Social coverage optimization to reduce social security deficit: Estimation of unrecovered social contributions from non-affiliated employees in Algeria

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Abstract:

The trajectory of social security financial balance, reported by the overall economic tables, reveals three phases of development. The first: growing financial surplus from 1970 to 1986. The second: the decreasing financial surplus, from 1987 to 1990. The oil counter-shock causing the fall of state's revenues, forcing it to review its economic model. The Third: is the growing deficit phase, which began in 1991 and still rising to exceed 800 billion DA in 2021. This deficit is due to the financial crisis of the national pension fund (CNR). Several studies call for the extension of social security coverage to overcome this imbalance, this work attempts to verify this hypothesis, using a scenario based on the assumption of a 100% social contributions recovery. The findings confirm the structural nature of the deficit and the urgent need to systematic reforms.

Keywords: Social contributions, economic transition, structural adjustment plan, informal work, Social security for employees.

Jel Classification Codes:H55, J08, J46, H10.

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1. Introduction:

During the 1980s, Algeria was on the verge of beginning a new chapter of its history. The socio-economic and political challenges, combined with the modest results of the restructuring five-year plan (1980-1984), were already indicating the onset of an economic transition that would significantly affect the socio-economic aspects of society.Thus, all efforts were made to prepare the Algerian economy to embrace a new policy, based on opening up to the rest of the world and encouraging the private initiatives.

To succeed in this transition, the emphasis had to be placed on supporting the new economic orientation by a social policy designed to mitigate the negative externalities of liberalization. Being the main instrument of social policy in Algeria, social security has undergone several changes aimed to strengthening its role in reducing negative externalities of liberalization and precariousness of employment.The access to social benefits, previously restricted by contributory conditions, was gradually modified to integrate solidarity measures ensuring vertical redistribution from high to low wages (Mendil, El moudden, &Hammouda, 2018).

1.1 Research Problematic:

The liberalization of the Algerian labor market led to a decline in permanent employment in favor of non-permanent employment. This shift, among other things, contributed to the emergence of the non-affiliation to social security funds by salaried workers (GHEROUFELLA, 2022). The responsibility for abstaining from affiliation falls on both employers, who seek to reduce their social charges for competitiveness reasons (Friedman, 1962) but also on employees due to ignorance and lack of foresight (Merouani, El Moudden,&Hammouda, 2016).

By exceeding 41% of the employed population (ONS, 2019), the development of informal work in Algerian economy is affecting the social security in two ways: In addition to not paying contributions, informal workers can benefit from social benefits from the system, in the event that they fall under another category of social insured persons (beneficiaries or non-active insured persons). Especially since this phenomenon of non-declaration is widespread among young people and women (Souag, Hammouda,& Adair, 2016). A hybrid social security with a predominantly Bismarckian insurance model (Merouani, El moudden, & Hammouda, 2014) which is supposed to be primarily funded by social contributions was unable to cover nearly 40% of its social benefit expenditures in 2021.

A contributory pension system managed on a pay-as-you-go basis suffers from a recurring deficit exceeding 640 billion dinars in 2020. It is considered generous due to the replacement rates it offers and its coverage of certain categories without requiring contributions from their part (El moudden, Benallah, Bonnet, & Math, 2012) this system is now being called upon to rationalize its benefit expenditures and optimize its funding resources.The observation of deficit and the development of undeclared employment, pushes us to raise the question of whether the extension of social coverage to all salaried employees, all things being equal, will make it possible to eliminate the deficit of the social security system for employees?

1.2 Research Aims:

The objective is to attempt an estimation of the unrecovered contributions from employees not affiliated to social security in Algeria. With a practical application in mind, answering this question will shed light on the nature of the deficit in question and the extent of the revenue that escapes the salaried workers' social security funds.The article is structured in four sections to provide a comprehensive analysis of the evolution and challenges of the social security system in Algeria.

The first section examines the era of the planned economy when Algeria's social security system was thriving. The second section addresses the challenges faced during economic downturns, where social security system was slowing down. The third section highlights the persistent financial struggles over the past thirty years. Finally the fourth section explores the estimation of unrecovered contributions from non-affiliated employees, using a scenario based on the assumption of a 100% recovery rate of contributions.

2. The planned economy era: a social security system in surplus

After its independence, specifically in 1967, Algeria chose to adopt an economic planning approach characterized by the socialization of means of production and a centrally administered management of the economy, with the objective of building a basic industrial sector.

By adopting this model, Algeria prioritized social justice, economic development, and the preservation of its independence. Moreover, believed that planning was the path to take, through a policy of planned industrialization, which imposed the austerity, where industrial investments reached 40% of GNP.A few years after the adoption of this economic policy, sustained growth was achieved.

