

Comparative study of Moroccan pension systems in terms of equity

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Abstract— The Moroccan pension system, the subject of much current debate, is designed on the basis of a pay-as-you-go system, the pensions paid to current retirees are financed by the working population of the same period. Such an operation is likely to disrupt the distribution of income of the same generation, as among future generations, due to the generosity of certain schemes on the one hand and unfairness on the other. However, there are several pension systems around the world, each based on a different philosophy and calculation bases. The aim of this work is to analyse the intergenerational and intragenerational equity of the pension system in force in Morocco, initially through indicators and in particular from standard cases, then we will be able to establish a comparison between what a pensioner receives compared to what he has contributed during his period of activity for a better visibility on the system.

Index Terms— retirement system, equity, redistribution, intergenerational, intergenerational.

1 INTRODUCTION

Pension systems by definition have aimed above all to ensure a minimum subsistence level for workers who are too old to continue in their jobs, in other words, working people pay premiums called "contributions" to this organisation, which in turn guarantees them an income when they retire called "retirement pension".

However, nowadays, this minimum base is assured and retirement is a new age of existence, reward for a lifetime of work, which is now usually achieved in good health, countless mechanisms have contributed to this growing imbalance between active contributors and inactive recipients. The Moroccan pension system is no exception to this rule, numerous studies and reports have already demonstrated the urgent nature of the reform of its pension system. Indeed, the Moroccan economy has little job creation and low economic growth, unemployment and the aging of the population born after independence have gradually created an imbalance between active contributors and inactive recipients, solutions exist, but each at a political and social cost that increases more and more over time. Thus during the last 20 years, the main pension schemes (CNSS, CMR, RCAR, CIMR) In 1980, an average of 15 people aged 20 to 60 contributed to the income of a single retiree, whereas in 2002 the ratio fell to 3.35 working people for every retiree; the unbalanced evolution of the population of contributors and beneficiaries explains this significant decline; in this respect, the reform of pension plans is becoming an urgent priority. We must consider a proposal acceptable to contributors and beneficiaries that can save this system from a fall that will be costly not only at the level of pension systems but also at the macroeconomic level leading to other problems, so any resolution made must be part of a long-termist logic that ensures the sustainability of systems.

All in all, this work aims to elucidate an essential element which is equity, this element is essential within any distribution made by systems, whether intergenerational or intragenerational. This article is based on the work carried out by several researchers who have tried to analyse the impact of pension reforms worldwide, in particular the work of DUPUIS J-M., EL MOUDEN C, PETRON A and BLANCHET D who have proposed reforms for the sustainability of pension systems. In this sense, Morocco has embarked on a process of analysis and reform of its pension systems, a reform that must meet the expectations of the political, economic and social world. These reforms have an impact on the redistribution that occurs in different generations and within the same generation. In this context, our article will constitute an attempt to answer and analyse the equity of the Moroccan pension system.

2 INTRA-GENERATIONAL EQUITY MEASURES

2.1 Comparison of cases :

The first source of inequality between employees of the same generation is institutional diversity. If the age of entitlement is the same for all four funds, the other parameters differ from one fund to another. These differences are presented in the table below:

Thus, and because of this institutional diversity, inequalities in treatment are produced in favour of public sector employees. Because the highest pension level is attributed to the public sector. As well as the reference salary differs from one

plan to another.

TABLE 1
COMPARISON OF CASES

	CMR	RCAR	CNSS
Reference salary	Last salary	Average career salary	Salaries Average of the last eight annual
Pension rate	100%	90%	70%
Pension rate Contribution period required to reach maximum	40 years	45 years	7560 days reported (approximately 30 years)

Source: established by us

But it is important to take into consideration the length of contribution required to benefit from a full pension. Thus a CNSS pensioner can have a full pension at around 30 years of service, a CMR affiliate can have it after 40 years of contribution, while a RCAR affiliate can have it after 45 years of work. This heterogeneity of parameters therefore generates a certain inequality within a group of pensioners of the same generation affiliated to different pension schemes. This inequality in terms of pension paid is presented in the

TABLE 2
PENSION COMPARISON

	CMR	RCAR	CNSS	CIMR
Average pension l	7015.46	4783.92	2083.02	3342.03
Minimum pension	1000(5 years service)	1000	10 00	---
Maximum pension	No ceiling	10956	4200	---

Source: established by us table below.

