itself in different forms.

When social security law provides for subsidizing the financial deficit of the pension system from budgetary sources, allocations of resources to social insurance are an explicit form in which the Government intervenes to rebalance the pension system.

The government can also intervene by increasing contributions or reducing social spending.

Another government intervention in the social security system is by guaranteeing minimum levels of benefits or by guaranteeing benefits for certain occupational categories, in which case it covers the difference between legal benefits and those earned by beneficiaries from the social security contribution component.

At the level of social security branches, the role of social security guarantor is exercised by the government, either within the social security system or through social assistance.

The government's implicit guarantee is in situations when it is necessary to save public or private non-performing pension systems.

Even though the social security system operates on the principle of financial autonomy, the government subscribes to multiple risks and remains the **last guarantor** of national social security systems.

*Between income and benefits there is interdependence. A certain level of social protection is the result of the joint effort of the active population, the government that develops social and fiscal policies, and last but not least, is the result of the actuary's skill in suggesting ways to achieve the overall economic and social security goals through actuarial models.*

*In the case of a reform of the social security system, actuarial work is laborious, and actuarial practice combines existing experience and existing social security systems, actuarial and prediction techniques. Actuariate is an art built on mathematics, statistics, finance, philosophy, sociology in which the environment is the system of social protection.*

**Actuarial models** are developed by actuaries in social security, whereby they manage to transmit to the government and decision-makers relevant information on the potential effects that budgetary decisions can have on the social security system and ultimately on the state budget.

## Literature review

The concern for the study of the 85 generations is illustrated by Carp (2012), which made a component population design until 2040, starting from the interest in studying and shaping the balance of the social security system in Romania.

Anghelache, Carp (2016) addressed the issue of voluntary contributions to the social security system. Carp (2018) proposed the benefit-matching model through voluntary contributions and contribution testing.

Manole, Anghelache (2016), and others. have carried out a comprehensive analysis of the private pension system in Romania, which was legislated starting with 2004.

Starting in 2012, Carp) designed an alternative pension model that was promoted and improved in 2018.

Anghelache, Verejan, Partachi (2006) have a real contribution to defining the set of indicators for analyzing actuarial effects in pension schemes.

## Methodology, data, results and discussions

• **Methods of analyzing a social security scheme**

There are different methodologies for predicting social security pension systems.

The most important methods are actuarial methods, econometric methods and mixed methods.

**Actuarial methods** have been the oldest methods applied in the field of insurance and proved to be valuable for the forecasting of the Social Security System.

Econometric methods are, in fact, extrapolations of previous trends using regression models. In essence, the difference between the two methods is that actuarial methods depend on **endogenous factors (internal factors of the model)**, while econometric methods are based on exogenous factors.

Mixed methods are based partly on endogenous factors and partly on exogenous factors.

Within these methods, an approach that can be taken into consideration when an important part of the population is assured and the system is **quite mature** is to use the **national population and labor force** projections **as a basis** and to apply proportions appropriate to obtain predictions of the social security system.

A more general method of predicting the pension system is the component method. However, this does not exclude the reference to the national population or the forecasts of the workforce for establishing projection factors or elements.

The component method, as the name suggests, divides the insured population into components and simulates the evolution of each component over time. The degree of breakdown will depend on the availability of the data for evaluation and also on the calculation capacity available to the actuary. The minimum required breakdown is per category of insured persons (eg active insured persons, retired, invalids, widows / widowers and orphans), men and women within each category and single age categories within each sex. Additional breakdowns may refer to analyzes of the active population, previous jobs and income levels. In this respect, it is clear that a further breakdown can be justified only if it is expected to lead to a proportional increase in the accuracy of the forecasts.

Current techniques are considered to be a group of insured persons at one time, and the current probable values of future insured salaries, on the one

hand, and pension benefits due to members of the group and their survivors, on the other.

This technique is naturally *suitable for the evaluation of occupational pension schemes*, which are generally fully funded. However, the current valuation technique may provide an additional financial perspective and can therefore be an important aid to the forecasting technique.

• **Indicators of analysis in a pension scheme**

The introduction of a social protection scheme must be preceded by a process of consultation of interest groups (government, employees, beneficiaries, employers, other insured persons).

The requests made by each stakeholder about the level of benefits they wish to obtain are subject to the actuary's analysis, which estimates the long-term financial resources that need to be collected in the system, taking into account risks and uncertainties. This assessment is the foundation of legal regulation. The Actuary proposes the quantitative assessments underpinning social policies.

At this stage evaluations are difficult because they can not be based on historical data of the scheme. Actuarial assumptions are built on historical economic data, demographics, or similar data from other countries.

