

Prospection of the Factors Impacting the Sustainability of the Moroccan Pension Scheme

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ABSTRACT

The objective of this study is to identify the factors impacting the sustainability of the Moroccan pension system. To this end, an adapted literature review and a study of the history and current diagnosis of the Moroccan pension system were conducted. Thus, variables appropriate to the factors identified in the literature review were selected to analyze their effects on the sustainability of the Moroccan pension system. This analysis revealed the impact of economic and demographic factors on the sustainability of the Moroccan pension system, and that over the last decade, the financial factor has also had a significant impact. Furthermore, between the 1990s and the 2000s, factors related to pension legislation and to management of the pension scheme had a significant impact on the sustainability of Moroccan pension plans. The article also discusses the efforts made by the Moroccan government to make the national pension system sustainable, some of which are in perfect harmony with the results obtained.

Keywords: Sustainability, Pension scheme, Morocco, pension reform.

JEF classification: H55, H75.

1. Introduction

The sustainability of pension schemes is a concern for most national policy makers and pension researchers. It is obvious that we are in an era characterized by the multiplicity of pension system reforms that are being implemented. Even countries that have not yet implemented these reforms are either in the process of rolling them out or in the process of reflection or consensus building with concerned stakeholders.

This article is part of the process of enriching the public and scientific debate aimed at identifying the sources of weakness in the Moroccan pension system. To this end, we have conducted a literature review aimed at listing the main factors impacting the sustainability of a pension system.

Then, we studied the history of the development of the Moroccan pension scheme, in order to understand the contours of the existence of each pension plan. In addition, the current architecture of the scheme was exposed and a diagnosis of this system was carried out. The findings are mainly derived from the various reports, studies and articles dealing with this subject. In addition, the history of the reforms of this system has been exposed to analyze the efforts made by public authorities.

Subsequently, we opted to deploy an empirical approach to identify the factors that have the greatest effect on the sustainability of the Moroccan pension system. The results of the literature review and the study of the Moroccan pension system made it possible to select variables representing the factors identified as having an impact on this sustainability.

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Thus, one variable was selected to represent the sustainability of the Moroccan pension system and ten variables representing the different factors impacting the sustainability. Regarding the temporal scope of the study, the perimeter covered is divided into 4 periods: the pre-1990 period, the 1990s period, the 2000s period and the 2011-2019 period. Note that the study was limited to the year 2019 to isolate the effect of the covid-19 pandemic. It should also be noted that the Moroccan pension system studied includes all the basic compulsory schemes, namely the civil pension scheme managed by the CMR (Moroccan Retirement Fund), the private sector civil pension scheme managed by the CNSS (National Social Security Fund), and the pension scheme of state owned enterprises' staff which is managed by RCAR (Collective Retirement Allowance Scheme).

Given the large number of variables obtained and the difficulty of finding the corresponding data for each year, we have opted to use the average data per period, when data for the entire period are available. If not, we opted for a data representing the general trend of the period concerned, in particular data collected from General Census of Population and Housing carried out once every ten years.

After an analysis of the evolution of each variable compared with the evolution of the sustainability indicator of the pension system, we tried to detect the variables with the greatest effect on the said sustainability.

The results have made it possible to identify certain avenues that can enrich the Moroccan public debate on pension reform and the solutions to be adopted to ensure the sustainability of the pension system.

2. Literature review

No one can deny that the sustainability of pension systems is not dependent on a single factor. Indeed, several factors have a more or less pronounced effect on the sustainability of a pension system. Through a relevant review of the literature, we attempt to identify these factors.

Through the literature review, we were able to identify six factors that can have an effect on the sustainability of a pension system, namely economic, demographic, financial, political, pension fund manager-related and legislative factors.

➤ **Economic factors**

The economic situation has a direct impact on the financial balance of pension schemes. A well-functioning economy with good jobs provides a comfortable contribution base that can support the ongoing costs of pension funds. Indeed, economic growth will allow pension funds to pay large pensions and become resilient to future shocks (Peinado and Serrano, 2017).