The pension legislation in force has introduced a minimum common pension between the schemes (1000DH/month). However, it is clear that the average pension differs from one plan to another. Indeed, we have noted above that Moroccan pension schemes present a certain degree of inequity. In what follows, we will try to measure this inequity.

2.2 Measurement indices:

To measure equity within a generation, we will use two main indices; payback time (DR) and payback rate (g), based

on the following assumptions:

- The starting gross salary is $S = 1000$.
- The contribution rate at CMR level is 20% and at CNSS level 11.89% and (6% to 12%) for CIMR, RCAR
- Retirement period is 19 years (based on TD 88-90 mortality table)
- Rate of salary increase is 4.5%.
- Career Length: 40 years

The first indicator is the payback period (D) defined as the period of time it takes for the pensioner to recover what he or she has contributed.

$$D = \frac{\sum_{i=1}^T C_i}{R_1} \quad (1)$$

With :

D: payback period

C_i : contribution paid during year i

R_1 : the first pension received

The payback period (D) is the number of years for which the first annual pension can be paid to recover all contributions made.

The second indicator is the recovery rate (g) which represents the ratio between the sum of pensions received and the sum of contributions paid.

$$g = \frac{\sum_{i=1}^N R_i}{\sum_{i=1}^T C_i} \quad (2)$$

With :

- g: recovery rate
- R_i : annual pension
- C_i : annual contribution

The calculation of the two parameters DR and g for the four cases is summarized in the following table

TABLE 3
COMPARISON OF THE DR AND G OF THE DIFFERENT CAISSES

Indices	Caisses			
	CMR	RCAR	CNSS	CIMR
DR	12years 7month	15years 7month	11years 10month	13years 2month
g (%)	5.72	2	6.28	4.80

Source: established by us

At first glance, for people with the same profile, but belonging to different funds, the delay and the recovery rate differ from one fund to another, which means that there is a certain inequity that manifests itself within this generation of retirees.

3 INTER-GENERATIONAL EQUITY MEASURES

Generational inequalities are caused by changes in pension calculation rules as a result of changes made by the legislation governing the various pension systems in Morocco. In this section, we will try to analyze the equity between two generations with the same characteristics: a salary increase rate of 4.5% and a length of service of 35 years, and a salary of 1000 MAD/month. The choice of these data is an example to highlight this intergenerational equity.

3.1 CMR cases

The third indicator is the replacement rate:
The replacement rate is the ratio between the first pension and the last salary.

$$TR = R1 / St \quad (3)$$

With :

TR : replacement rate

R1: the first pension received

St : the last salary received

The replacement rate and the percentage of the last salary you receive after retirement.

The fourth indicator is the actuarial yield: also called the internal rate of return. This indicator measures the interest rate that the employee must obtain on his contributions in order to obtain the level of benefits insured by the pay-as-you-go system.

$$-\sum_{i=0}^{T-1} C_i / (1+i)^i + \sum_{i=0}^{N-1} R / (1+i)^{i+T} = 0 \quad (4)$$

In other words, it is the discount rate that equals the balance sheet of pension benefits/contributions over salaries over the entire life cycle. This is the interest rate at which individuals should have invested their contributions to obtain the same amounts of benefits in a pure savings logic.

With a retirement age of 60, we will study the effect of the contribution period on the value of the TRI.

TABLE 4
CMR CASES

Indicateurs	P1950	P2000
TRI	10.59%	6.7%
Recovery Rate	15.08%	5.27%
Payback time	9ans 7mois	12ans 5mois
Replacement Rate	87.5%	87.5%

Source: established by us

At CMR level the contribution rate has increased considerably from 7% in 1990 to 20% in 2006

According to the result obtained, the fund is not fair in terms of redistribution between generations. Because the first generations benefited from the regime more than the new ones. In terms of the recovery rate, the 1950 generation of retirees benefited more than the 2000 generation, because for every dirham contributed in activity, it is paid at 15 dirhams at the time of retirement. On the other hand, in the generation of pensioners of 2000, a dirham contributed is paid only with 5dirhams, 3 times less compared to the old generation. For the other indicators Sort, DR and g, they also show the same result. This proves that the new generations of CMR pensioners bear more costs in terms of contributions in its scheme compared to the older generations of pensioners.

