

## Parametric reform analysis of the Moroccan public pension system

Hind El-Houjjaji\*, Abdellah Echaoui

Faculty of Law, Economic and Social Sciences-SOUISSI, Mohammed 5 University, Rabat, Morocco

\*Corresponding author: [elhoujjajihind@gmail.com](mailto:elhoujjajihind@gmail.com)

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### Abstract

In 2016, the government of Morocco adopted a parametric reform intended to deal with the critical financial situation of the CMR civilian pension regime. We examine the robustness of this reform using the Cohort-Component population projection model to the fund's population during the period 2014-2064. Then we lead a projection of the scheme financial situation. Moreover, we project the status quo situation and an alternative scenario where we propose to increase the retirement age solely, and then compare the results with those of the 2016 parametric reform. **Findings/Originality:** For the three scenarios, a parametric reform will have a limited effect on the financial situation, in both the long and the short-term. In long run, it is not sufficient to solve the problem of massive increase of pension scheme deficits while in short run it is not sufficient to eliminate the existing structural problems neither to avoid the future financial deficit. Furthermore, our alternative scenario seems to have some more advantages, comparing with the other scenarios.

## Introduction

Recently, the pension system in Morocco has reached maturity; in other words, the collected contributions no longer manage to finance all pensions. The Moroccan pension system is financed conforming to a Pay-As-You-Go (PAYG) financing principle, where actual contributions received from workers adherents to the pension scheme are used to pay actual retirement pensions to those retirees. According to Towerbridge (1952), in a pure PAYG pension system, revenues equal to outlays each year. In Morocco, there are two compulsory retirement regimes for the public sector workers, namely the Moroccan Pension Fund (*Caisse Marocaine des Retraites* – CMR) and the Collective Scheme for Retirement Allowances (*Régime Collectif d'Allocation de Retraite* – RCAR). Likewise, for the private sector workers, there is one mandatory retirement regime, which is the National Social Security Fund (*Caisse Nationale de Sécurité Sociale* – CNSS). It is to highlight that the deteriorated pension system situation is due directly to the decreasing number of assets in favor of that of retirees. In this situation, in a PAYG pension scheme, the financial situation is corrected using the reserves. Still, the annual consumption of the reserves will exhaust them.

As stated by recent reports of *Cabinet Actuariat* (2010) and *Cour des Comptes* (2013), the Moroccan pension system is under considerable financial pressure, especially the CMR's civilian pension regime. If the pension scheme is expected to maintain current levels of contributions and benefits, the financial deficit would be unsustainable, and the income security of future retirees would be challenged. To deal with this critical situation, the government promulgated in 2016 a parametric reform to maintain the budgetary stability of the pension system. This type of reform simply reduces the generosity of benefits or the program in general. It does not change the overall structure of the program (Disney, 2003).

During the last years, the Moroccan life expectancy increased from 48.45 years in 1960 to 75.52 years in 2015. Also, the Moroccan fertility rates fell from 7.07 in 1960 to 2.53 in 2015. These demographic changes in the Moroccan population make it possible to increase the retirement age. This measure aims to contain the growth of pension expenditure due primarily to the increase in the old-age dependency ratio. The old-age dependency ratio is the number of persons aged 65 or older as a percentage of the potentially active population. For this reason, we will study the impact of solely increasing the retirement age.

Several methodologies are employed to study the PAYG parametric reforms and their several effects. To model pension reforms, the World Bank has developed special software, called Pension Reform Options Simulation Toolkit (PROST), for simulating pension reform options and analyzing their consequences. Using this tool, Zambaa and Hassen (2013) simulated some propositions for the Tunisian pension reform. Sayan and Kiraci (2001) used a computational investigation of alternatives for a PAYG based pension system to study parametric pension reform options with higher retirement ages using an optimization analysis. Furthermore, forecasting parametric reforms rest on forecasting the pension demography. For that, the Cohort-Component method is used (e.g., Gonzalez, Conde-Ruiz, & Boldrin, 2009; Houssi, 2005). As presented by Romaniuc (1990), this method has three main applications of population projections. A stochastic version of the demographic Cohort-Component model of forecasting future population is also used (Alho, 1990) or a simple method for projecting pension deficits (Zeng, 2011). Moreover, dynamic analysis can be used to analyze the effects of different parametric reforms, oriented to reach the financial balance of public pension systems, on the individual retired population welfare (Peinado & Serrano, 2012). Moreover, to estimate and analyze the effects of pension reforms and the trend of their liabilities, the method most commonly used is a computable general equilibrium model of an economy with a social-insurance pension system (Volkov, 2010). We can use the method to study the effects of demography and fertility changes on pension schemes. (see, for example, Abdesslem & Cherni, 2016; Abio, Mahieu, & Axtot, 2004; Cipriani, 2014; Fanti & Gori, 2012), to study the effects of reforms (e.g., Díaz-Giménez & Díaz-Saavedra, 2009, 2017) or to argue that the old-age crisis is foremost a political problem (Cremer & Pestieau, 2000).