In addition, unemployment is also an inescapable source of failure for pension schemes, in the sense that it clearly impacts the main resources of pension schemes, namely contributions. In the same sense, the informal sector impacts the financial contribution base of pension managers, as this sector is generally not covered by any social security scheme, thus constituting a real loss of income for the pension system.

Moreover, other economic factors such as the increase in public debt (Ebbinghaus, 2011) and the savings rate (Holzmann, 2000) have an impact on the sustainability of pension schemes.

➤ **Demographic factors**

It is clear that demographic factors are undoubtedly the principal factors that affect the financial sustainability of a pension plan. In this sense, some researchers (Blake and Mayhew, 2006; Chand and Jaeger, 1996) specified that the impact of demographic factors will be more pronounced on the sustainability of pension systems than the impact of economic factors.

The aging of the population is certainly the first demographic factor with a direct impact on the financial balance of pension systems (Wang et al., 2019). Indeed, this phenomenon prolongs the duration of benefits and consequently increases the pressure on the financial expenses of pension funds, especially if this increase is not compensated by an adequate flow of contributors.

Increasing fertility has a positive impact on the sustainability of pension schemes. For example, the adoption of the two-child policy in China, instead of the one-child policy, will reduce the financial deficit of the Chinese pension scheme by almost 72% in 2090 (Zeng et al., 2017). In addition, it has been shown that an increase in the total fertility rate of 0.1 children per woman will reduce pension scheme expenditures by 4% from 2050 in OECD countries (Bongaarts, 2004).

However, some studies do not adopt this approach and have shown that a country's fertility does not have an immediate effect on the sustainability of its pension scheme. Thus, an increase in the fertility rate does not have a clear effect on the sustainability of pension schemes, but its effects are palpable on the financial health of pension schemes in the long term (Blake and Mayhew, 2006). Moreover, it has been shown, using an overlapping generations model, that a decline in fertility is not necessarily a "demographic time bomb" but rather can have a positive effect on the level of pensions provided by a given pension scheme (Fanti and Gori, 2012).

The effect of increasing the age of retirement is not subject of a consensus by several empirical studies. For example and by studying the steadiness of the Chinese public retirement income, the deployment of a stochastic simulation proved that raising the retirement age by 5 years will delay the deficit of the Chinese pension scheme by almost 20 years (Tian and Zhao, 2016).

On the other hand and by deploying an overlapping generations model for the German case, other researchers have shown that moving the retirement age back from 9 to 12 months will decrease the contribution rate by 1.5% while keeping the same level of financial stability of the pension scheme (Fehr et al., 2012).

Concerning the Spanish case, Díaz-Giménez and Díaz-Saavedra (2009) showed that raising the retirement age would help to offset the financial deficits of pension schemes. Indeed, a three-year increase in the retirement age in Spain would ensure the sustainability of the Spanish pension scheme until 2050. As for the Slovenian case, simulations using an overlapping generations model have shown that increasing the retirement age by only one year (in the range of 60-65 years) will reduce pension scheme expenditure by 1% of GDP (Verbič et al., 2006).

Another demographic factor is the number of new births that will ensure a succession of contributors in the long term. In this sense, encouraging fertility and adjusting the parameters of pension plans (raising the retirement age, lowering the annuity rate or raising

the contribution rate) are the main solutions preferred by public authorities to mitigate the effect of aging on pension plans.

➤ **Financial factors**

The management of financial reserves resulting from the surplus of contributions over benefits, in the case of funded pay-as-you-go pension plans, is an obvious factor in the sustainability of pension plans.

Thus, an efficient financial market will allow the pension system to better grow its reserves. In this sense, pension plans with highly fluctuating financial investments are greatly affected by these fluctuations (Holzmann, 2000). To this end, it is wise to assign the strategic allocation of reserve funds to competent organizations specialized in this field.

