

Simulation of Pension Reform in Algeria (Econometric Study)

(محاكاة لإصلاح نظام التقاعد الجزائري (دراسة قياسية)

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المخلص:

تهدف هذه الدراسة الى بناء سيناريوهات تحاكي نظام التقاعد الجزائري بغرض الوصول الى حلول حقيقية للحد من مشكل عجز الصندوق الوطني للتقاعد، حيث تقام في الآونة الاخيرة عجز هذا الصندوق الذي يلعب دورا هاما في منظومة الحماية الاجتماعية الجزائرية، ويرجع السبب الرئيسي في تزايد فجوة العجز الى ارتفاع امل الحياة لدى المتقاعدين مع عدم قدرة فئة العمال على تمويل موارد الصندوق نظرا لتقلص حجم هذه الفئة بالمقارنة مع العدد المتراكم الهائل للمتقاعدين، عبخذا الصدد، تمثلت عينة الدراسة في مجتمع العمال الاجراء، الغير اجراء والمتقاعدين وذلك بالاعتماد على قواعد بيانات محلية لصناديق الضمان الاجتماعي، حيث تم اضافة تغييرات في صيغة حساب معاش التقاعد عن طريق اقتراح سيناريوهات للإصلاح، لقد خلصت نتائج الدراسة إلى أن رفع سن التقاعد من 60 الى 65 سنة هو الحل الأمثل لإرجاع التوازن المالي لصندوق التقاعد وبأقل أضرار ممكنة على رفاة الأجيال.

الكلمات المفتاحية:

العجز الموازني، صندوق التقاعد، الحماية الاجتماعية، التوازن المالي، أمل الحياة.

Abstract:

This study aims to build simulation scenarios for real solutions to reduce the problem of pension fund deficits. The Fund's deficit, which plays an important role in the Algerian social protection system, has recently worsened. The main reason for the growing deficit gap is the high life expectancy of retirees, with the category of workers unable to finance the Fund's resources owing to the decrease in the size of this group compared to the huge backlog of retirees. The sample study was in the community of non-performing workers and retirees based on local databases of social security funds, where changes were made in the pension calculation format by proposing reform scenarios. The results of the study concluded that raising the retirement age from

60 to 65 years is the best solution to restoring the financial balance of the pension fund and with the least possible damage to generational well-being.

Keywords:

Balance deficit, pension fund, social protection, financial balance, life hope.

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Résumé :

Cette étude vise à construire des scénarios de simulation afin de trouver des solutions réelles pour réduire le problème des déficits des fonds de pension. Le déficit du Fonds, qui joue un rôle important dans le système de protection sociale algérien, s'est récemment aggravé. La principale raison du déficit croissant est l'espérance de vie élevée des retraités, la catégorie de travailleurs ne pouvant financer les ressources du Fonds en raison de la diminution de la taille de ce groupe par rapport à l'énorme arriéré de retraités. L'étude-échantillon a été réalisée dans la communauté des travailleurs non performants et des retraités sur la base de bases de données locales de fonds de sécurité sociale, où des modifications ont été apportées au format de calcul des pensions en proposant des scénarios de réforme. Les résultats de l'étude ont conclu que le relèvement de l'âge de la retraite de 60 à 65 ans est la meilleure solution pour rétablir l'équilibre financier du fonds de pension et le moins possible nuire au bien-être des générations.

Mots clés :

Déficit budgétaire, Fonds de pension, Protection Sociale, Equilibre Financier, Espérance de vie

Introduction:

The pension and social insurance systems that allow protection against the risks associated with death, disability and old age faced by all families are an integral part of the social protection system. The dual objective of these systems is to protect against poverty and predict sudden loss of incomes in the event of one of its known causes in life events. Algeria's social security system is based on the principle of distribution and is administered by the National Pension Fund of the Public Sector. Algeria's system for the protection of older persons is based more on the principle of insurance (than on the principle of justice).

It had recently identified a significant deficit that could worsen for future generations. To date, the State was still looking for an optimal solution to that deficit, even if those reforms were very modest.

In this paper, we will address the Algerian pension system so that we can determine its characteristics and financial position, and we will analyze in parallel all the variables associated with the national pension system in order to evaluate the reform process at the level of the national pension system.

The main objective will be to impose an interim reform that will ensure the Fund's financial balance over the 2047 horizon

Problem Research:

In the light of the above, our problem will include asking the following question:

What is the optimal modelling of the national pension system that will enable us to achieve financial efficiency without compromising social justice and the well-being of members of society?

In this context and in the light of the foregoing, the following issues arise:

- How can expenditure on the National Pension Fund's allocation be efficient? Will this negatively or positively affect macroeconomic variables and society's well-being?
- How can the fiscal sustainability of the National Pension Fund be ensured? Will this negatively or positively affect macroeconomic variables and society's well-being?

Study variables:

Dependent variable: effectiveness of the national pension system

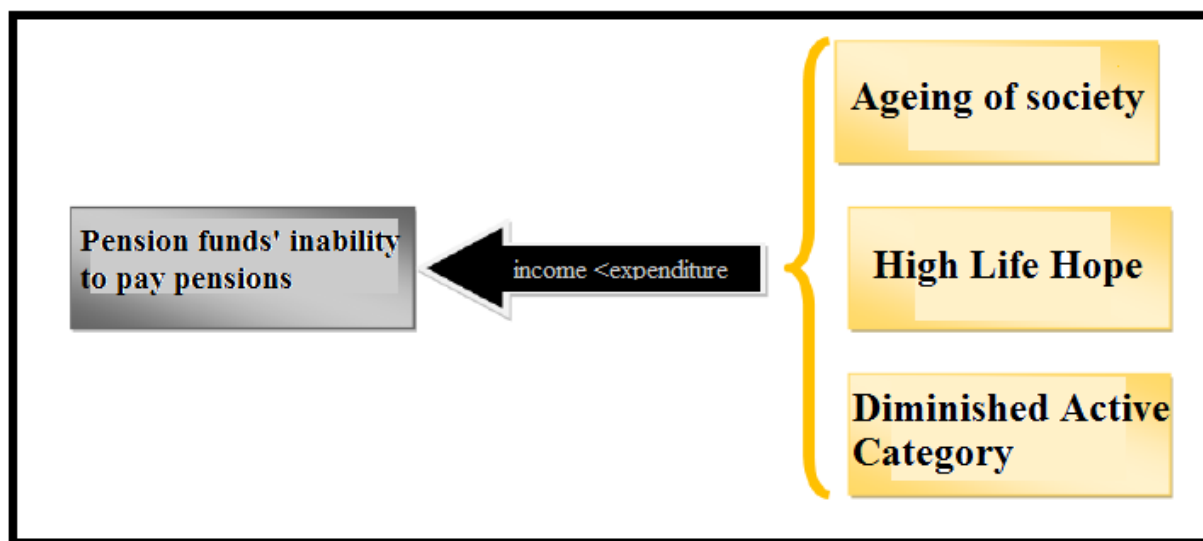
Independent variables:

Factors affecting pension effectiveness are:

- The ageing of society
- High Life Hope
- The system's active category of contributions is reduced

These factors were selected through the study's studies and research, and were taken to see how they affected the financial position of the pension fund.