With the State as the main employer, the country was witnessing massive salaried employment of its productive population (76% of the employed active population was salaried in 1977 compared to 67% in 1966).This process has allowed a remarkable drop in the level of unemployment in Algerian society. Reduced by almost 50% between 1966 and 1982, unemployment fell from 32.9% to 16.3%. And it was exactly in 1984 that it reached its lowest level, namely 8.7%.

2.1 Impact of the economic situation on the social security:

Far from being without effects on social security, the above elements have enabled the strengthening of the financing of its funds. The number of contributors has multiplied and the number of people insured has tripled. Statistical data show that the number of personally insured persons increased from 906,000 to 2,829,000 between 1970 and 1980.

The overall volume of social contributions increased at an annual growth rate of nearly 20% during the period 1978 and 1982. This resulted in a positive and increasing balance for the system, as demonstrated by the data in the following table:

Table N°1:Social security contributions and benefits (1975-1986). (Unit: millions DA)

Year	1975	1979	1983	1986
Social contributions	2 197,8	6 907,1	10030.8	22074,5
Social Security benefits	1 656,0	4348,40	6452.2	11480,4
Balance	541,8	2558,7	3578.6	10594.1

Source : ONS, Rétrospective des comptes économiques (1963 à 2014). Editions 2016.

The system was able to cover all its expenses with its own resources. Which contributed to the establishment of a significant financial reserve, amounting to five times the operating budget of the Ministry of Health in 1980 (GRANGAUD, 1984).In addition to the favorable economic conditions that promoted the increase in the number of contributors, the financial stability of social security was due to certain characteristics that restricted access to social benefits through contributory conditions.

This excluded the unemployed and first-time job seekers from social coverage. Statistics show that in 1982, social security left approximately 40% of the Algerian population without coverage, preventing them from benefiting from social insurance services (OUZZIR, 2006). This presented an inconsistency with the public authorities' policy of improving social well-being.To eradicate all forms of social exclusion among workers, a process of overhauling social security system was initiated.

2.2 Using economic growth to serve social justice:

Encouraged by the positive economic results of the 1970s, the generalization and harmonization of social security in Algeria began in the middle of this decade. Where we find the first unification measures bringing together the 11 regimes and 71 social security organizations under a national social security fund and regional and professional social insurance funds.

In addition to Ordinance No. 71-74 of November 16, 1971, concerning the socialist management of enterprises, which emphasized the protection of employees from all forms of professional and social exploitation, there were provisions in Law 78-12 of August 5, 1978, concerning the general status of workers. Article 9 of this law states: “In application of the principles set forth by the national charter regarding the social protection of workers, the state ensures the social protection of the worker and their dependents against the effects of old age, illness, accidents, and death”.A national commission to overhaul social security was established by Decree No. 75-43. Its mission was to carry out in-depth reflection on social insurance in Algeria.

The work of this commission was crowned by the promulgation of all legislative and regulatory texts on social insurance in 1983: (Social insurance law no. 83-11), (Retirement law no. 83-12), (Work accidents and occupational diseases law no. 83-13). Following whichinstitutional reforms were undertaken to unify the system, standardize it and generalize it (Rouabhi, 2010).

2.3 Unification of the social security system:

Designed with the aim of improving social protection, the reform laws of 1983 represent a decisive shift in the trajectory of social security in Algeria. The unification and harmonization of social security, as well as the expansion of its role in providing social benefits characterized the overhaul. This was manifested through the reorganization of the system under new principles, moving away from an insurance-based logic towards a social assistance logic.

The reform efforts aimed to address the contributory and occupational nature of the system, which had previously prevented inactive individuals from accessing social coverage.All national and regional social security funds have been grouped under two main insurance funds: The national social insurance and work accident fund (CNASAT) and The national pension fund (CNR).

The unification of rights and obligations for all professional categories (employers, employees, self-employed individuals, and those classified in special categories), as well as the consolidation of funding sources, aimed to create a social security system based on principles of equality, unity, and uniformity. This departure from the Bismarckian insurance logic was ambitious in its goal to achieve a more cohesive social protection framework.The pursuit of equality involves a social protection model known as "social-democratic," aiming to de-commodify social rights by protecting the entire society against socio-economic inequalities stemming from arbitrary income distribution (Esping Andersen, 1990).

Historically, Lord W. Beveridge designed a flagship model around the idea of universality after the Second World War Based on Keynesian ideas of full employment. The main concern of this model was to reconcile macroeconomic policy and social protection by fighting against income inequality and massive unemployment to stimulate the economy.The effort to unify social security in Algeria was possible by the positive economic results of the 1970s and the growth in wage employment.

The unification was accompanied by a desire to extend coverage more broadly. The laws of 1983 envisioned an expansion of the categories covered by social security on a dual level, insured persons and beneficiaries and integrated even a third category namely specific categories. Which include workers equivalent to employees, those engaged in particular activities, individuals not engagedthe effort to broaden social coverage expanded social security beyond traditional professional affiliations to include other categories such as non-active insured individuals.