The literature points out that the financial imbalance of pension funds is often associated with demographic aging. The inequality at the level of the age pyramid directly affects the retirement outlays as the part of pensioners is superior to that of contributors (Disney, 2003). The researches increase about the future financial viability of pension systems, especially since the World Bank published its policy research report (World Bank, 1994), where it made its recommendations on social security, which still apply today (De Bustillo, De Pedraza, Antón, & Rivas, 2011). But before the World Bank report, Hagemann and Nicoletti (1990) discussed the effects of the demographic transition in four OECD countries. They also discussed the different solutions available to governments. Kings, Turkisch, and Manning (2007) explained that the main consequence of an aging workforce lies in the challenge of attracting and retaining capacity in the public service while a large number of experienced staff retires will only intensify in many countries members of the OECD.

Volkov (2010) explained that economists usually use the demographic factor as the standard explanation. However, as some studies have shown, these phenomena are not always decisive. As he explained, "It is interesting that although the age dependency ratio (ADR) rose for all European countries in the 1960s–1990s. The total dependency ratio (TDR) fell. According to forecasts, this trend will disappear in the next forty years, and the TDR will rise".

For this reason, in France, the focus was primarily on parametric changes to adjust the financial imbalances of their pension system without affecting the system's operating mode, which is a PAYG model. Every year the Pension Observation Council (*Conseil d'Observation des*

*Retraites* – COR) publishes a report on the evolutions and prospects of pensions in the country. This mission was attributed by the pension reform law of 2014. This report provides a return to balance in 2042 in the best Scenarios (Conseil d'Observation des Retraites, 2019). Otherwise, several papers lead evaluation studies of the Italian pension reforms process, which was adopted since the 1990s, and provide many recommendations (e.g., Agudo & García, 2011; Brugiavini & Galasso, 2004; D'Amato & Galasso, 2002; Natali, 2004).

In Spain, which has a public PAYG pension scheme providing defined benefits, has opted for parametric reform, involving gradual small-scale changes in benefits, and has also encouraged complementary but voluntary private schemes. In the mid-1980s and 1990s, changes were introduced to contain pension's expenditure. The required number of contributions years used to calculate the value of the retirement pension was increased (De Bustillo et al., 2011). De Bustillo et al. (2011) evaluated the impact of a parametric reform based on increasing the reference period used to calculate benefits. Vidal-Meliá (2014), evaluated the 2011 Spanish pension reform using the Swedish system as a benchmark. Altiok and Jenkins (2013) estimated the fiscal burden of the historical PAYG social insurance pension systems in North Cyprus and have also explored several possible parametric reforms to arrive at a long-term solution to the financing of these systems.

There are only a few studies on pension reform in the Maghreb region. Ben Braham (2009) studied the pension system generosity and reforms in Algeria, Morocco, and Tunisia. Dupuis et al. (2011) analyzed the impact of pension systems on the living standard of the elderly in the Maghreb. Furthermore, to evaluate the status of the Tunisian retirement system, Chourouk (2003) and Houssi (2005) presented a comparative overview of pension reforms undertaken in Tunisia, Algeria, and Morocco. The results showed that the Tunisian pension system, compared with his two neighboring countries, was the most problematic and financially insecure in the context of an aging population.

Moreover, Boudahrain (2003) presented the social security system, which is in decline, in both Morocco and Tunisia. He showed that any solution to the pension schemes problems in these countries would involve the application of an appropriate strategy for the medium and the long-term. Finally, Dupuis, El Mouddeh, and Petron (2010) highlighted the fact that the demographic aging, which is a new issue in the Maghreb region, will negatively affect the financial balance of pension systems in the coming decades and must be anticipated in advance.

In this paper, we use the Cohort-Component population projection model to project the population present in 2014 in the civilian pension regime of the pension fund. Then we project its financial situation during the period 2014-2064. In this context, we propose to project during the same period the status quo situation before the parametric reform and an alternative scenario where we propose to increase the retirement age solely and then compare the results with those of the 2016 parametric reform.

## Methods

Current research uses the Cohort-Component population projection model to project the scheme population by age and sex. This method, developed by Whelpton (Whelpton, 1936), is based on the fact that each year, every member of a population becomes one year older. We divide the population of the baseline year into cohorts classified by age and sex. Then we project the year-on-year transition of each cohort based on different demographic and financial hypotheses. We will use this method, which is considered as a guide to future intervention (Burch, 2018), as a prospective analysis (Romaniuc, 1990) of the future financial and demographic situation of the CMR civilian pension regime.

Each year, the number of contributors, retirees, and survivors is projected using mathematical formulas. Thereby, the number of contributors in a year represents the assets of the

previous one from which the subscribers who passed away and those who henceforth have a disability are subtracted. These new affiliates replace the subtracted ones of the prior year, spread over the different cohorts. Thus, to project the number of contributors we use the mathematical formula below:

$$A_{x+1}^{t+1} = A_x^t(1 - Q_x - T_V) + E_{x+1}^{t+1} \tag{1}$$

where  $A_x^t$  and  $A_{x+1}^{t+1}$  represents the total number of contributors aged  $x$  and  $x+1$  respectively in the year  $t$  and  $t+1$  respectively,  $Q_x$  is mortality rate at age  $x$ ,  $T_V$  is disability rate and  $E_{x+1}^{t+1}$  is the new entries aged  $x+1$  in time  $t+1$ .