3.2 CNSS cases

TABLE 5
CNSS CASES

Indicateurs	P1980	P2010
TRI	8.86%	6.97%
Recovery Rate	9.18%	5.55%
Payback time	9ans 10mois	11ans 3mois
Replacement Rate	60%	60%

Source: established by us

At CNSS level, the contribution rate rose from 7.20% in 1993 to 11.89% in 2010.

Similarly, for the CNSS, the results obtained show that its sys-

tem is not equitable in terms of redistribution between generations. Because the first generations benefited from the regime more than the new ones. The recovery rate shows that the 1980 generation benefited more than the 2010 generation. Because each dirham contributed by the generation of 1980 is paid at 9 dirhams. The IRR, DR and g also show the same finding, the old generations have benefited from better pension levels than those of the new generations.

3.3 Measures adopted to reduce the generation gap: the case of CMR

Generational inequalities at the level of the CMR have been reduced by the payment of an additional contribution by the older generations of pensioners in order to have a pension level close to that of the new generations. This measure is called a "buy-back" payment and will be defined as follows: It is important to note that older generations have enjoyed relatively low pension levels compared to younger generations because of the reference salary which was the basic salary only (which represents 30% of the overall salary). But because the contribution rate was low, the contributory effort of these generations in the system was also low. This resulted in high values for the key equity measure indicators (DR and g). Following the widening of the basis for calculating civil pensions under the reforms of the 1990s, 1997 and 2002, members were required to pay an additional deduction (buy-back) to take account of seniority acquired before the effective date of the said reforms.

Redemption (1) introduced by the 1990 reform :

The date of 03/01/1990 is known at CMR by the inclusion of 50% of statutory and permanent allowances and premiums in the base for contributions.

Rate: 4% per year of service completed up to 31 December 1989

Basis of calculation: residence allowance (10% of basic salary) and 50% of the amount of fixed and permanent allowances held by the member on 1 January 1990.

Withholding tax: amounts due are withheld in instalments over 10 years as from 1 January 1990.

Withholding taxes are levied at source on the remuneration of active employment and, in the event of the removal of executives, on the pensions granted to the member or his successors in title.

Redemption 1 = $(4 \times \text{nb of year} \times 50\% \text{ of fixed and permanent compensation})/100$

Redemption 2 introduced by the 1997 reform :

Rate: 4% per year of service completed up to 31 months 1997

Basis of calculation: 50% of the amount of permanent allowances and premiums relating to the administrative situation held at 1 June 1997

Withholding tax: amounts due are deducted by monthly withholdings from activity remuneration and spread over a period not exceeding 10 years as from 1 January 2000

In the event of the removal of executives before the said date, the sums due shall be deducted from the pensions grant-

ed to the member or his successors in title from the date of retirement for a period not exceeding 10 years from the date of receipt of the said pensions.

Redemption 2 = $(4 \times \text{nb of year} \times 50\% \text{ of fixed and permanent compensation})/100$

Redemption 3 introduced by the 2002 reform :

This measure consists of the re-payment of pensions paid by the CMR and applies to pensions and survivors' pensions paid by c in accordance with the rules in force before 1 June 1997.

The beneficiaries of this reform bear an additional deduction for the length of service taken into account for the calculation of the pension, fixed at 4% per year on the amount of premiums and allowances which were not subject to a levy and from which the pensioners concerned benefited at the date of their removal from the management staff.

The additional deduction shall be made from the pensions of the persons concerned by monthly withholdings extending over a period of 10 years from 1 January 2002:

Redemption 3 = $(4 \times \text{nb of year} \times 100\% \text{ of fixed and permanent compensation})/100$

Indeed, these measures introduced by the CMR (repurchase 1, 2 and 3) allowed the older generations to have a revaluation of their pensions but in return, this measure weighed heavily on the balance of the CMR civil regime because of underpricing applied for many years.

4 CONCLUSION

In addition to these indicators, the CNSS has taken legal and regulatory measures, in particular the 3240-day minimum contribution rule, which has given the CNSS the right not to refund contributions for a period below this required threshold. This unfair measure has just been amended today in order to entitle all contributors to the CNSS plan to have their contributions' capital increased if the minimum contribution period condition is not met. The diversity and heterogeneity of the parameters of pension schemes in Morocco and their legislation create a certain inequity illustrated by all the inequalities that exist between their members, whether of the same generation (parameters of each scheme) or of different generations (changes in legislation and reforms adopted).

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