In addition to horizontal transfers based on professional solidarity, the system was designed to perform vertical transfers based on national solidarity. in any professional activity, and beneficiaries of social and professional integration schemes.However, the favorable economic situation supporting national welfare funding quickly changed with the onset of 1986 oil price crash. The socio-economic repercussions of this downturn were severe, prompting public authorities to change the national economic model and thereby adjust the social security system once again.

3. Economic Downturn: A Social Security System in Slowdown

The modest outcomes of the 1980-1984 five-year restructuring plan and the precipitous decline in state revenues triggered by the 1986 oil price shock exposed the inherent limitations of the centralized planning model.Due to negative GDP growth rates that began in 1987, a sharp increase in unemployment (20%) and rising inflation, a shift in course was required starting in 1988 by the promulgation of laws that initiated the transition from a centralized planning system to a market economy.

In order to facilitate this kind of shift, the focus was first on integrating a social policy with the future economic strategy in order to lessen any unfavorable externalities.In this context, social security was set to play a crucial role, despite beginning to experience a deceleration in revenue growth relative to its benefits. (Table n° 2).

Table N°2 Social security contributions and benefits (1986-1990). (Unit: millions DA)

Year	1986	1987	1988	1989	1990
Social contributions	22074,5	22585	23259	26030	26884
Social Security benefits	11480,4	12161,4	17854,3	19744,8	25367,3
Balance	10594.1	10423.6	5404.70	6285.2	1516.7

Source :ONS, Rétrospective des comptes économiques (1963 à 2014). Editions 2016

With balances dropping from 10,594.1 billion DA in 1986 to 1,516.7 billion DA in 1990 and later turning negative, social security faced a serious reversal and entered a new phase in its history, that of chronic deficit.

4. The economic transition: Three decades of social security deficit

Being the main instrument of social policy in Algeria, social security once again underwent modifications during the 1990s, aimed at strengthening its role in reducing the negative externalities of liberalization of the national economy and job insecurity.Unified for both employees and non-employees until 1992, social security was restructured into two subsystems by decree No. 92-07, which established:

- The National Fund for Social Insurance for Salaried Workers (CNAS).
- The National Fund for Social Insurance for Non-Salaried Workers (CASNOS).

This separation is due to the emergence of non-salaried people following the development of the private sector after the removal of institutional obstacles hindering its development since 1988.

4.1 The structural adjustment plan: using social security to facilitate workforce reduction in public entreprises

Due to external debt servicing reaching 80% of export revenue and an external balance in deficit of less than $240 million in 1989, Algeria experienced an economic downturn. The unemployment rate climbed to nearly 30% by 1994. Debt rescheduling became necessary, subjecting Algeria to International Monetary Fund (IMF) restrictions following the signing of the Structural Adjustment Program (SAP) agreement in April 1994.The SAP prioritized reducing public investments and the disengagement of the state from the labor market. A public enterprise recovery program between 1994 and 1997 led to the dissolution of 815 enterprises and the loss of 405,000 jobs (MUSETTE, ISLI,&HAMMOUDA, 2003):

- 212,960 workers laid off.
- 50,700 beneficiaries of voluntary departure compensation.
- 100,840 placed on technical unemployment.
- 40,531 admitted to early retirement.

In order to relieve the social shock due to such measures, the legislator promulgated the following texts:

- Legislative Decree No. 94-09, preserving employment and protecting workers likely to involuntarily lose their jobs.
- Legislative Decree No. 94-10 Establishing early retirement.
- Legislative Decree No. 94-11 unemployment insurance for workers likely to involuntarily lose their jobs due to economic reasons
- Legislative Decree No. 94-12 setting the social security contribution rate.

Charging social security, already in financial difficulties (see table no. 3), with bearing the cost of layoffs cases and early retirements.A social protection program was implemented (AFS and IAIG) managed by the social development agency and financed by the aid fund for disadvantaged social categories with more than 945,000 beneficiary households, the establishment of the national social security fund unemployment insurance (CNAC) for laid-off workers, without forgetting early retirement.

Table N°3:Social security contributions and benefits (1991-1999). (Unit: millions DA)

Year	1991	1993	1995	1996	1997	1998	1999
Social contributions	36134	59990,8	78514	95247,2	110454,2	113253,4	171475
Social Security benefits	42644,3	67728,2	103567,2	138704,4	168626,4	198437,3	255022,2
Balance	-6510.3	-7737.4	-25053.2	-43457.2	-58172.2	-85183.9	-83547.2

Source :ONS, Rétrospective des comptes économiques (1963 à 2014). Editions 2016

Decree No. 94-188 established the National Unemployment Insurance Fund (CNAC). The unemployment benefit is set at 50% (or more) of the reference salary and cannot be less than 75% of the guaranteed national minimum wage (SNMG). At the end of 1999, the CNAC recorded the submission of 192 558 files of laid-off workers, 99% of which came from the public sector.