The number of retirees in a year represents the retirees of the previous year from which the retirees who passed away are subtracted, and the new retirees are added. Each year, the number of the retirees is calculated with the mathematical formula below:

$$R_{x+n}^{t+n} = R_x^t(1 - Q_{x+n-1}) + NR_{x+n}^{t+n} \tag{2}$$

where  $R_{x+n}^{t+n}$  represents the total number of retirees aged  $x+n$  at the year  $t+n$ ,  $R_x^t$  are retirees of the year  $t$  aged  $x$ ,  $Q_{x+n-1}$  is the mortality rate, and  $NR_{x+n}^{t+n}$  is the new retirees aged  $x+n$  in the time  $t+n$ . These new retirees are composed of the regular retirees aged 60 and new ones with minimum service years of 21 years for men and 15 for women. These conditions for an early retirement changed with the new reform, where they will be 24 service years for men and 18 for women, and the retirement age increased to 63 years.

Each year, the successor's number represents successors of the previous year from which those who passed away and those remarried are subtracted, and the new successors are added. The total number of successors is calculated according to the following mathematical formula:

$$S_{x+1}^{t+1} = S_x^t(1 - Q_x - \tau_{(x,x+4)}) + NS_{x+1}^{t+1} \tag{3}$$

where  $S_x^t$  and  $S_{x+1}^{t+1}$  represents the total number of successors aged  $x$  and  $x+1$  respectively in the year  $t$  and  $t+1$ , respectively,  $Q_x$  is the mortality rate,  $\tau_{(x,x+4)}$  is the probability of remarriage between age  $x$  and  $x+4$ .  $NS_{x+1}^{t+1}$  represents the total number of new successors, aged  $x+1$  in the time  $t+1$ , who are retirees' spouses and assets, with a difference of 10 years.

After performing the demographic projection of the pension fund's members, we simulate the average salary used to calculate contributions. We also simulate the average pension paid, classified by the contingencies covered, based on changes in their trends over time, and multiplying these variables by the total number of member workers and the number of pensioners.

Each year, we calculate the actual payroll by multiplying the number of assets by the average wage. This payroll is multiplied by the rate of contribution to determine the number of contributions ( $C_t$ ) paid at time  $t$ :

$$C_t = \gamma \sum_{x=\alpha}^{\tau-1} \overline{W}_{x,t} \cdot A_{x,t} \tag{4}$$

where  $\gamma$  is the contribution rate,  $\overline{W}_{x,t}$  is the average income for a member aged  $x$  at time  $t$  and  $A_{x,t}$  indicates the number of active members aged  $x$  at time  $t$ ,  $\alpha$  is the entry age of the scheme, and  $\tau$  is the retirement age.

Next, we multiplied each average pension with the relative number of pensioners to obtain the total expenditure for each pensioner's category. The latter are classified by the contingencies covered: retirement and survivors' pensions. Subsequently, we added these

different expenditures to the total spending of benefits to obtain the total amount of the pension ( $B_t$ ) which is expressed as follows:

$$B_t = \sum_{x=\tau}^{\omega} P_{x,t} \bar{B}_{x,t} \quad (5)$$

where  $\bar{B}_{x,t}$  is the average pension benefit and  $P_{x,t}$  represents the number of pensioners aged  $x$  in the generic time  $t$ ,  $\omega$  is the extreme age and  $\tau$  is the age of obtaining the first retirement or the survivor pension.

Finally, the projection of cash flows comprises firstly the technical result, which is defined as the difference between contributions and benefits, on the other hand, the amount of total assets belonging to the pension scheme at a specific time  $t$  represents the fund value ( $F_t$ ). Excluding the fixed management cost, the evolution of the fund can be described as follows:

$$F_{t+1} = (F_t + C_t - B_t) \cdot (1 + r_{t,t+1}) \quad (6)$$

where  $C_t$  and  $B_t$  represent respectively the annual contribution income and the pension benefits paid at the beginning of the year  $t$ , and  $r_{t,t+1}$  indicates the global asset return related to the period between  $t$  and  $t+1$ .

In this paper, we took the year 2014 as the basis of our projections. We divide the pension scheme population into age and gender cohorts. Then, we observe the demographic and financial evolution of the scheme until the year 2064, according to the assumptions below. The demographic projections are based on the mortality tables TD88-90 and TV 88-90 to estimate the number of men and women deaths successively. To estimate the age of the spouse, we consider a different age of ten years between spouse and employee (or retiree).

Furthermore, the remarriage probabilities used are from the study by the INSEE (*Institut national de la statistique et des études économiques*) on widows and widowers remarried between 1951 and 1952. Moreover, each year, we consider that the recruited staff replaces the employees who passed away, those who henceforth have disabilities, and the new retirees. Finally, we use a disability rate of 1%. For the financial hypotheses, we consider a reserve placement rate of 4.25%, a pension revaluation rate of 1%, and finally a rate of wage developments and a discount rate of 4.5%. Furthermore, family allowances are projected in terms of 2% of the main expenses. The demographic and financial situation was projected according to 3 scenarios.