The first question that needs to be answered is how we define the coverage area, which is the population included in this field, the benefits of the population according to the risk covered.

The target population includes people in the public sector, the private sector and self-employed workers. If the budget sector has a high degree of certainty regarding the collection of contributions, for the contributions that can be collected from the latter two categories, the actuary is required to formulate assumptions, so that the valuation has the *future coverage and a good outcome of the projected rate compliance.*

**The objective of the system** is to systematically accrue income to provide security for social benefits that are allocated, and their allocation must be orderly and rational.

**A social security program** guarantees that financial resources will be available, will be sufficient to cover the benefits and administrative expenses.

In order to ensure availability, the level of contributions, contribution rates and the period of collection (date) are projected. The contribution rate must be relatively stable over time. The rate of collection of contributions is a parameter set by actuaries by scientific methods. The system must have an accumulated amount of resources constituted in reserve fund..

*Between the cost of a system and the share of the contribution there is a conceptual delimitation.*

**The cost of the system** expresses the level of expenditure that can be expressed as a percentage of GDP or in nominal values.

The cost of the system is not influenced by the type of system chosen as a social protection system.

When creating a system, it should be borne in mind that a contribution period is needed to finance long-term benefits.

International social protection standards provide for a minimum number of years of contributions, ranging from 10 to 15 years, so that an insured person is entitled to a retirement pension.

For pension funding, in my opinion, it is necessary to delimit ***the profile*** **of the employee**. In other terms, this profile is also referred to as the insured person's **career model**.

To ensure funding, it is established that the main objective is to set an expected level of social protection and benefits. Another important milestone is the stability of the contribution rate that will influence a fair redistribution between generations. The main objective will influence the funding method.

In a PAYG scheme it is important to ensure an actuarial balance. In this sense, a set of indicators is defined and used.

**To define the indicators we will use the following notations:**

V(t) = total revenue including interest income at the end of year t;
C(t) = annual total contributions in year t;
D(t) = interest revenue in year t;
B(t) = total expenditure in year t;
W(t) = insurable earnings (basis of contribution) in year t;
$\partial(t)$ = contribution rate in year t;
i(t) = the rate of interest in year t;
d(t) = demographic dependency ratio in year t;
TP(t) = number of pensioners in year t;
TS(t) = number of active taxpayers in year t;
$\propto (t)$ = replacement rate of income in year t;
p(t) = average pension in year t;
w(t) = average insurable income in year t.

**The actuarial method** determines a set of indicators, among which we list the most important:

» **Total revenue** which is calculated using the formula**:**

$$V(t) = C(t) + D(t)$$

» **The reserve fund,** which is calculated using the formula:

$$\Delta FR(t) = FR(t) - FR(t-1) = V(t) - B(t)$$

» **Total contributions,** which are:

$$C(t) = \partial(t) * S(t)$$

$$D(t) = \left[\sqrt{1 + i(t)} - 1\right][C(t) - B(t)] + i(t) * FR(t-1)$$

» The PAYG system **cost rate** is given by the formula:

$$r_{PAYG} = \frac{B(t)}{W(t)}$$

» **Contribution rate.**

When determining the contribution rate, account is taken of the influence of the two major factors, namely the rate of demographic dependence and the rate of replacement of pension income.

***The demographic dependency ratio,*** which is determined as the ratio between the number of pensioners in year t and the total number of active contributors in year t:

$$d(t) = \frac{TP(t)}{TS(t)}$$

***The replacement rate of retirement income,*** which is determined as a ratio between the average pension level in year t and the average insurable income in year t (for the sake of simplification we use the term average wage in year t):

$$\propto (t) = \frac{p(t)}{w(t)}$$

***Contribution rate level for the period*** $(t, t+1)$ ***is:***

$$\partial(t, t+1) = \frac{\bar{B}(m) - \bar{B}(n-1) - FR(n-1)}{\bar{W}(m) - \bar{W}(n-1)}$$

Depending on the chosen pension scheme, the contribution rate formula is customized. If the social security system is mature and the demographic structure is stable, the contribution rate is stable. With the help of these indicators, actuarial calculations provide the results to decision-makers who need to know the obligations and costs of the scheme and when they need to intervene if they want to mitigate the stagnation or collapse of the scheme.

In order to design a social security system or periodic assessment, the actuary has to analyze the systems with which the social security system is in direct or indirect relationships and is concerned about uncertain future events.

The design of a scenario for the evolution of uncertain events is done using a model, which is a simplified form of reality. In an actuarial model, we include the factors that could influence the results without including them altogether. Individuals using the model must be aware that as the actuary discovers new variables that explain reality, the model will change over time by including the new variables.