Laid-off workers are eligible for the early retirement plan provided they have accumulated twenty years of experience, contributed for ten years and are at least 50 years old for men and 45 years old for women. Ordinance No. 97-13 in 1997, established proportional retirement and retirement without age conditions.In addition to the CNAC, social security was equipped in 1997 with a national fund for paid leave and bad weather unemployment in the construction, public works and hydraulics sectors (CACOBATH).

To summarize, social security is made up of five insurance funds having the status of public establishment with specific management (law 88-01), ensuring coverage of all social risks stipulated by convention 102 of the organization International Labor Organization, namely:

- Medical care, disability, death, illness, maternity, work accidents, and occupational diseases are covered by the (CNAS) for salaried workers and (CASNOS) for the non-salaried workers.
- Retirement (CNR)
- Unemployment (CNAC).

This rehabilitation of social security, to contain the effects of the crisis, caused a slowdown in revenue compared to the growth in expenditure. Leading to a progressive imbalance (contributions-benefits) exceeding 83 billion DA at the end of the 1990s.

The liberalization of the labor market and the expansion of the scope of social security intervention had serious financial repercussions, which can be observed in the changes in the financial balances of the system during the period from 1999 to 2010.

Table N°4:Social security contributions and benefits (1999-2010). (Unit: millions DA)

Year	1999	2000	2001	2003	2005	2007	2010
Social contributions	171475	193832	234260,4	257914,2	301502,8	398414	629773,6
Social Security benefits	255022,2	261161,7	317283,6	343733,2	400947,8	518410	741575,8
Balance	-83547.2	-67329.7	-83023.2	-85819.2	-99445	-119996	-111802

Source :ONS, Rétrospective des comptes économiques (1963 à 2014). Editions 2016

With the state's withdrawal from the labor market and its liberalization following Law 90-11, a new configuration of the labor market emerged. This included a rise in independent workers and employers, as well as a decline in permanent salaried employment in favor of non-permanent salaried employment.

By 2019, non-permanent salaried workers represented nearly 30% of the active population and more than 40% of all salaried employment.The main characteristic of this category of non-permanent salaried workers is their predominant non-affiliation to the social security system, with 56.8% not being registered in 2014.

The development of informal work, which exceeds 41% of the employed population, affects social security on two fronts. In addition to not paying contributions, informal workers can take advantage of the social benefits of the system if they fall under another category of social insured, such as dependents or non-active insured persons.

Consequently, they can benefit from social services without needing to contribute.This depletes the system's resources while increasing its expenses. This state of deficit persists and is becoming increasingly alarming (Table No. 5).A Bismarckian-type system, which is supposed to be mainly funded by social contributions, is unable to cover nearly 40% of its social benefits expenses in 2021.

Table N°5:Social security contributions and benefits (2011-2021). (Unit: millions DA)

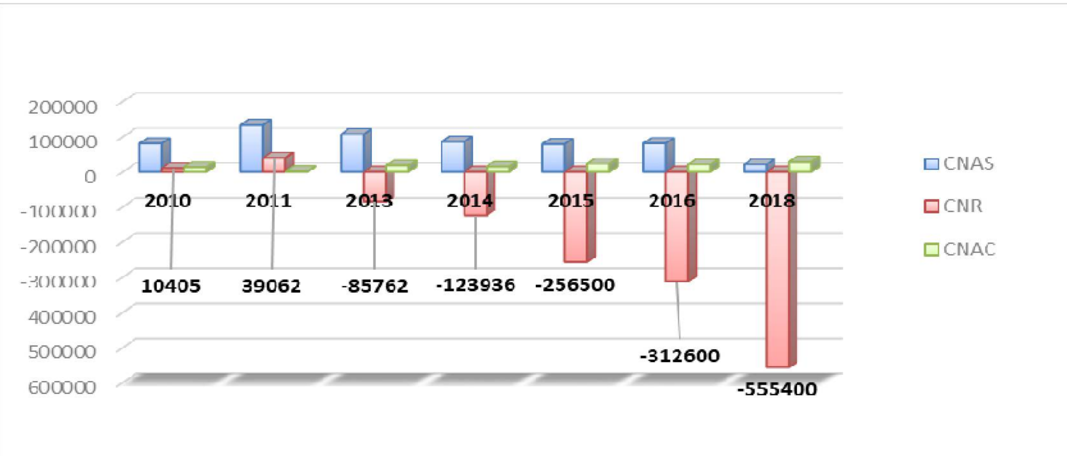
Year	2011	2013	2015	2017	2019	2020	2021
Social contributions	779548,6	1002345,7	1142056,1	1154930,9	1220420,7	1221002,7	1277260,8
Social Security benefits	833575,9	1201948,9	1447889,1	1778099,7	1857717,4	1993261,2	2092320,6
Balance	-54027.3	-199603	-305833	-623169	-637297	-772259	-815060

Source :- ONS, Rétrospective des comptes économiques (1963 à 2014). Editions 2016. And TEE 2016-2019 et TEE 2019- 2021.