The first scenario is the Status quo. In this projection scenario, we have considered that the system maintains the ancient legislation before the 2016 parametric reform. We choose this scenario to study the effects of the old parameters on the pension scheme's financial situation. The second scenario is the 2016 parametric reform. To prevent a public deficit from possibly growing out of control, the Moroccan government adopted a parametric reform that covers all the pension's parameters. So, the contribution rate, the retirement age, and the basis for calculating the pension will rise progressively to attempt successively 28%, 63 years, and the average of 96 months. The third scenario is the reform proposal. Readjusting the totality of pension parameters seems like a right reduction of beneficiaries. Thus, we study the impact of increasing the length of an individual's working career. This scenario appears acceptable by the system adherents and politically feasible because the years added before retirement will increase the level of the members' pension.

## Results and Discussion

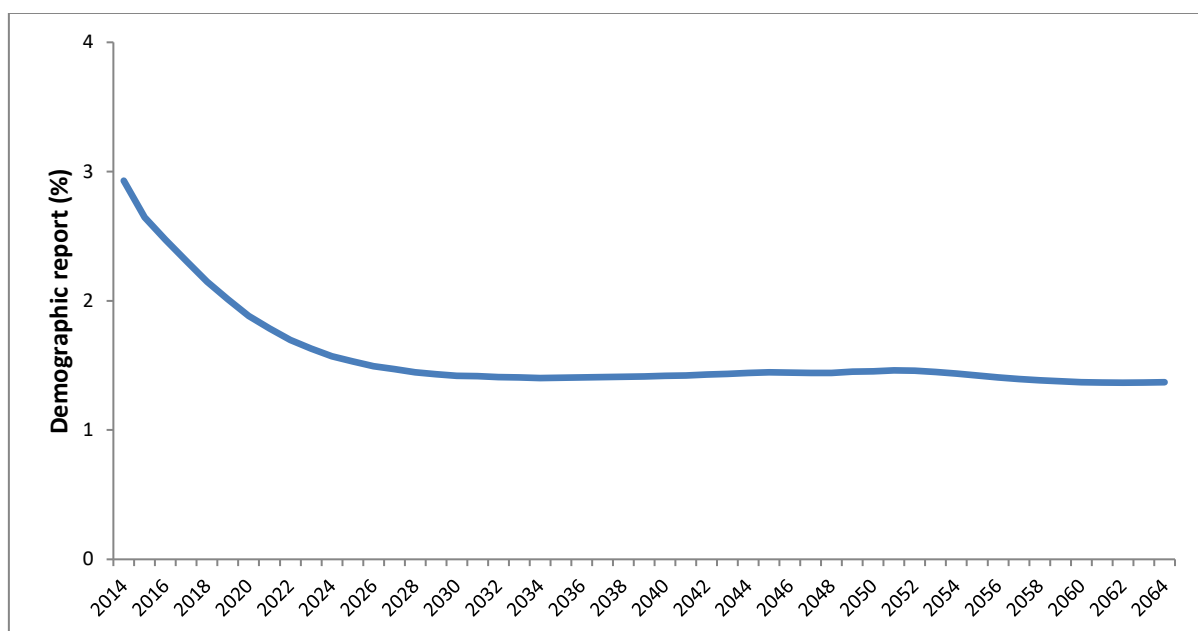
Using the Cohort-Component population projection method, we simulated the evolution of financial and demographic parameters of the CMR's civilian pension regime. The demographic

and financial situation was projected according to 3 scenarios. The first one is the unchanged legislation, the second one is the 2016 pension reform, and the last one is a parametric reform that we proposed, which is based solely on increasing the retirement age.

### Scenario 1: Pension scheme perspectives under unchanged legislation (status quo)

The analysis starts with studying, under unchanged legislation, the fund's demographic and financial evolutions. We projected during the period 2014-2064, the total number of working contributing members and the pensioners' one. After the demographic projections, we will project then the scheme's Cash flows.

The analysis of the scheme's demographic situation is based on the review of the demographic ratio, which is the number of pensioners<sup>1</sup> as a percentage of the number of working people belonging to the scheme. It is used to study the effects of demographic trends of pension expenditure financed on the PAYG principle (Houssi, 2005). The evolution of the CMR's demographic ratio is described below (see Figure 1).