Actuarial models are constructed on the basis of past experience, data of related phenomena, or actuary reasoning. The model should be validated by comparing its results with the actual results of the modeling phenomena.

The social security model has as input statistical data and uses assumptions about the future behavior of uncertain variables.

Model outputs are system revenue and expense, and tools for setting the funding strategy.

Statistical data must be credible and sufficient to properly explain the phenomenon. When the observations are insufficient, the actuary will include the whole population in the analysis. Sometimes, when the social protection system wishes to secure a new risk, the actuary will not have historical data and the actuary's reasoning and art is necessary.

Actuarial models are constructed for economic and financial evaluation, the consequences of the occurrence of phenomena associated with a risk or the uncertainty of manifestation of phenomena trends, the severity of the effects and the frequency of its production.

The degree of complexity of the actuarial model depends on several factors. Depending on the purpose, the actuarial models are simplified or complex. In the first case, the purpose of creating the model is to get an overview of trends in the evolution of phenomena. If a system reform is desired, a complex approach is needed. The Actuary needs to express its views on financing and allocation strategies, long-term investments and benefits.

The degree of complexity of the model is determined by the available statistical data.

Building a model type is based on the ability and techniques of data collection and on the availability of running IT applications. Last but not least, the actuary takes into account the constraints related to the time at which the model is to be realized. In international practice it is recommended to use the technical terms according to ILO definitions so that the actuaries give the same meaning to them and there is a conceptual continuity. These terms are recommended to actuaries and refer to the assessment of the cost of social

security. The use of technical terms in the meaning of the ILO has the effect of correctly and quickly comprehending the actuarial reports.

***The Actuary should highlight all deviations from rules and rules that are considered useful and taken into account.***

➢ **Capture ratio**[1]

This concept expresses the ratio between the average of the insurable earnings from a social security system over a given period of time and the average wage per economy over the same period.

$R_c = \frac{\overline{W_a}}{\overline{W}}$, where $R_c$ is the capture ratio, $\overline{W_a}$ is the average of insurable earnings and $\overline{W}$ este is the average wage per economy in the assessed period.

➢ **Limit on insurable earnings**

This concept expresses the maximum amount of insurable earnings up to which the social security contribution is due.

Sometimes this concept also expresses the maximum amount on which pensions are calculated.

In Romania, periodically, insurable earnings were capped at 3-5 gross average wages used to substantiate the social insurance budget. In the period 01.07.2007-01.01.2011 there was no ceiling for insurable earnings, which allowed the collection of a large mass of contributions, but also the accumulation of large points of credit by the well-paid insured in Romania, so a chance for this category of employees for large pensions in the future.

$P_{wa} = \max(W_a)$, where $P_{wa}$ represents the insured earnings ceiling or the maximum contribution to social security..

➢ **Contribution collection report**

There is a *difference* between the amount due as a social security contribution and the amount paid.

The ratio between the amount of contributions collected and the amount of contributions that should have been paid is the collection of contributions.

In the ideal case, the collection ratio is 1 if all employers, employees, self-employed, other insured persons would pay the due contributions.

$R_{pc} = \frac{C_p}{C_d}$, where $R_{pc}$ is the contribution collection report, $C_p = \Sigma C_{p,}$ the amount of contributions paid by system participants, $R_{pc} = \Sigma C_d$ s the

1. *Catchment ratio – OIM terminology*

amount of contributions to be paid by policyholders, employers, other natural or legal persons.

➢**Coverage rate**

This indicator has a legal and administrative sense.

**In the juridical**, legal sense, the coverage rate expresses the ratio of the number of registered persons to the potential number of persons who should be covered in accordance with the legal provisions.

In the case of a health care system, the coverage rate expresses people who benefit from health benefits and benefits without contributions..

➢ **Rate of contributors**

The ratio of the insured persons (persons with at least one contribution paid over a given period) to the total labor force**.**

➢ **Density factor**

This indicator expresses the ratio between the average number of contributions actually paid in the course of a financial year and the maximum possible amount of contributions for the same financial year.

## Conclusion

Without exhausting the theoretical and practical aspects that need to be known and applied in a social security system, this article highlighted the fact that scientific methods are the basis for the projection of social security systems.

They are permanently supervised by the actuarial work.

By the actuarial actuarial results synthesized in Actuarial Reports, the decision makers can hold the information necessary for the elaboration of the social policies. These have to be maintained in the long run, given that the social security system projections refer to long periods of contributions to which the contributors will also benefit from the benefits.

I conclude that the scientific basis should be provided by the actuaries, so as to ensure long-term projections in the social security system and to guarantee its financial stability.

In Romania, emphasis should also be put on the fundamental role of actuary in social security..

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