Figure 01: Relationship between study variables



Source: Prepared by researchers.

-The study hypotheses:

In order to answer the questions raised, we have formulated two main hypotheses that change should be made either by decrease or in excess of the Fund's expenditure and income,

They are the following:

- * Or, on the expenditure side: is to reduce the Fund's burden as little as possible.
- * The second aspect of funding resources is to maximize the Fund's income as far as possible.

- Previous studies:

There have been no exciting previous standard studies at the Algerian level showing the impact of reform on pension funds except for one (Flici Farid, 2016), while there are studies

I have dealt only with the legal aspect of this reform (Madani Abdelkader, 2016), and in addition, recent demographic outlooks indicate the need to look for a resource New funds(*Hamza Sharif Ali, 2006*)

Global experiments have shown that standard reforms tend to reduce the lifting of the stomach, suspension and reduction of the the replacement rate.

The share of the capitalization column in the financing of pensions varies from country to country, for example, France, which has introduced a one-year savings scheme2003 is only a supplementary column, whereas in Germany the share of this column is above the distribution-based column, whereas in AmericaLatin and Chilean capitalization included an important portion of the retirement pension, and the distribution-based column constituted only the lowest retirement.

1. Reforms and motives of Algeria's pension system:

The process of reforming pension schemes is of a global nature (Naoual Oukassem, 2012). At the turn of the century, many States introduced several reforms to pension schemes. There is no uniform global model applicable to all countries, but each has its own specificities. Reforms continue to be driven jointly by addressing the financial problems of pension schemes, and the main drivers of the review of Algeria's pension system have been focused on:

- Socio-economic transformation through the transition from a oriented economy to a market economy.
- International competition and the gradual entry of the Algerian economy into the world economy (engagement in the course of accession to the World Trade Organization (WTO), entering into a partnership agreement with the European Union and other regional and international arrangements), highlighting the importance of the pension system's conformity with international conditions.
- The role of the welfare State (Welfare state) is reviewed. The public treasury is no longer the primary source of funding for social security.

Reform in a comprehensive and progressive manner must carry a lot of intergenerational justice, intergenerational solidarity and a sense of responsibility on the part of social actors, as reform is a complex process with no single solution (Jean Christophe le Duigou, 1999).

In this discussion, we felt that we should address the reform of the National Pension System, since the 2017 Retirement Act cannot be dealt with without mentioning the reform that precedes it as an extension of these laws and updates.

2. The new pension law reforms:

These are all the reforms affecting the national pension system under Act No. 16-15 of 31 December 2016 on retirement, which amends and supplements Act No. 83-12 of the last issue of the Official Gazette of 2016.

The main areas of the new law can be summarized as follows: (Ben Dahma Houaria, 2015)

- Article 2 of the Act, which amends and approves article 6 of Act No. 83 -12, stipulates that: "The employees shall be entitled to benefit. Pension on fulfilment of the following two conditions, age (60) At least one year, however, working women can retire at their request from age (55) Full year, at least fifteen (15) years' employment. "
- The same article stipulates that: "A worker shall, in order to avail himself of a retirement pension, engage in an actual work of at least seven and a half years' duration (7.5) with social security contributions." The worker may, according to the same source, "voluntarily choose to continue

his activity beyond the above age of up to five (5) years during which the employed body cannot refer him for retirement".

- Article 3 of this Act, amending and supplementing the provisions of article 7 of the previous Act, states that "the pension may be benefited from before the age provided for in article 6 above, the worker (h) Who holds a position characterized by very difficult circumstances after a minimum period of office and determines the list of appropriate employment positions and ages as well as the minimum period to be served in the positions mentioned in the first paragraph above through organization. "

- Article 4 of the same Act, which supplements and amends the provisions of article 7 bis in the previous Act, states: "The retirement age mentioned in article 6 above may be extended at the worker's request. For jobs with higher qualifications and professions with rare qualifications, the "List of jobs with higher qualifications and professions with rare qualifications, as well as the conditions and modalities for the transfer of the right to extend the retirement age and the rules for the liquidation of the pension relating thereto through regulation" shall be established.

- Article 5 of the Act, which amends and supplements article 10 of the 1983 Act, stipulates that "a worker who has fulfilled the requirements set forth in articles 6, 7, 7 bis and 8 of this Act shall have the right to retire, but the reference to retirement cannot be established before the decision to grant the pension has been communicated."

- Article 7, which complements the provisions of article 61 bis of Act No. 83-12, states: "Without prejudice to the provisions of this Act and during a transitional period of two years (2), a retirement pension may be granted with immediate benefit if the wage earner has completed an effective period of work resulting in the payment of contributions equivalent to thirty-two. (32) The minimum age listed below has reached or exceeded fifty-eight years. 58 years in 2017 and 59 years in 2018 ".

- The law stated in the same article that "the pension shall be utilized in the cases provided for in the above paragraph at the sole request of the wage worker", adding that "the age provided for in article 6 of Act No. 83-12 shall be applied to the workers mentioned in this article from the first two sides of 2019."

- Abolition of the proportional retirement without the requirement of the founding age under article 2 of Ordinance No. 97-13 of 31 May 1997.

- Article 9 of the Act affirms that: "Its effect shall be effective from the first two sides of 2017."

The deputies of the National People's Assembly ratified this law on November 30, while the members of the National Assembly ratified it on December 21.

3. Criteria proposed by the National Economic and Social Council for addressing the financial difficulties of the CNR:

There are some criteria proposed by the CNES to address the financial difficulties of the CNR. The CNR National Pension Fund recently went through a very difficult financial situation. In order to simplify this dysfunction, criteria have been proposed in order to find appropriate short-term applicable solutions before the imbalance penetrates: *(CNES's report, 2015)*

- Total Repeal of Decision No. 13-97 of May 31, 1997 on Proportional Retirement and Prior Retirement
- Need to install and consume the system of vigilance over appropriations
- The need to freeze the completion of some new-built projects
- Review the age of retirement referral by raising it to 62 years.