Note that a sustainable pension system contributes to the stability of the entire financial system of a country (Sholdarov and Mullaboev, 2019). Conversely, the development of a pension system requires a well-functioning local financial market (Walker and Lefort, 2000). This situation points to the complexity of the cause-and-effect relationship between a developed financial market and a sustainable pension system.

➤ **Political factors**

Political factors have a critical impact on the sustainability of pension systems. In this sense, it is worth noting that failure to meet commitments to policyholders is a political factor with a very destabilizing effect on the cohesion of the pension system if the State does not intervene.

In this respect, the political stability of the State plays a primordial role in the durability of a pension system, and even its continuity. The confidence of the policyholders in the public authorities is of a strategic interest in encouraging them to declare themselves voluntarily on available public pension plans.

On the other hand, and in order to reduce the number of parametric reforms of pension systems that require lengthy social debates, a research (Godínez-Olivares, 2016) proposed automatic adjustments indexed to certain parameters like indexing benefits to the current level of wages or to economic growth as well as indexing the retirement age to life expectancy. This alternative will avoid the risks associated with short-term, often less costly but unsustainable solutions adopted by decision-makers in order not to damage their popularity.

➤ **Factors related to pension fund managers**

Factors inherent to pension fund managers clearly impact the sustainability of the pension schemes. Thus, the evolution of certain parameters such as the demographic ratio (ratio between the number of contributors and the number of beneficiaries) and the rate of coverage of the active population employed by a pension plan informs on the current situation, or even future, of the sustainability of these plans.

In this respect, the provision of these managers with adequate and performing deliberative bodies that ensure their good functioning has become more than a necessity. In addition, the role of these bodies must go beyond their classic control and orientation function and evolve towards a warning and proposal force inspired by internal reflection and good practices deployed at the international level in this area.

➤ **Factors related to legislation**

The impact of the legislative and regulatory framework relating to the pension sector has a direct effect on the stability and sustainability of a pension system. Indeed, the multiplication of amendments and reforms is a clear indicator of the instability and unsustainability of the pension system, as a stable system rarely requires multiple amendments to its legal and regulatory texts.

However, the number of these amendments is not in itself the only indication of the instability of the pension system. Indeed, the nature of these amendments is the real index of this instability, given that in some countries, the amendments may concern measures demonstrating the performance of the system (increase in the annuity rate, increase in the minimum pension, introduction of a retirement bonus, etc.). In this respect, it is necessary to study the legislative system of a country before pronouncing on its stability, and therefore its sustainability.

3. History briefing of the Moroccan pension scheme

In order to encourage French civil officials to immigrate to Morocco, the French protectorate provided them the same benefits as civil officials in the French administration, including pension coverage.

Thus, in 1930, only French civil officials employed in the Moroccan administration were entitled to a civil pension following the institution of a compulsory civil pension scheme managed by the Caisse Marocaine des Retraites (Moroccan Retirement Fund), which was responsible for collecting employee and employer contributions (supported by the State budget).

In 1931, a civil pension scheme for the Moroccan civil officials was established. It is worth noting that this scheme operated on a funded basis between 1930 and 1950.

Later in 1950 (Royal decree of May 12, 1950), a single defined benefit scheme financed by provisioned distribution was set up to replace the two above-mentioned schemes until 1971 when the civil and military pension schemes were unified in a single retirement fund, namely the Moroccan Retirement Fund (laws 11.71 and 13.71).