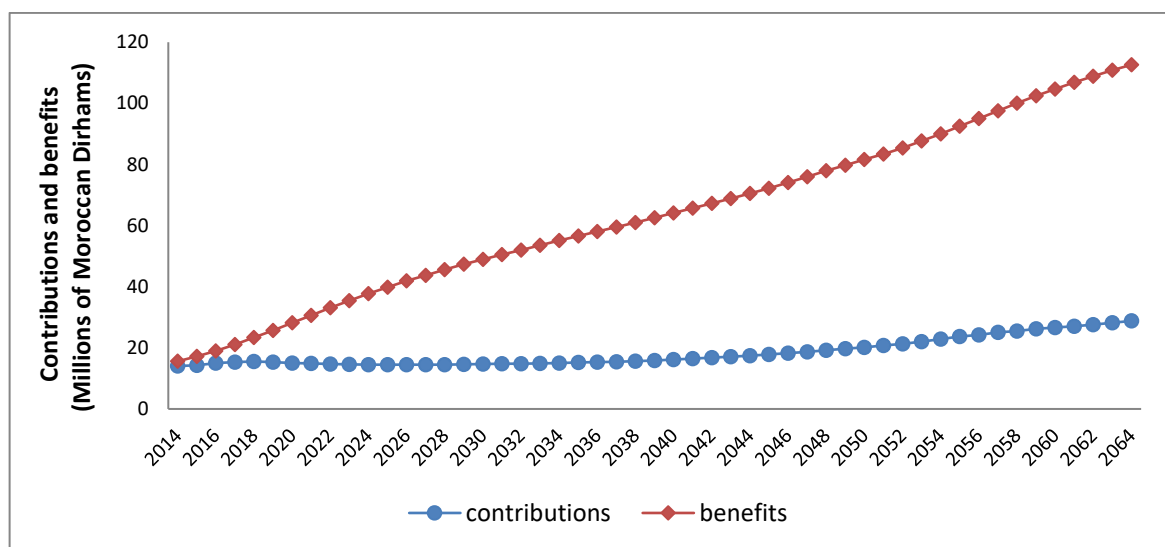


**Figure 1.** Demographic report projection of the CMR's civilian pension regime

The projection of the demographic report showed the changes over time in the ratio of contributing members to pensioners belonging to this scheme. According to our results, the number of contributors will decrease compared to pensioners from 3 in 2014 to 1.37 in 2064. It will be less than one and a half persons to finance the benefits paid to each pensioner by the end of our projection period. This negative exponential decline results in a deterioration of the demographic situation in this plan that the number of pensioners grew faster than that of the assets. This must be due to the result of the public sector employment policy where new employees replace, each year, workers who passed away, those who henceforth have a disability, and those retired. The divergent evolution between the numbers of contributors and retirees (Haut-Commissariat au Plan, 2012) is reflected in the aging of the scheme's population, which is the most alarming prospect for a PAYG pension scheme. This critical situation will inevitably affect the pension scheme of financial circumstances.

<sup>1</sup> The number of pensioners here is composed of the number of retirees and the half number of survivors.

After projecting the demographic situation of the fund, we will project the financial one. A PAYG system needs equilibrium between revenues and outlays each year, i.e., active members inside the scheme need to pay enough contributions to cover the benefit payments of retired members. Therefore, we projected and analyzed the evolution of the amounts of contributions and benefices (see Figure 2), the global result (see Figure 5), and the numbers of the reserves (see Figure 6). The financial projection will show us the changes in the income and expenditure of the pension scheme.



**Figure 2.** Projection of the CMR's civilian pension regime contributions and benefits under the status quo scenario (Millions of Moroccan Dirhams)

The projection results in Figure 2 shows that there is an evolving gap during the projection period between contributions and benefits, which represent a significant portion of pension plan incomes and expenditures. This widening gap over the years must be due mainly to the contrast evolution between contributors and retirees' numbers. The significant increase in the benefits must be resulting in the average pension and the number of pensioners that are positively correlated and follow the same trend (Zambaa & Hassen, 2013). The slight increase in contributions is due primarily to maintenance of the contributing population growth throughout the projection period. Therefore, this mismatch between contributions and benefits will lead to a deficit in the global result (see Figure 5) and a profound decrease in the reserves (see Figure 6) during the projection period.

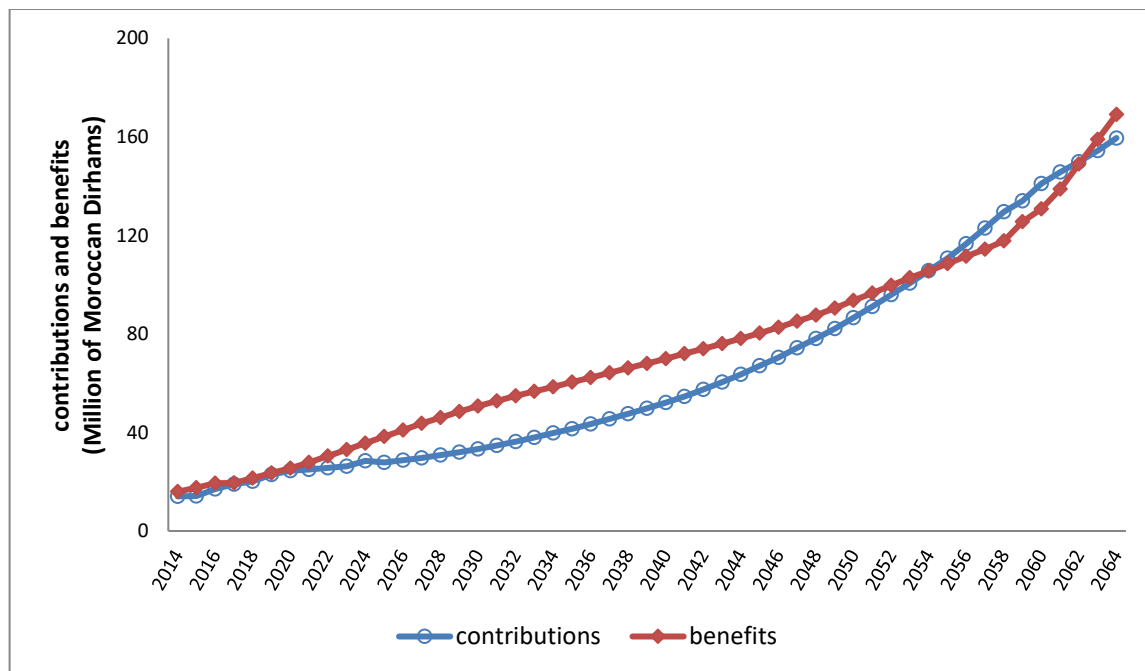
According to the simulation, the global result of the CMR's civilian regime has recorded a deficit in the first year of the projection. Also, the deficit will accumulate from one year to another until the last projection period to reach 100.96 million Moroccan Dirhams. The net result deterioration is due to the widening gap between the level of contributions and pensions throughout the projection period. In addition to the decline of the pension fund global result, the reserves will expire in 2023.