4. Criteria for the regulation of the informal sector in relation to social protection:

The Supplementary Finance Act 2015 (LFC2015) established severe penalties against employers who do not declare their workers to CNAS interests. This criterion allows primarily for the protection of workers and their access to their social rights, on the one hand, and on the other in order to urge employers to regularize their status with social security interests without penalties, taxes or delays over the specified period. Employers who owe contributions to Social Security have been granted until 31 March 2016 until they claim to settle their status through the maturity register and cancel taxes and delays, provided they pay their contributions and request a maturity register to pay their previous debts. *(Ben Dahma Houaria, 2015)*

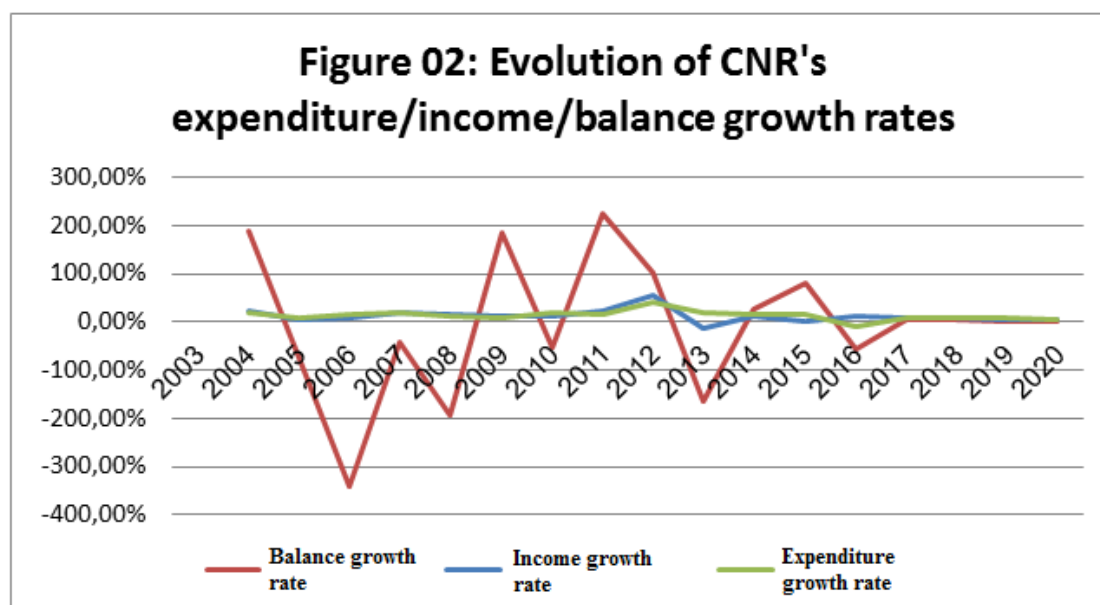
With regard to CASNOSA, a new law regulating social insurance for non-employees will come into force and will focus on new measures developed by public authorities that will be more flexible in collecting social contributions. On the other hand, it will allow the preparation of a supplementary retirement that allows the remaining 20% of the pension to be saved on CASNOS funds.

5. Resistance to Change

Most actors in the social security system, notably contributory workers, have resisted and categorically rejected the change resulting from the enactment of a new law that requires the abolition of prior retirement and the extension of retirement age. "The various unions in the education sector and health unions have upheld the employee's right to relative retirement, which grants the employee the right to retire from under-age work where the retirement rate is according to the years of service provided. The unions have rejected the new amendments to retirement wholly and in detail, threatening to launch protest movements if they are applied on

the ground. Especially for employees of the national education sector who are exposed to occupational diseases in the sector's right to retire on the basis of 30 years of employment irrespective of the legal age of 60 for men, with women in the national education sector having the right to retire after 25 years of employment. The education unions have based their demands on figures provided by the Directorate of Public Employment, which reveal that the number of employees in the national education sector is estimated at 31.2 per cent of the total number of employees 1603994 which means that the number of employees in the national education sector is estimated at more than 600 thousand education sector", which ranges in age from 30 to 40 years of age from 41.6 per cent to 45.5 per cent or more than 280 thousand women in the sector, which means eligibility for claims. Health unions have also maintained their relative retirement earnings, as the new amendments they intend to pass do not serve a wide range of employees who have spent a lifetime in the public service due to low pay. It is worth mentioning that the number of health sector employees is estimated at 12.3 per cent of total public employment workers. The proportion of women is estimated at 18 per cent employed in the public health sector and is the third sector in terms of the number of retirees after education, interior and local communities.

6. Imbalance in Algeria's pension system that led to the problem of disability



Source: Prepared by researchers based on Ministry of Labour, Employment and Social Security statistics.

Years from 2016-2020 are projections of personal preparation based on the data for the years 2003-2015

The pension fund balance has recently known fluctuations in its proportion. The Fund's largest deficit in 2015 was 258 billion DZD, or 27.92 million of the Fund's total expenditure, equivalent to 2% of GDP, with a widening deficit gap of 79.22% compared to 2014, which accounted for 15.58% of total expenditure, or an increase of 24.55%.

The rapid growth of pension fund deficits is due to the increasing volume of expenditures resulting from the increase in the number of retirement referrals, especially prior retirement, which caused expenditures to grow by 16.59 per cent, as well as the negative decline in revenue from 11.96 per cent in 2014 to -0.46 per cent in 2015, mainly due to the collapse of petroleum prices and thus the decline in the petroleum levy allocated to the pension fund as social security contributions.

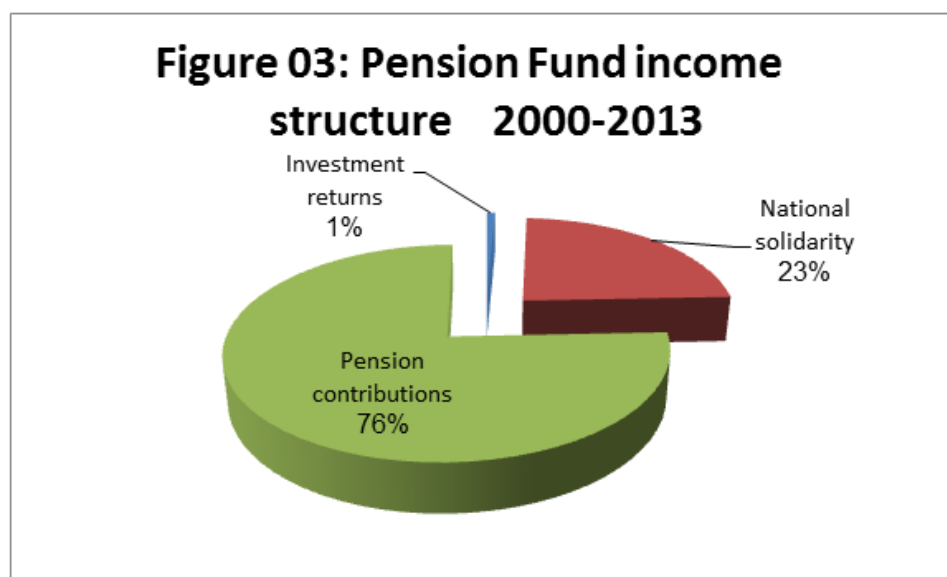
From the aforementioned analysis, the Fund's deficit grows 5 times expenditure, and forecasts indicate a persistence of deficits during 2016-2020. This calls for an accelerated search for a means to reduce both the increase in expenditure and the increase in income.