4.2 National Pension Fund (CNR) in Deficit: Cyclical or Structural?

According to data from the National Office of Statistics (ONS), social insurance funds are facing financial difficulties that are compounding and becoming a heavy financial burden.The National Pension Fund (CNR) stands out due to its growing financial deficit over several years (Figure 1). Since the signing of the Structural Adjustment Program (SAP), the number of its beneficiaries has increased significantly, from 820,600 retirees in 1994 to nearly 3,400,000 in 2023. This has led to an acceleration of the financial deficit of the salaried system.

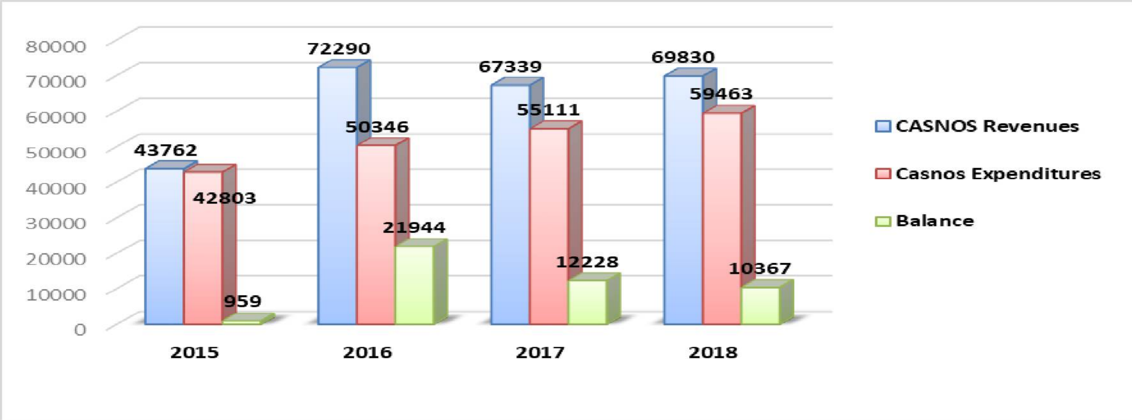
Fig N° 1:Evolution of the financial balance of salaried insurance funds (2010-2018). (Unit: Millions DZD)



Source: ONS, l'Algérie en quelques chiffres éditions : 2014, 2017 et 2021.

Compared to the salaried system, the non-salaried system managed by CASNOS, performs better financially (Figure n°2). Despite the problems of improvidence it experiences. Employers and self-employed people are known for their inclination to immediately maximize profits and minimize costs of all kinds, including those of social security. This justifies the low rate of social coverage of this socio-professional category with insurance funds. In 2014, nearly 1,491,000 self-employed people were not affiliated to social security.

Fig N° 2:Evolution of Revenues and Expenditures of Non-Salaried Regime (2015-2018). (Unit: millionsDA)



Source: ONS, AQC éditions: 2021.

4.3 The Causes of the national pension fund (CNR) deficit:

The pension system for salaried workers is mandatory, contributory, and managed on a pay-as-you-go basis. This implies a focus on financial sustainability in its management.Characterized as generous (El moudden, Benallah, Bonnet, & Math, 2012) due to offering relatively high pension rates and the possibility of early retirement from the mid-1980s until 2016.

As for the replacement rate, an indicator of the relative standard of living of retirees, it ranges from 37.5% to 80%, and can reach up to 90% for retirement without age conditions (Mendil, El Moudden, & Hammouda, 2018), which concerns workers who have accumulated long years of service, numbering 246,503 in 2015.The CNR is suffering from great financial difficulties expressed by a redundant deficit for several years (figure. 1). This deficit is increasing to reach the sum of 640 billion dinars in 2020.This imbalance between the volume of revenue and that of expenditure is mainly due to economic and demographic causes.

4.3.1 The economic causes of the deficit:

Comparing the development of CNR expenses to its revenues during the period 2013-2018 (table 6), we find that revenues are growing at an average annual growth rate equal to 1.32%, while the growth rate of expenses is 13.41%.

Table N°6:Development of CNR expenditure and revenue (2013-2018). (Unit: millions DA)

CNR	2013	2014	2015	2016	2017	2018	Moyenne
Revenues	669,6	648	668,5	695	699,1	714	682,3666
%Growth		-3,23%	3,16%	3,96%	0,59%	2,13%	1,32%
Expenditures	678,8	803,1	909,5	1036,9	1187,4	1270,3	981
% Growth		18,31%	13,25%	14,01%	14,51%	6,98%	13,41%

Source : ONS data.