The decline of the financial situation may be due to the low coverage rate. This rate is the ratio of the amounts of contributions to that of pensions. Another factor that can explain the situation; it is the changing demographic circumstances, including the decline in fertility and the increase in life expectancy (Ben Braham, 2009; Chourouk, 2003; Houssi, 2005). The deterioration of the financial situation can also be due to the generosity of the scheme. This latter is an ambiguous notion (e.g., Kuitto, 2018; Scruggs, 2006; Zambaa & Hassen, 2013) which can be measured either by the level of pension benefits as the level of annual pension (Zaidi, Grech, &

Fuchs, 2006) or the level of replacement rate (Hachon, 2008). Furthermore, there are other causes of the financial problems worsening, such as the downtrend in the economic situation, the anticipated retirement, and the late entry of young people on the labor market due to the longer duration of the studies (Zambaa & Hassen, 2013).

**Scenario 2: Pension scheme perspectives under the 2016 parametric reform**

In 2016, The Moroccan government adopted a parametric reform to extend and improve the CMR's financial viability horizon for a few years. This reform aims both to increase the pension scheme resources and to reduce its expenses by covering all parameters. Thus, the annuity rate will be reduced as of 2017 from 2.5% to 2%. The reference salary, based on which the retirement pension is calculated, will be increased progressively from the last payroll of activity to the average salary of the previous 24 months of activities in 2017, 48 months in 2018, 72 months in 2019 to reach 96 months in 2020. Moreover, the contribution rate, which is 20% (10% employer contribution and 10% wage contribution), will be increased from 2016 at a rate of 2% per year to reach 28% in 2019. The age of access to retirement will be increased to 63 years with an increase of 6 months for each generation from that born in 1957.



**Figure 3.** Projection of the CMR's civilian pension regime contributions and benefits under the 2016 parametric reform (millions of Moroccan Dirhams)

As can be observed in Figure 3 and compared with the situation where the parameters remain unchanged, the gap will be reduced between the amounts of contributions and benefits. Moreover, the reform targets will only be visible from 2054 where contributions will exceed benefits. According to our results, the impact of the parametric reform on the net result simulations stipulates a clear improvement in the reduction of the budget deficit as compared to the global result in the case of unchanged legislation even if it remains negative (see Figure 5).

The projection of the financial situation under this scenario shows an improvement in the scheme's financial situation that will not be in the long run. Moreover, even if this parametric reform has narrowed the gap between income and expenditure, it can only delay by 10 years the entry into a deficit of the pension scheme, setting it at 2033 (see Figure 6) instead of 2023 on the



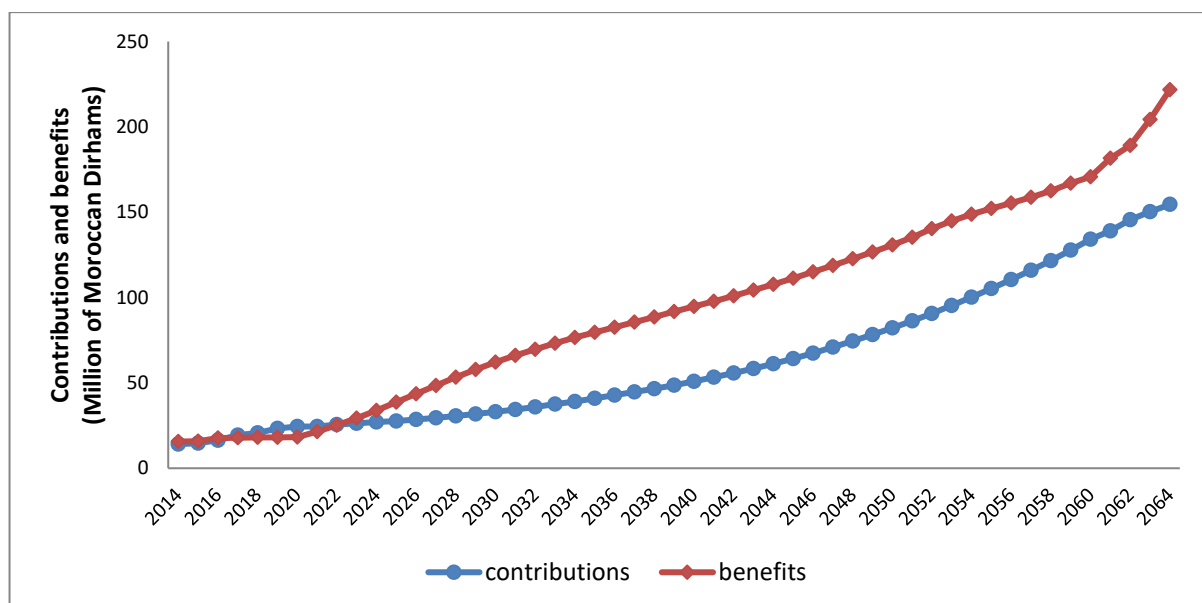
status quo scenario. Thus, the depletion of the reserves is only temporarily postponed, but cannot be avoided shortly. This parametric reform studied in scenario 2 induces a better financial performance compared to the first scenario.