Afterwards, new schemes were created, notably CIMR (the Moroccan Inter-professional Retirement Fund), CNSS (the National Social Security Fund) and RCAR (the Collective Retirement Allowance Scheme). Below is a presentation of the Moroccan pension schemes operational to date, presented in the order of their creation:

- **CMR:** The Moroccan Retirement Fund is created by Royal decree of March 2, 1930, it manages the civil pension scheme (law 11.71) and the military pension scheme (law 13.71) and civil and military disability pensions. This scheme is based on the principle of a staggered premium (pay-as-you-go financing).
- **OCP internal pension fund:** It is created in 1947 for the benefit of the Cherifien Office of Phosphates (OCP) staff. Closed since 2000 to new recruits, now affiliated to the RCAR. The plan is a defined benefit plan financed on a pay-as-you-go basis.
- **CIMR:** The Moroccan Inter-professional Retirement Fund is established in July 1949 at the initiative of certain companies at a time when no retirement coverage was provided by the State for private sector staff. It is managed by an employers' association and governed by the Royal decree of November 15, 1958 on associations. In 2018, the CIMR was

transformed into a mutual pension company in accordance with the obligation for pension organizations to be established in this form. This plan is financed by points.

- Common retirement fund of ONE : It is created in 1952 for the benefit of the staff of the *National Electricity Office* (ONE) and of the companies in charge of the water and electricity production, transport and distribution. Closed since 2001 to new recruits, now affiliated to the RCAR. The scheme operates on the principle of provisioned distribution.
- CNSS: The National Social Security Fund is established in 1959 and manages the pension scheme for private sector employees, as well as other benefits. The CIMR will thus become an optional complementary scheme to the CNSS. This scheme is based on the principle of a staggered premium setting a break-even contribution rate over a period of 5 years.
- RCAR: The Collective Retirement Allowance Scheme is created by Royal decree of October 4, 1977 for the benefit of non-tenured employees of the State and local authorities and the personnel of state owned enterprises. This scheme is managed by the CNRA (the National Pension and Insurance Fund, which is part of CDG Group, a deposit and management national Fund). It is financed by a mix of capitalization (2/3 of the overall contribution) and pay-as-you-go (1/3 of the overall contribution).

It should be noted that a detailed analysis of the context of the creation of all these schemes is presented in this article in the section dedicated to the analysis of the legislation related to the pension sector.

4. Diagnosis of the Moroccan pension scheme

The pension scheme in Morocco is obviously not in a comfortable situation. Indeed, the CMR's civil pension scheme, which is already in a technical deficit, expects to exhaust its reserves in 2026-2027, a date that has been delayed thanks to the 2016 parametric reform (Autorité de Contrôle des Assurances et de la Prévoyance Sociale et al., 2019). For its part, the RCAR is already experiencing a situation of technical deficit and expects its total exhaustion of reserves by 2042. Only CIMR escapes this situation. Indeed, the financial projections of CIMR show that this scheme will not be in a financial trouble in the long term, at least until 2060. However, a first technical deficit is expected between 2033 and 2050 (Cour des Comptes, 2013). Similarly, and according to projections made on the pension branch of CNSS, the date of the first overall deficit is expected in 2024 while the exhaustion of its reserves is expected in 2040 (Autorité de Contrôle des Assurances et de la Prévoyance Sociale, 2018).

A wide range of analyses, studies, and reports have addressed the issue of diagnosing the pension system in Morocco. Analysis of some of this literature (Caisse marocaine des retraites, 2005; Tlaty, 2008 and Achour, 2012) highlights the following findings:

- Institutional and governance aspects: the Moroccan pension system is inspired by the Bismarckian model in the sense that it is aimed at well-defined socio-professional categories. Its architecture is based on a logic of specialization of the schemes, each of which is aimed at a given sector (civil public sector, military public sector, private sector and state owned enterprises). The coordination and unification of the vision and functioning of all these schemes are now necessary. The multitude of these funds is not in itself a source of problem. On the other hand, the heterogeneity of the schemes contributes to the fragmentation of the labor market, given the difference in the generosity of each scheme, which discourages mobility between the different sectors (public, private

and state owned enterprises) and leads to a concentration of skills in the sector offering the greatest generosity. Concerning the governance aspect, the CMR was managed between 1958 and 1996 by the pension department of the Ministry of Economy and Finance, and it was not until the law reorganizing the Fund that it was able to enjoy administrative and financial autonomy. As for CNSS, the omnipresence of syndical dogma contributed to some of the observed management problems. However, it should be noted that, on the recommendation of the WB and the ILO, the various Moroccan pension funds now have their financial accounts audited and are conducting the necessary prospective studies for the actuarial and financial management of the various schemes they manage. In addition, a framework law on the organization of the pension sector needs to be put in place. In addition, the control exercised over pension schemes is purely financial and must be modernized to deal with the technical aspect, and the governance of these schemes must be strengthened.