This rapid increase in expenditure is due to the revaluation of retirement pensions to significant levels during the years 2011 at 10%, 2012 at 9%, 2013 at 11% and 2014 at 12%. With a cumulative increase in pensions between 2002 and 2016 reaching 86.5%.In addition, the revisions of the guaranteed national minimum wage (SNMG) in 2010, 2012 and more recently in 2021 by presidential decree no. 21-137 setting it at 20,000 DA, lead to an increase in retirement expenses.

Since minimum pensions are calculated at 75% of the SNMG according to law 12-83.Finally, the use of retirement (early and without age conditions) from the 1990s until 2016 (for the economic reasons given), caused an increase in the number of retirees, resulting in an increase in retirement costs in Algeria.

4.3.2 The demographic causes of the deficit:

From a demographic perspective, the dependency ratio of contributors to retirees dropped from 8 employees per retiree in the early 1990s to 1.97 employees per retiree in 2018. This ratio is well below the standard, which requires at least 6 active contributors per retiree.The average number of people retiring increased during the period 2011-2017, with 162,500 retirees per year, compared to only 84,854 during the decade 2001-2011.

Moreover, the situation risks getting worse from 2020 with the arrival of large generations at retirement age (60 years and older) 5,347,931 in 2025 and 6,626,437 by 2030. This will bring the national dependency ratio closer to that of European countries and will create a shock on the financial balance of the pension system(Mendil , El moudden, & Hammouda , 2018).

Table N°7:Evolution of the number of new retirees (2012-2017).

Year	2012	2013	2014	2015	2016	2017
Nbr retirees	129652	162870	147876	143203	204891	188311

Source : ONS, L'Annuaire statistique de l'Algérie n°35.

The importance of demographic coverage of retirees by a sufficient number of contributors is particularly significant in a pay-as-you-go system. This system entails the redistribution of contributions collected from the active population in a given year as pensions paid to retirees in the same year. Consequently, extending social coverage is advocated by several studies addressing the issues of financing social security (Merouani, El moudden, & Hammouda, 2014) or addressing its effectiveness. (MendilD. , 2014).

5. Can extending social coverage restore the financial balance of social security for salaried workers?

To answer this question, we will attempt to estimate the revenue from unpaid social security contributions by uninsured salaried workers.This uncollected revenue will be compared to the financial deficit of employee social security, represented by the deficit of the CNR. This estimation will help us to approximate the potential of social contributions in financing the salaried system.

5.1 Estimation Method:

To avoid overestimating or underestimating the potential revenue of the CNAS, the method adopted in this study revolves around developing an average contribution per salaried, allowing the smoothing of individual characteristics of the contributors (Hammouda & Souag, 2012).This smoothing by average aims primarily to provide a unified representation of contributions from all categories of contributors (permanent, non-permanent, public, private, seasonal workers...). Especially since the results of the ONS survey on wage incomes and the individual characteristics of Algerian employees (Statistical Collections No. 189), as well as the study (Benhabib, 2021) confirm the low inequality in monthly salaries between permanent and non-permanent employees.

Given the aforementioned elements, we assume an equivalent average contribution for both declared and undeclared employees.The average annual contribution per insured salaried (AACIS) is calculated as follows:

$$\text{AACIS}_n = \frac{\text{Total annual revenue from social contributions (year n)}}{\text{Number of contributing salaried employees (year n)}}$$

Once the average annual contribution is calculated. It will be multiplied by the number of non-contributing employees to approximate the uncollected annual revenue. After estimation, the uncollected revenue must be allocated across the various insurance funds of the salaried system based on executive decree No. 15-236 of September 3, 2015, amending executive Decree No. 94-187 of July 6, 1994, which sets the distribution rate of social security contributions.

Table N°8:Contribution rate and its distribution across social security branches and funds

Branches	Quota part	Funds
Social insurance	13%	Managed by the **CNAS**, the amount of revenue from these two branches represents **41.3%** of total social contribution revenue.
Workplace Accidents and Occupational Diseases	1.25%	
Retirement	18.25%	Managed by the **CNR** the amount of revenue from these two branches represents **54.3%** of total social contribution revenue.
Early Retirement	0.5%	
Unemployment Insurance	1.5%	Managed by the **CNAC** and represents **4.4%** of total social contribution revenue.
Total	**34.5%**	**100%**

Source: Elaborated by the researcher based on data from Executive Decree No. 15-236 of September 3, 2015, establishing the distribution of the social security contribution rate.

According to the shares allocated to each insurance branch, the law stipulates a distribution of the total social security contributions among the three insurance funds as follows: CNAS 41.3%, CNR 54.3%, and CNAC 4.4%.Finally, a comparison between the financial needs of the CNR expressed as a deficit, and the financial revenue calculated from non-contributing employees wages, will demonstrate the potential and limits of a social contributions financing method under current conditions.