7. The National Pension Fund has recently suffered from the problem of funding its allocations due to the following reasons:

- Algeria's social security system is limited to benefits rather than contributions. Benefits are not linked to contributions to Algerian social security: Not all associates are contributors. This means that not all beneficiaries of benefits (social security services) contribute contributions, for example, students receive scholarship subject to very small social security deductions, as well as foster children, spouses and sometimes higher benefits.
- The parallel sector is an obstacle to the optimal allocation of social protection assistance and grants for ageing, because there are those who have unauthorized income and benefit from social remittances, which may further widen the poverty gap and inequality in income distribution.
- Support for goods that are widely consumed and necessary for members of society by the State will increase rich and poor because rich people can afford to buy goods subsidized at their real price, while low-income and poor people cannot.
- There is no coordination between the various social protection bodies and the zakat and suspension bodies, which may be a supportive tool of the social protection system in today's crises.
- The collapse of petroleum prices is an obstacle to covering social protection expenses, especially since Algeria's economy is rentious and unproductive and does not have a developmental alternative to creating wealth and national income.
- Algeria's labour market is not flexible, resulting in a decline in the contributions of social workers and an obstacle to the financing of social security funds.

- The ageing of Algerian society is an additional social allowance for the State, whereas the existing mechanisms do not allow this deficit to be addressed in the future.
- Algeria's social protection apparatus does not enjoy the efficiency and effectiveness necessary to create welfare and social justice among members of society.
- Wages are on the rise, which means that pensions will also be high.

8. Income structure of the National Pension Fund



Source: Farid Felisi's study

Investment returns are estimated to be only 0.75% of the National Pension Fund's total income. Its financial position, not to mention the ineffectiveness of Algeria's financial markets and the non-diversification of its financial portfolio, Workers' contributions constitute the largest source of retirement finance, registering 75.64% of gross revenues. and followed by the State's contribution under so-called national solidarity through the disbursement of family allowances and grants. In addition to expenditures for retirees receiving low retirement grants and, in 2006, the National Fund for Retirement Reserves was established (FNRR), which is financed mainly by directing 2% of the petroleum levy raised in 2012 to 3% in order to fill the deficit caused by prior retirement, represents a profound reform directed towards contributing to the pension system for future generations. (*Farid Felisi, 2016*)

In 2010, the Finance Act approved the inclusion of a fee on tobacco, a fee on ships and cruises destined for tourism and pleasure, as well as the deduction of 5% of the net benefits for drug importers.

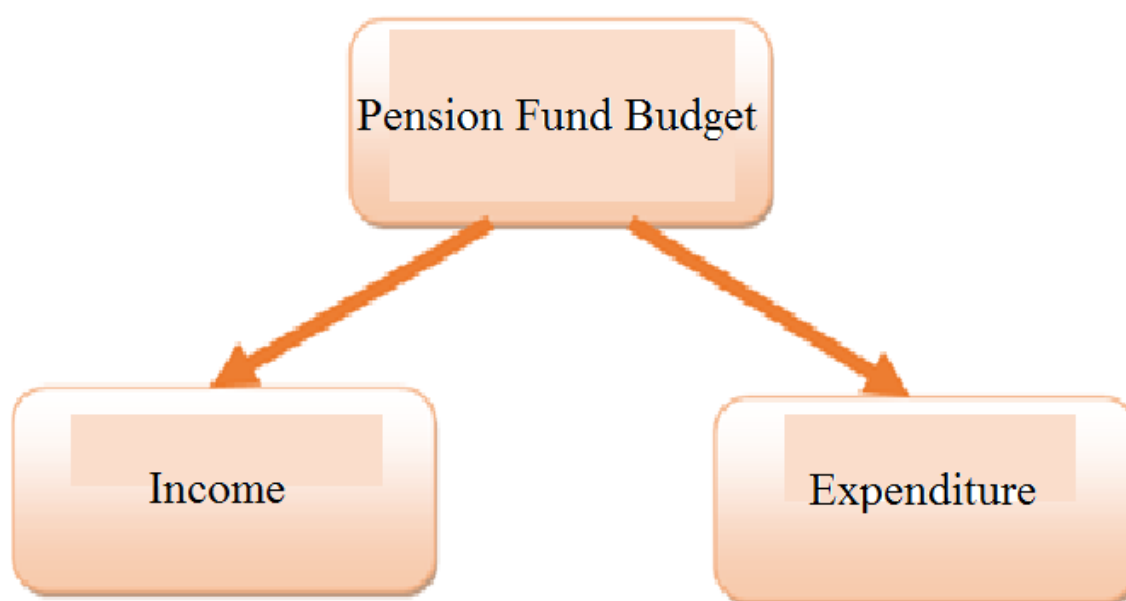
9. Answer to study hypotheses

Before proceeding to answer the research hypotheses, we need to clarify that the pension fund's budget is twofold: splitting expenditures and splitting revenues.

Expenditures consist of all the Fund's burdens: allowances, pensions, financial and in-kind performance.

Income consists of all the Fund's resources of various kinds: contributions, petroleum collections, taxes, fees and State assistance.

Figure 04: Pension Fund Budget

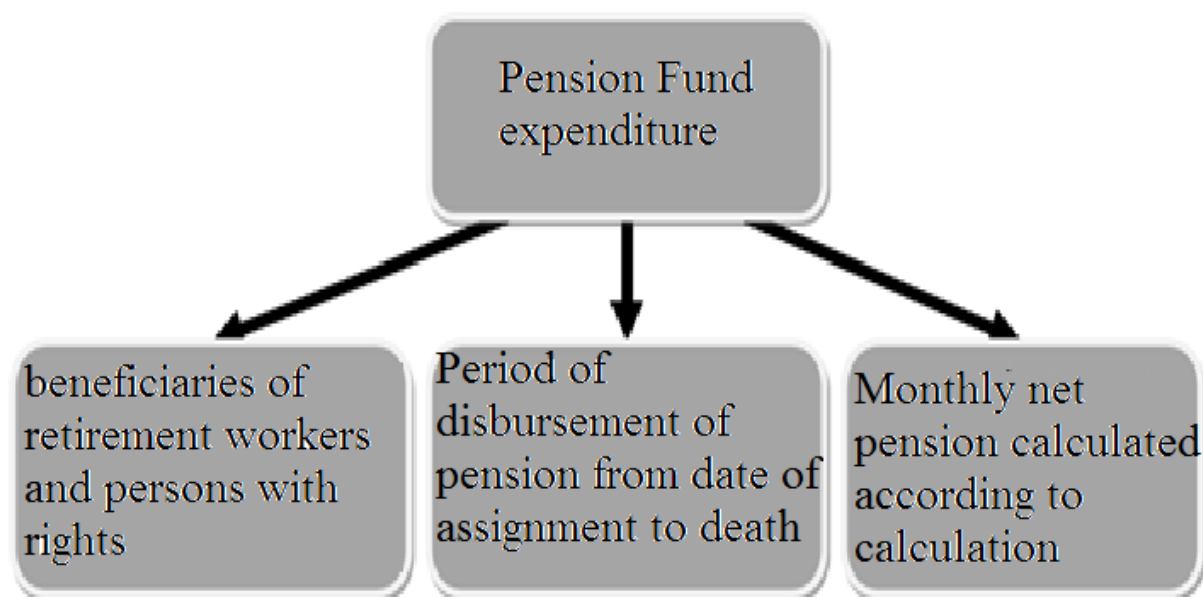


Source: Prepared by researchers

- ❖ The first hypothesis is that pension fund expenditures should be reduced to the least extent possible:

In order to address this hypothesis, the variables of pension fund expenditures, consisting mainly of pension allowances for retirees and the elderly, which change depending on the number of beneficiaries and the duration of their previous pensions and salaries, must first be defined, as follows:

Figure 05: Reduction of pension fund expenditure



Source: Prepared by researchers

Accordingly, a change should be made by decreasing the elements indicated in the figure in order to reduce expenditures:

A) Reduction of monthly net pension: the pension is subject to several criteria and calculation that enable us to reach the net amount of the employee's pensionable remuneration. The pension is calculated through the subsequent calculation within the 80% of his or her salary during the last five years:

$$\text{Pension} = 2.5\% * \text{Insurance period} * \text{Reference pay} * \text{Annual revaluation ratio}$$

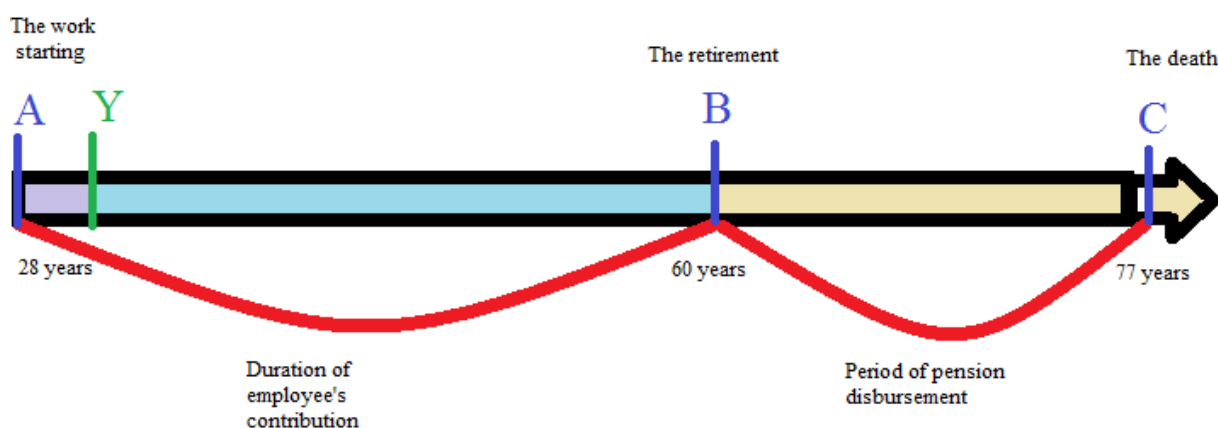
For example, a 32-year employee who was receiving a salary of 20000.00 per month during the last 5 years, his pension will be as follows:

$$\begin{aligned} \text{Pension} &= 2.5\% * 32 * (20000 + 20000 + 20000 + 20000 + 20000) / 5 \\ &= 16000 \text{ DZD} \end{aligned}$$

Therefore, after the above wording has been fragmented, we conclude that the aforementioned ingredients must be changed, so that the sub-hypotheses are as follows:

- 2.5%: The rate of adoption of the years of insurance (contribution), which is the proportion on which retirement is calculated, is equal to the pension. The lower the value of the pension, the lower the value of the pension, the lower the expenditure and vice versa, the lower the proportion on which retirement is calculated.
- Annual reassessment rate: estimated at 1.05 pursuant to the 2015 decision.

Figure 06: Socially Insured Worker's Life Cycle



Source: Prepared by researchers

- 32: The period of contribution, which represents the number of years' service spent contributing to social security contributions. The lower the cost, and vice versa, the higher the pension's income is also affected by the number of years of service but in the opposite direction the lower the number of years of service the lower the expenditure as well as the benefit of contributions.
- 20,000: Reference pay, representing the employee's average wage over the last five years, is equal to the pension the lower the expenditure and vice versa, so it should be reduced by calculating retirement on the basis of base pay only (i.e. base pay + professional experience-grants and compensation), i.e. without calculating grants and compensation for each wire and sector contrary to what is now happening as the first proposal. The second proposal is to reduce wages by reviewing the consolidation of the wage system and its compensatory systems for each wire as long as the employee goes about his or her work, but this solution will also reduce the Fund's contributions.
- 5: The number of years of work on the basis of which the pension and sports reference pay is calculated is inversely commensurate with the value of the pension. The lower the value and the higher the value of the pension, the higher the number of years of work on which the average wage is calculated.
- Reduce the estimated 80% compensation rate to a maximum: For mutual benefit, raising the private insurance rate and reducing the insurance rate in the public system is the best solution to overcome the fund deficit crisis with the aim of alleviating the burden on the fund (currently 80% of the expenses incurred by social security when presenting the performance to the socially insured and 20% is the responsibility of the private optional insurance contributing to the supplementary retirement finance).

- Reduce the annual reassessment ratio to 1.

B) Reduction in the period of pension disbursement: from the date of the worker's retirement to the end of his death, they are expressly commensurate with the expenses of the Fund. The longer the pension is accrued, the higher the expenses and vice versa, as shown in the figure above.

We note from the form that represents the worker's life cycle that whenever point "V", which represents the retirement referral, is removed from the point "and" which represents the death of the retiree. The longer the pension is paid and the lower the employee's contribution period, Thus, the Fund's expenditures are increasing and its revenues are decreasing, and vice versa, if point V approaches the point "and" what needs to be done to reduce expenditures and increase income.

Accordingly, in order to reduce the pension's duration,

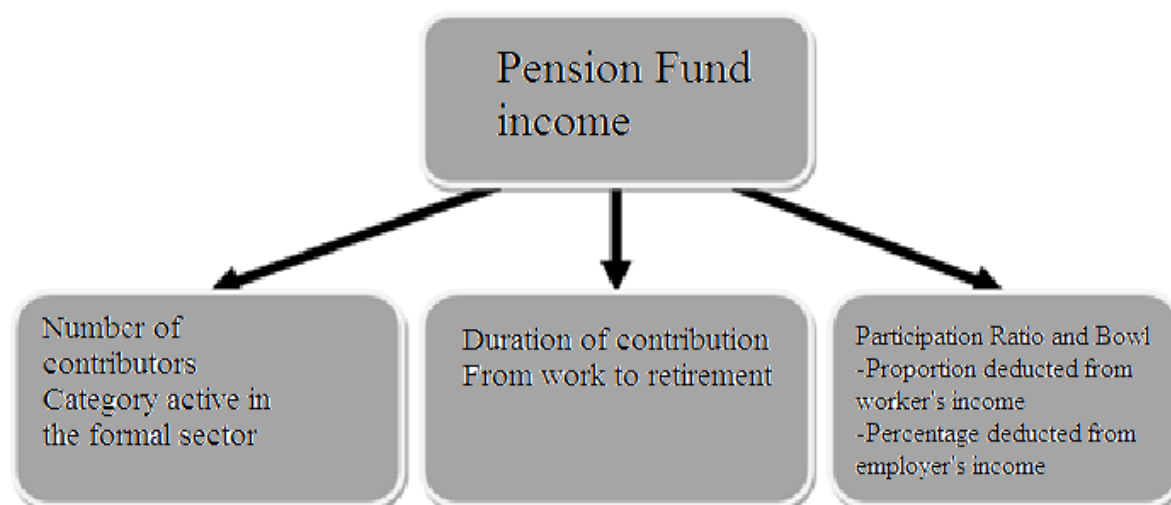
- ✓ Extension of Retirement Referral Age
- ✓ Extended years of service
- ✓ Eliminate early retirement, but these solutions may increase unemployment rates.
- ✓ Raise the legal age of employment (currently 16 years, possibly up to 21 years).