### Scenario 3: Pension scheme perspectives under the parametric reform proposal

Pension funds operating in PAYG mode use three measures to rebalance reserves and adjust the pension system's resources to expenditures (*Conseil d'Observation des Retraites*, 2001). These measures are intended, on the one hand, to reduce pension fund expenditure by reducing the level of benefits paid, or on the other hand, to increase its resources through an increase in contribution rates or the creation of specific levies. A third measure is to increase the labor force and reduce the number of retirees. This measure is applied either by increasing the participation rate or by reducing the transition age of the activities at retirement.

In this paper, we choose to study the effect of increasing the pension scheme's resources by raising the retirement age only. We will increase the latter by one year each year to reach the age of 65 years because a sudden and flat increase in retirement age would likely be politically infeasible (Sayan & Kiraci, 2001). Increasing the number of contributions years is one of two elements that increase the system contributive, which means an increase in the ratio of the active contributions to the resulting pension (De Bustillo et al., 2011). This article seeks to analyze the implications of such reforms for the pension scheme's financial situation.

Increasing contributions level by keeping a large number of labor forces inactivity had a direct impact on changes in the amounts of contributions and benefits (see Figure 4). This scenario is politically feasible because the years added before retirement will increase the level of the members' pension. Thereby, we notice the increase in the level of contributions compared to benefits. This has a direct influence on the level of the global result (see Figure 5) and the reserves (see Figure 6). But this improvement is not at the same level as that observed at the level of the 2016 parametric reform.



**Figure 4.** Projection of the CMR's civilian regime contributions and benefits under the parametric reform proposal (Millions of Moroccan Dirhams)

The gap between the amounts of contributions and pension expenditures is reduced in this reform proposition compared to the status quo (see Figure 2). Also, the sum of contributions

exceeds the pension expenditures one is during the period from 2017 to 2022. However, in the long run, the gain resulting from higher contributions is caught up by the increase in the average pension; in other words, the pension scheme receives more but also generates more pensions. This situation has a direct consequence on the global result (see Figure 5). Even if this later remains negative, its amounts are higher than those recorded by the 2016 parametric reform from the start date of the projection up to 2024.