Table N°9:Evolution of the total revenue of the salaried workers' scheme (2014-2018). (Unit: ThousandsDA)

Revenue	2014	2015	2016	2017	2018
CNAS	459756682	474944052	482064544	492339742	489094000
CNR	648000000	644000000	724300000	699100000	714800000
CNAC	40114000	126484000	85766000	29303000	39640000
Total	1 147870682	1 245428052	1 292130544	1 220742742	1 243534000

Source : ONS, annuaire statistique de l'Algérie N°35, AQC édition 2021.

The total revenue of the salaried workers' system consists of three sources of funding:

- **Social Contributions:** These include contributions from salaried workers, deducted at a fixed rate of 34.5% of the salary subject to contributions as defined by law. Additionally, there are social insurance contributions for retirees set at 2% of the main benefit.
- **State Budget:** This covers family allowances and so-called national solidarity expenses through the provision of a differential supplement for retirees whose pension amount from contributory rights does not reach the legal minimum, which is 75% of the SNMG and 2.5 times the SNMG for moudjahidine. The state also finances supplementary allowances provided for small retirement and disability pensions and retirement allowances, as well as exceptional revaluations.
- **Other financing sources** provided by the income from the funds placed; the eligibility contributions paid by employers for unemployment insurance and early retirement; late payment surcharges and penalties and other financial sanctions against employers who default on the obligations of taxable persons; donations and legacies.

To obtain the total amount of social contributions, financial resources from the state budget and other funding sources must be subtracted from the total revenue of the salaried workers' system.

Table N°10:Deduction of the value of social contributions during the period (2014-2018) in 1000 DA

	2014	2015	2016	2017	2018
Revenues (1)	1 147870682	1 245428052	1 292130544	1 220742742	1 243534000
State * (2)	382 760 000	456 387 000	432 910 000	440 510 000	445 800 000
Other sources (3)	25713775	19078232	21821102	32460971	24768520
Social Contributions of retirees **(4)	16062000	18190000	20738000	23708000	25406000
Social Contributions= (1) – (2+3+4)	723334907	751772820	816661442	724063771	747559480

*The funding expenses covered by the state budget are: (family allowances, social insurance, pensions, and annuities).

**The contributions of retirees are obtained by applying the social contribution rates (2%) to the total income of retirees.

Source: According to data gathered from:

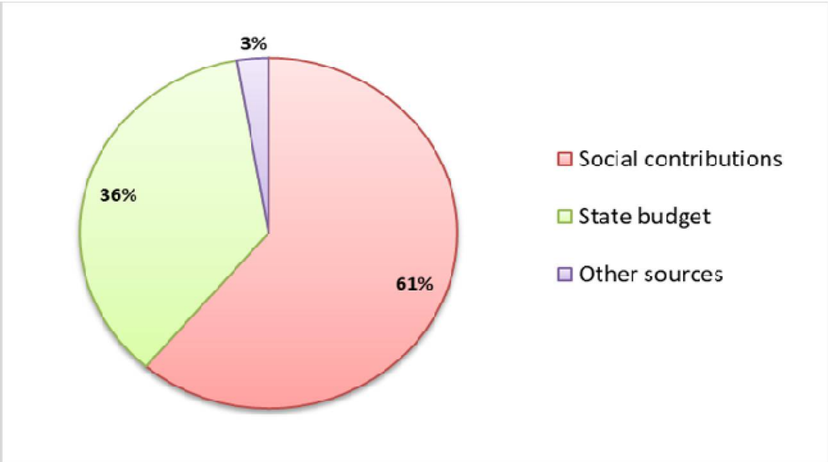
- ONS, Algeria Statistical Yearbook No. 35, AQC edition 2021.

-CNR Data.

- The Court of Accounts (2014, 2015, 2016, 2017, and 2018).

In accordance with its hybrid nature (Merouani, El moudden, & Hammouda, 2014) combining funding from social contributions and taxes, the 2018 statistics show that the salaried workers' social security system is financed as follows: 62% from social contributions, 36% from the state budget, and 2% from other sources.

Fig N° 3:Proportion of social contributions, state funding, and other sources in the financing of the salaried workers' system (2018).



Source: ONS Data.

Using the total revenue from social contributions and the number of salaried workers during (2014-2018) we calculated the average annual contribution per insured salaried, and the results are as follows:

Table N°11: Evolution of the average annual contribution per insured salaried (2014-2018) (Unit: Thousand DA)

Year	2014	2015	2016	2017	2018
Social contributions (1)	723334907	751772820	816661442	724063771	747559480
Contributing employees (2)	5938431	6126302	6140078	5874042	6347433
AACISn=(1)/(2)	121,8057273	122,7123345	133,0050599	123,2649973	117,7735125

Source: Elaborated by researcher based on ONS Data.

According to Table (11), the average annual contribution per affiliated employee (AACISn) is estimated to be around 123,712.3263 DA.Multiplying this amount by the number of non-contributing employees can provide insight into the potential revenue that could be gained from the affiliation of current non-affiliated employees.