C) Reduction in the number of beneficiaries: The number of beneficiaries of retirement pensions is the number of workers transferred to retirement during the period of pension disbursement and is strictly commensurate with the Fund's expenses. The more beneficiaries of retirement pensions the higher the expenses and vice versa. Therefore, in order to reduce the number of beneficiaries:

- Review of employment policies, as the majority of retirement beneficiaries are public servants (permanent) in office whether they are employed in public institutions of an administrative or economic nature, but workers employed under certain types of fixed-term contracts (temporarily) they often do not benefit from retirement, and in this case the optimal solution would be to switch from the (permanent) operating system to the (temporary) operating system that ends with the termination of the worker's duties.
- ❖ The second hypothesis is that funding resources (income) should be maximized as much as possible:

To address this hypothesis, the pension fund's income variables, consisting mainly of three basic components, primarily shareholder contributions, must first be defined by 03% of petroleum levies and taxes. (e.g. Tobacco Tax and Pharmaceutical Import Tax), however, the most important source of pension funding has been highlighted, namely shareholder contributions, which change depending on the proportion of contributions and their dependency, the number of shareholders and the duration of the contribution, according to the following format:

Figure 07: Maximizing funding resources (income)



Source: Prepared by researchers

Therefore, after the breakdown of the Pension Fund's funding resources above, we conclude that a change must be made in excess of the above components.

From the above data, the following sub-hypotheses can be derived:

A) Participation Ratio and Bowl:

- Increase the proportion of social security deductions (currently estimated at 09% for the worker and 25% for the employer in public institutions, noting that private sector contributions are not reliable much due to the expansion of informal activity).

B) Duration of contribution:

- Increased retirement age to extend contribution period (currently estimated at 60 years)
- Increase in the number of years of service to extend the contribution period (currently estimated at 32)

C) Number of contributors:

Attracting the category that is active in the informal sector by tightening its control and devising new mechanisms for collecting its contributions, such as moving on site and checking unauthorized incomes, but this process requires additional operating expenses that may burden the Fund.

Re-launch of births and immigration (by granting concessions to encourage marriage and childbirth).

Create new positions of employment (but provided that manpower is attracted to deliver productive projects that create added value in the national economy).

D) The establishment of a solidarity fund between the various branches of social security: to allow internal and external transfers to these bodies in order to close any of them, especially the pension fund.

E) A final proposal is to invest social security funds' assets to obtain returns through which surpluses are achieved to cover current deficits, sustainable development and intergenerational solidarity.

10. Actors in the reform process

The previous analysis leads us to the fact that there are several factors to be taken into account in assessing the pension system and reform options, including:

- Demographic
- Economic
- Policy Options/Pension System Characteristics
- Individuals' behaviour

Pension system analysis requires long-term projections (from 10 to 75 years), where modeling has proven effective in diagnosing and evaluating pension reforms, it is a department to regulate the thinking of pension systems.

The reform process will also affect three key economic clients: the State, consumer and enterprise.

- The state:

The State is responsible for the formulation of public, economic and social policies.

Economic policy is based on market machinery and aims to achieve economic growth.

State policy provides public enterprises covering market deficits, providing education and education to members of society and serving the interest of the enterprise (productivity) and providing social welfare to society.

Social policy targets only the most disadvantaged groups in society, especially those who have been excluded from inclusion granted by economic and political policy.

general ".

- The consumer: Change will affect individuals' and families' income and behaviour and hence their consumption

* Family income:

Consists of all income received by the household or household members, in cash, in kind or services, annually or on closer crumbs, but excludes emergency profits and others such irregular and usually incidental revenues. Household income is available for current consumption:

- Income from work, whether paid or private.
- Income from ownership, i.e. profits that are revenue from investing in an enterprise where the investor does not work. This includes pensions and premiums.

Annual in the form of profits from voluntary private insurance schemes.

- Income from household production, which is the estimated value of housing services from owner-occupied housing, unpaid household services and household consumer durable goods services.
- Income from social transfers, benefits and social security allowances, for example, unemployment insurance.

• Institutions:

Enterprises are producers who produce goods and services for consumers in the market, where the production process includes the following factors: work, head

Ma, technology. Inputs are converted into outputs within the investment process.

11. The econometric study

In this model, the role of the State is limited to the conduct of the pension system. pensions ", which deduct contributions from the active generation and pay pensions to the retired generation, The State's budgetary constraint is also the financial balance of the pension system. s economic policies, such as operational, fiscal and banking policies, as they require a process to assess their overall effectiveness, They will also not include consumers and producers because they need to measure their consumption, distribute their incomes and measure their well-being. In this research, I elaborated on the financial, demographic and temporal variables of the Pension Fund only, that the reform process would take place at its level.

So that we can apply the study dialogues we have to form different conciliations between at least one sub-variable and several variables among the above reform proposals.

We can prepare remediation combinations from the following variables:

A. Current system-specific demographic and financial data (*Mohammed Khaled al-Zu 'abi, 2013*)

- Contributing population by age and sex
- Retirees with direct rights by age and sex

- Averageworkingyears (determined by sample of new retirees by age and sex)
 - Average base pay by age and sex
 - Pensions including: basic pension, increases, familygrants by age and sex
 - Year of Evaluation
- B. Macroeconomic data:
- Real PIB growth rate
 - Inflation Ratio
 - Nominal wagegrowth rate
- C. Financial indicators:
- Distribution of pensions by nature
 - Value of annual contributions
 - Annual balance

ReformIndicators

We have dropped the variables preceding the reformprocess, taking 2015 as a reference. The State has passed a lawextending the retirement age to resolve the problem of disability. We have alsoconductedthisstudy for 32 years, assumingthat a new generationwilljoin the retirement system in 2015. The number of workingyears applicable in Algerian legislation (32 years) isestimated to be of life. We must therefore have the followingindicators:

Table 01: ReformIndicators

Requirement:

variable	Indicator
Demografic variables	
Growth Rate of SociallyInsuredWorkers in 2015	9.1 %
Pensioners' growth rate in 2015	5%
Number of workers as of 2015	6770299
Number of new workers as of 2015	187871
Number of retirees as of 2015	2773615
Number of new retirees as of 2015	204942
Number of new widows as of 2015	531359
Number of new orphans as of 2015	409513