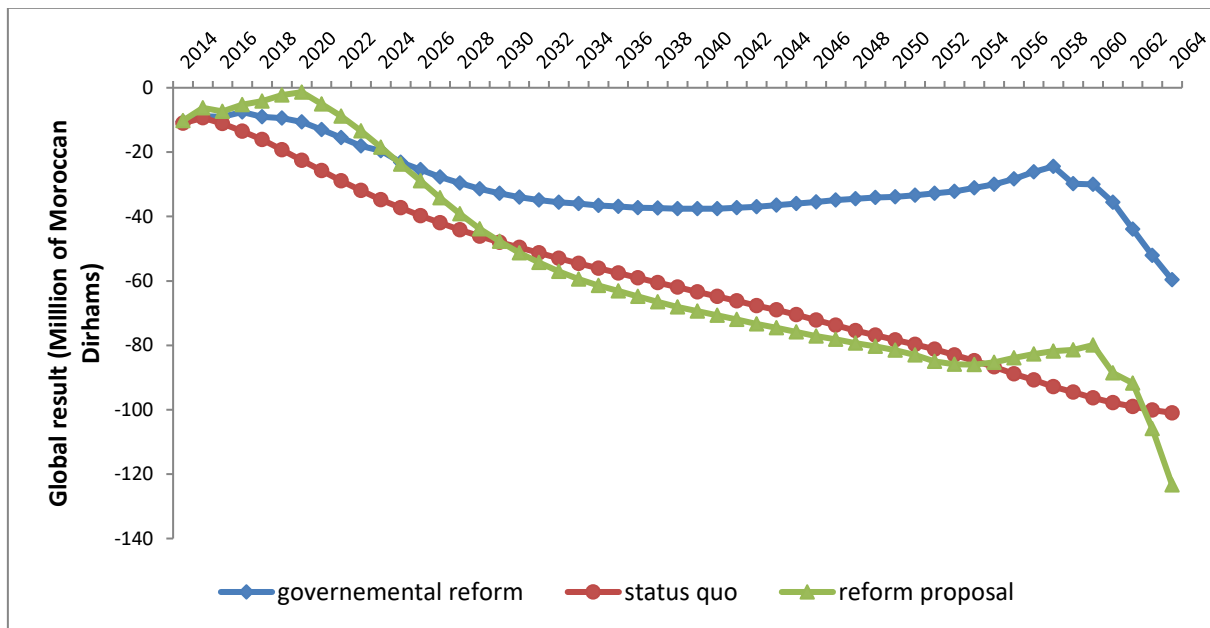


Figure 5. The global result projections under the three scenarios

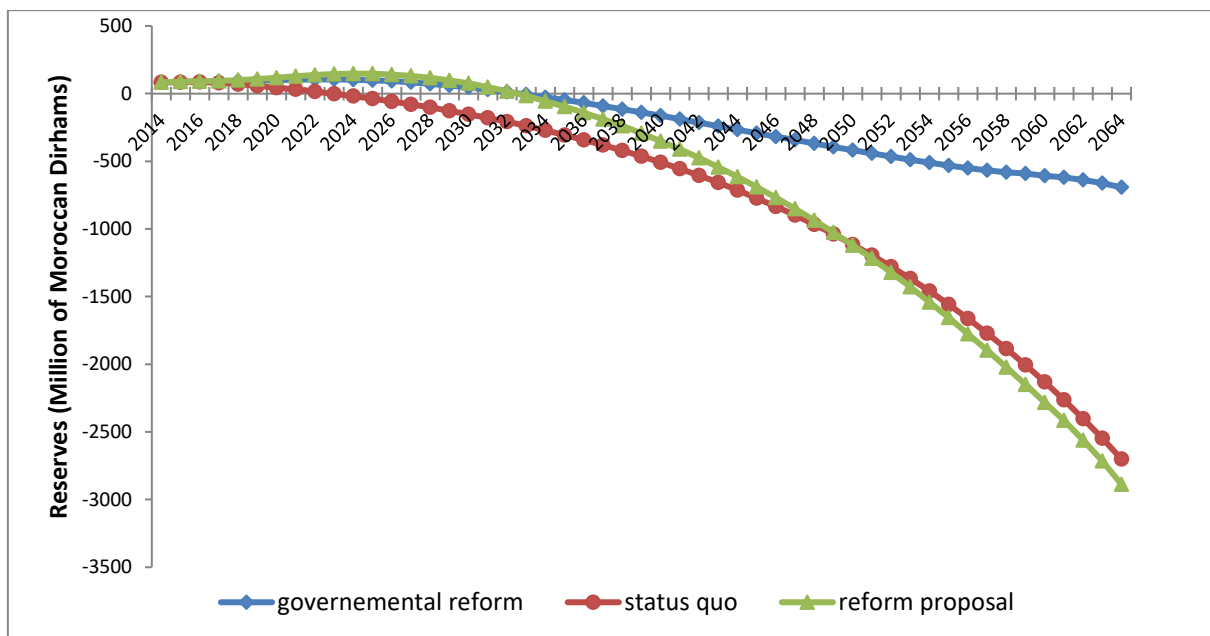


Figure 6. The reserves projections under the three scenarios

According to the third scenario projections, the gradual raising of the retirement age only has had a positive impact on the amounts of the reserves. Even if the reserves in the reform

proposal and the 2016 parametric reform are consumed in the same year, the number of the first one is higher than the second before the date of consumption. Although this reform proposal represents a good reform option, we should mention that the pension fund disequilibrium still not eliminated during the projection period. The projections results prove that the parametric reform is not sufficient to remove the existing structural problems, but it only delays the pension fund's insolvency date. The CMR's civilian pension regime has a positive balance until 2033 and will become insolvent in 2034 when the Social Security Reserve Fund runs out (see Figure 6).

## Conclusion

This study aimed to contribute to the debate on Moroccan pension reforms. This paper examines the CMR's civilian pension regime's financial viability by using the Cohort-Component population projection method. Our approach was based on comparing, during the period 2014-2064, the financial benefits of the 2016 parametric reform to those related to the status quo situation and to a proposed alternative scenario based solely on increasing the retirement age.

In this study, the financial projections under the three scenarios prove that the parametric reform is a temporary solution for the scheme's financial situation. Moreover, it is not sufficient to solve the problem and maintain financial balance in the pension fund. The restricted impact on the scheme's financial situation can be attributed to the massive increase of pension scheme deficits. Indeed, by keeping the actual structure, the reserves are expected to run out in the year 2023, while it will be until 2033 under both the 2016 parametric reform and the alternative scenario. The results of financial projections point to the ineffectiveness in the long-term of the parametric reforms to stabilize the financial situation of the pension fund.

Moreover, the efficiency of this type of reform will be limited even in the short-term. We should note that changing only the system parameters is not sufficient to eliminate the existing structural problems neither to avoid the future financial deficit of the pension system. In fact, in the 2016 parametric reform scenario and in the alternative scenario, the pension scheme will become insolvent in 2034, when the social security reserve fund runs out. Based on the results of the projection, both scenarios are offering this scheme roughly ten years of additional time to correct its important underlying unbalances. Nevertheless, after this brief period, the structural problems will resurface.

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