Table N°12: Estimation of annual unrecovered revenue by the salaried system (2014-2018). (Unit: Thousand DA)

Year	2014	2015	2016	2017	2018
AACISn (1)	121,8057273	122,7123345	133,0050599	123,2649973	117,7735125
N° uninsured salaried (2)	1324569	1270698	1417922	1639958	1059567
Unrecovered revenue = (1) x (2)	161340090,4	155930318	188590800,5	202149418,4	124788927,4

Source: Elaborated by researcher based on ONS Data.

By multiplying the average annual contribution per affiliated employee (AACISn) by the number of non-affiliated employees during the period (2014-2018), we obtain an average result of 166,559,910,900 DA. This amount is annually lost by the insurance funds of the salaried workers due to non-affiliation.In addition to being below the financial deficit of the CNR, theoretically, this amount cannot be entirely allocated to it. According to table (9), only 54.3% of the amount is dedicated to the CNR, 41.3% to the CNAS, and 4.4% to the CNAC.

Table N°13:Allocation of the estimated unrecovered revenue on insurance funds of salaried workers. (Unit: thousands DA)

	2014	2015	2016	2017	2018
CNAS	66633457,33	64399221,32	77888000,6	83487709,78	51537826,99
CNR	87607669,09	84670162,66	102404804,7	109767134,2	67760387,56
CNAC	7098963,97	6860933,99	8297995,22	8894574,40	5490712,80
Total	161340090,4	155930318	188590800,5	202149418,4	124788927,4

Source: Elaborated by the researcher.

The 100% recovery of social contributions would reduce the financial deficit of the CNR by an average of only 90,442,031,630 DA per year during the period (2014-2018).

Table N°14:Theoretical balances of CNR under conditions of 100% Social Contribution Recovery

Year	2014	2015	2016	2017	2018
Balance of CNR (1)	-123936000	-256500000	-312600000	-486300000	-555400000
Unrecovered revenue (2)	87607669,09	84670162,66	102404804,7	109767134,2	67760387,56
Theatrical balance = (1) + (2)	-36328330,91	-171829837,3	-210195195,3	-376532865,8	-487639612,4

Source: Elaborated by the researcher.

This result confirms the structural nature of the crisis experienced by the salaried social security.Based on an annual contribution average of 123,712.32 DA, the number of contributing employees who must be affiliated to salaried social security, in order to rebalance the deficit of 555,400,000,000 DA recorded by the CNR in 2018, is 8 267 859 additional employees to the 6 347 433 already affiliated during the same year.

With 14,615,292 contributors, the dependency rate would be 4.5 contributors for one retiree.This rate would bring the technical balance from (-555.4 billion DA) to 0 DA. However, the fund is expected to ensure the sustainability of its balances by generating technical surpluses. This requires a dependency ratio equal to or greater than 5 contributors per retiree in the coming years.

This requirement remains difficult to achieve with the present economic and demographic potentialities of the national labor market.Marked by an aging population trend, the ratio of the working-age population to the retirement-age population will drop from 6 in 2021 to 2.7 in 2050 (Felici & Planchet, 2020) This illustrates the future financial difficulties of social security and further complicates the reform work to be undertaken.

The structural nature of the financial imbalance necessitates reforms. These reforms can be parametric to urgently stabilize the imbalance but must be systemic to eradicate it in the future.Especially that a multi-scenario study projections, have demonstrated the inability of parametric reforms to ensure the financial sustainability of the retirement system (Felici, F . 2023). The system will remain in deficit in both the short and long term, even under the most favorable simulation scenarios.

6. Conclusion:

Algeria's economic transition led to the readjustment of public institutions to the requirements of the new development model. Being the main instrument of social policy, social security has been the subject of several reforms aimed to strengthening its intervention to ease socio-economic tensions due to restructuration and structural readjustment operations.

Despite the efforts made to restrict social exclusion due to labor market liberalization (social safety net, unemployment insurance, early retirement without age conditions, etc.), the system assists to persistence of informal work.

The rising costs of benefits, coupled with the limitations of social contribution revenues, have led to a structural deficit in the salaried workers' system. This enforced the state to intervene repeatedly to mitigate the imbalance, providing nearly 600 billion DA in 2019, in addition to authorizing the National Investment Fund to grant subsidized interest rate loans to the CNR.

Estimates of extending social coverage to non-contributing employees show that the average unrecovered amount is 166,559,910,900 DA per year. Comparing this amount to the growing deficit of the salaried system reveals its limitations. In the case of 100% recovery of social security contributions from salaried workers, the CNR would reduce its deficit by an average annual amount of 90,442,031,630 DA but would remain in deficit.

Although the recovery of all social security contributions remains more than necessary, it is more than urgent to consider eliminating the deficit by acting on a dual level, namely the optimization of financing resources and the rationalization of costs.Having provided some estimation elements regarding the non-affiliated employees to social security funds, the study should be complemented by research addressing the feasible operational methods for recovering social contributions from non-contributing employees.

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