Financial variables	
Workers' wagegrowth rate in 2015	5.62%
Annualreassessment rate for 2015	1.05%
Average pensions for 2015 as a ratio to total pensioners (DZD/PENSIONER)	334415.56
Averagewages for 2015 as a ratio to total workers(DZD/WORKER)	731713
Expendituregrowth rate in 2015	16.59%
Revenue growth rate in 2015	-0.46%
Deficitgrowth rate in 2015	79.22%
Deficit/expenditure ratio 215	27.92%
Revenue 2015 (MILLIARD DZD)	668
Expenditure 2015 (MILLIARD DZD)	927
Balance 2015 (MILLIARD DZD)	-258
Replacement rate	80%
Proportion of social securitydeductions	9%
Ratio of insuranceyears' accreditation	2.5%
Time dynamic variables	
Number of years' workbased on which pension referencepayiscalculated	5
Age of entry into the world of employment as the legalage of employmentis 16 years	16-60
Averageage of entry into the world of employment in 2015	28
Minimum and maximum period of insurancerequired for retirement in 2015	15-32
Age of entry into retirement pursuant to the Relative and Ordinary Retirement Act 2015	45-60
Minimum and maximum retirement period 2015	45-77.1
Hope of life 2015	77.1
Probability of survivorbeforereceiving retirement pension in 2015	0.4
Probability of survivorafterreceipt of retirement pension in 2015	0.09
Death rate in 2015	5.2%

Source: Prepared by researchers

Modeling Reform Simulation

Dynamicmodelingisdefined as an applied and technicaltool for the management of retirement systems, whichensures the accounting and solidarity balance of the pension fund, where the fund'sassets and liabilities are updated, itsaccounting importance is to assess the evolution of thelatestsystems over time using digital analysisisthatwillbringcriticalreforms and solutions.

Modeling varies from one social protection system to another and from one retirement program to another. Accordingly, I modeled the national pension fund according to its structural characteristics, being based on the principle of distribution and also being the determinant of benefits.

Balance = Total Iranian expenditure - Total expenditure

1- Expenditure:

Total expenditure = previous generation expenditure + new generation expenditure

The number of retirees of the previous generation will decrease due to death until they fade completely at the end of the repair period, and thus their pension will also decrease until they are nil at 2047 (total expenditure = 0).

Previous generation expenditure = one pensioner's pension * (number of former retirees - number of deceased retirees)

New Generation Expenditure = 2.5% * (Number of Years of Work) * Average 5 years' wages * Probability of survival

Hence:

Total expenditure = one pensioner's pension * (previous number of retirees - number of deceased retirees) + 2.5% * (new generation retirement year-year of remediation) * Average wage awarded for 5 years * Probability of survivor

Expenditure = $DEP_{t+1} + DEP_t$

Expenditure = $PEN_x * (L_{t+1} - L_t * (1 - \text{taux}_m)^{32 - y_{t+1} + y_t}) + \frac{2.5\%}{5} \sum (y_{t+1} - y_t) * (1 + \text{taux}_s)^{t - a - y_{t+1} + y_t} * w * p_x$

2- Income:

Total revenues = previous generation revenues + new generation revenues

The number of first-generation workers will decrease due to death, abandonment of position, demobilization or retirement and thus contributions will decrease until the income becomes totally non-existent at the end of the repair period.

Previous Generation Income = One Worker's Contribution * (Previous Number of Workers - Number of Workers Who Left Work Due to Death, Demobilization or Retirement)

New Generation Revenue = 9% * New Generation Workers' Pay Mass Optimized * Survival Potential

Hence:

Total revenues = 1 worker's contribution * (number of previous workers - number of workers who have left work due to death, demobilization or retirement) + 9% * new generation workers' wage mass optimized * Survival probability

$$\text{Income} = \text{REC}_{t+1} + \text{REC}_t$$

$$\text{Income} = \text{COT}_x * (\text{B}_{t+1} - \text{B}_t * (1 - \text{taux}_m)^{32-y_{t+1}+y_t}) + 9\% * w * (1 + \text{taux}_s)^{r-a-y_{t+1}+y_t} * p_x$$

Where:

DEP is expense

REC is revenue

PEN_x is an individual pension x

COT_x are individual subscriptions x

L is the number of retirees

B Number of new workers

W, n Wage

Taux_m Wastewater Growth Rate

taux_s wage growth rate

r Retirement Age

a Age of admission to work

y Year of Evaluation

p_x Probability of survival of individual x

Reform scenarios

Pursuant to Algerian financial legislation, it is illegal for an employee's salary to be subjected to a double accounting deduction, otherwise this is considered arbitrary. Therefore, in applying the standard reform, it has prepared combinations aimed at changing the value of at least one financial variable to avoid breach of the law (financial, not time or demographic).

The standard study included 7 combinations, as follows:

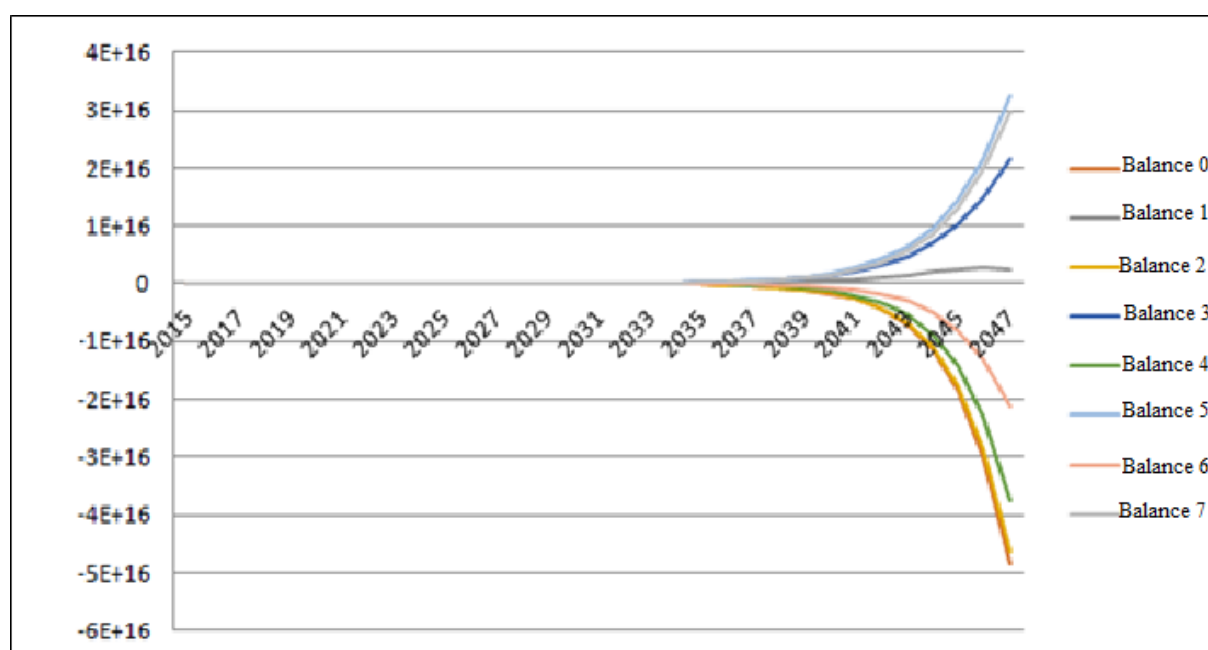
Table 02: Repair Combinations

Scenarios	Variables	Observation
Balance 0	The real state of the Fund's balance in 2015 has not changed.	Deficit in balance
Balance 1	Change in retirement age from 60 to 65 years	Achieve surplus after 5 years of reform
Balance 2	Change the subscription ratio from 9 to 12 %	Achieve a slight decline of the deficit but remain negative
Balance 3	Change in retirement age from 60 to 65 years Change the subscription ratio from 9 to 12 %	Achieve surplus after 4 years of reform
Balance 4	Change the certification ratio of insurance years from 2.5 to 2 %	Achieve a slight decline of the deficit but remain negative
Balance 5	Change in retirement age from 60 to 65 years Change the subscription ratio	Achieve surplus after 4 years of reform

	from 9 to 12 % Change the certification ratio of insurance years from 2.5 to 2 %	
Balance 6	Change in the number of years on the basis of which the average reference wage is calculated from 5 to 10 years	Achieve a slight decline of the deficit but remain negative
Balance 7	Change in retirement age from 60 to 65 years Change in the number of years on the basis of which the average reference wage is calculated from 5 to 10 years	Achieve surplus after 4 years of reform

Source: Prepared by researchers

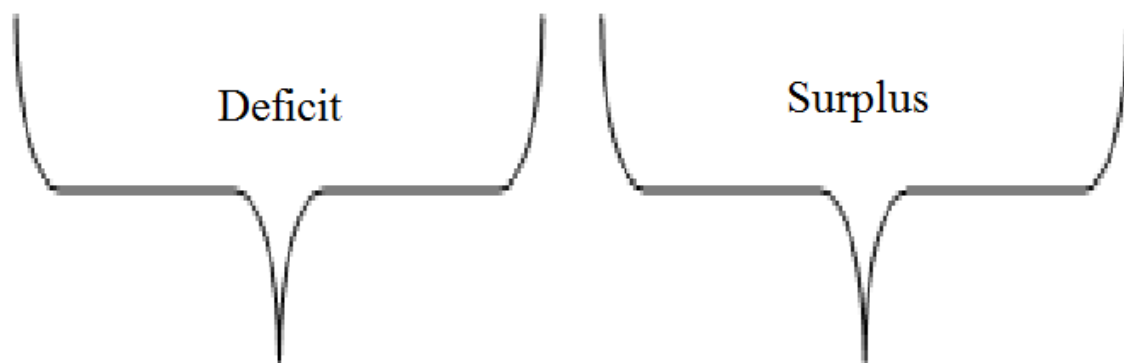
Figure 08: Pension fund balance evolves at various reform combinations (Unit DZD)



Source: Prepared by researchers

Arrange repair curves:

Balance0 < Balance2 < Balance4 < Balance6 < Balance1 < Balance3 < Balance7 < Balance5



Discussion of results

- At the beginning of the 2015 reform, we began with a deficit in the balance of the National Pension Fund estimated at -258 billion DZD, the largest balance in the reform process was the fifth combination balance in which we raised the retirement age from 60 to 65 years old. Increase the contribution rate from 9 to 12% and reduce the insurance years credit rate from 2.5 to 2% in which the problem of deficit was eliminated within 4 years after the start of the reform process, achieving a surplus of 654 billion DZD. Thereafter comes the balance of the seventh combination in which we raised the retirement age from 60 to 65 years and increased the number of years on the basis of which the average reference wage is calculated from 5 to 10 years. The problem of the deficit was eliminated within 4 years after the start of the reform process, achieving a surplus of 1 billion and 447 DZD. Next comes the third combination balance in which we raised the retirement age from 60 to 65 years and increased the contribution rate from 9 to 12%. The problem of the deficit was eliminated within 4 years after the start of the reform process, investigating a surplus of 603 billion DZD. Finally, the balance with the first combination in which we raised the retirement age from 60 to 65, where the problem of the deficit was eliminated within 5 years after the start of the reform process, investigating a surplus of 882 billion DZD. For the remainder of the combination (06, 04, 02), it only allowed the deficit to be reduced by very small proportions without being eliminated or a surplus at the pension fund level.

Extending the age of retirement referral may exacerbate the unemployment phenomenon of certified holders and delay their chances of obtaining permanent employment.

- The majority of those referred to prior retirement returned to temporary positions, which will result in youth unemployment.
- The proposals of the standard study may result in the loss of the rights of certain groups, which requires the adoption of a corrective policy by the State to disadvantage the welfare of the

category not served by the reform, which always remains within the framework of social protection and its organs, such as the Youth's Unemployment Protection Organs.

- The new Retirement Act is effective in the short term in improving the Pension Fund's financial position, contributing to eliminating the problem of deficits and potentially achieving a surplus balance. In the medium and long term, measures to raise the retirement age will re-enter the disability cycle owing to the weak active group that funds the system with social contributions, which will be offset by a significant increase in the number of retirees.
- The weak complementary retirement base provided by social synergies.
- Saving on social security often affects a worker's well-being. He does not always receive amounts equal to those he has saved, as he may receive less or more than he paid, and thus the social justice base is not achieved.

Conclusion

Efficiencies in expenditure on the National Pension Fund allocation need to be combined between the reduction of the insurance years' credit ratio (hence the estimated compensation ratio)

Currently, 80% (and raising the number of years on the basis of which the average reference wage is calculated from 1 to 14 while raising the retirement age from 24 to 21 years which will reduce

From the gesture of benefiting from pensions. Ensuring the financial sustainability of the National Pension Fund requires raising the participation rate while raising the retirement age from 24 to 21.

A year that will increase the crumb of taking advantage of Uncle's complexes.

Of course such reforms require political will, as any change to social security laws will receive popular resistance because it is inconsistent with the interest

The citizen, therefore, must change gradually rather than at once in order to be accepted by all actors.

It is obvious that these reforms will fill the current deficit at the pension fund level, as they aim to improve the Fund's financial pricing by making the balance

Achieves a surplus of income over expenditure, but the question is: will these reforms have negative economic and social implications?

Recommendations

We therefore propose the following recommendations in order to improve the effectiveness of the pension system:

- Raising the participation rate to be offset by a new pension programme supplementary to the distribution system so that the worker does not feel that he contributes to the contributions imposed on him without payment or a fine. This new programme is usually in the capitalization column where the Fund's income is invested and earnings are obtained after being employed in the capital market.

- Reducing the rate of accreditation of insurance years is unfair to the worker, since it will reduce his pension and thus his well-being. It is therefore best offset by the transfer of part of the burden to the supplementary pension system of social mutual benefits to maintain the same level of consumption of retirees.

- Improving the effectiveness of the financial market in order to obtain a return on the employment of the Fund's contributions.
- Transforming from a rente economy based on petroleum incomes, to a productive economy that creates added value and increases national income.
- Review the effectiveness of the social protection system, especially subsidies that go beyond their real destination to help the needy elderly, especially with the presence of the informal sector, where individuals earn unauthorized incomes and benefit from social benefits.
- Rationalize pension fund expenditure taking into account the expected performance and allocation objectives through the quality of social services provided to beneficiaries.

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