- Demographics aspect: The speed of deterioration of the demographic ratio in the majority of Moroccan pension funds is worrying. This is mainly due to the ageing of the contributing population (excessive departure of workers on retirement) accompanied by an insufficient level of job creation as well as the increase in life expectancy of retired persons. For the public sector, the State's vision of controlling the wage bill of civil officials is a brake on increasing the level of CMR contributions. As for the private sector, CNSS has a large potential for covering the population not yet covered, particularly that of unsalaried and organized workers (a project is currently under way).
- Financial aspect: All pension funds finance their benefits on a funded pay-as-you-go basis, with the exception of RCAR, which adopts a mix of capitalization and pay-as-you-go. With the exception of CNSS, all pension funds managing a general pension scheme (CMR, RCAR and the internal schemes of OCP and ONE) have benefits that exceed their contributions, thus drawing on their reserves and thus undermining their financial sustainability. Indeed, at the end of 2019, the CMR's civil pension scheme collected 23.3 billion MAD of contributions and spent 28.6 billion MAD (technical deficit of 5.3 billion MAD), the RCAR's general pension scheme collected 3.6 billion MAD and served 6.3 billion MAD (technical deficit of 2.7 billion MAD) and the internal schemes collected 0.3 billion MAD and spent 1.2 billion MAD (technical deficit of 0.9 billion MAD). As for CNSS, it collected 26.1 billion MAD and paid out 20 billion MAD in pensions (technical surplus of 6.1 billion MAD).
- Economic aspect: the labor market situation has had a significant impact on the balance of pension funds. Indeed, the evolution of the unemployment rate (according to the Moroccan High Commissioner for Planning, 9.2% in 2010 versus 12.2% in 2020) has generated a shortfall in the contributions that are supposed to feed the resources of the pension funds. Added to this is the weight of the informal sector, which remains a major concern for economic researchers and a real source of the reversal of the demographic situation in pension funds.
- Social aspect: the limited access of women to the labor market and the precariousness of the job offer (underemployment, under-qualification and seasonal jobs) constitute a deficiency in terms of increasing the size of the contributing population. There are also multiple forms of discrimination in the employment opportunities available to women, in terms of salary, promotion and treatment, especially in the private sector, which results in reduced pensions that are insufficient to lead a decent life. This results in a discouragement for women to enter the labor market, and consequently creates a shortfall for the pension funds.

In addition, it was noted that the rate of coverage of Moroccan employees by mandatory retirement insurance is below the MENA average (42.5% of the employed population at the end of 2019). In addition, the replacement rate of mandatory schemes in Morocco (in 2005: 63% of the average salary for the CNSS, 75% of the last salary for the CMR and 67% of the average salary for the RCAR) is very generous compared to European countries (between 50 and 60% in France and less than 50% in Germany), to Latin American countries (62% in Peru and 55% in Chile) and to Arab countries (65% in Tunisia and 70 in Jordan)

For CMR which is the most unbalanced Moroccan retirement fund, a detailed analysis of its situation (Court of Accounts, 2017) points out that the elements that led to its critical situation are mainly due to the following facts:

- Period 1957-1996: employer contributions (State, local authorities and certain public establishments and companies) were not regularly paid to CMR. The State simply financed the deficit between the year's expenditures and revenues, via a balancing subsidy, to ensure the payment of pensions. The reason is due to a legal vacuum caused by the law 11.71 instituting a civil pension scheme which abrogated the provisions of the decree of 15/12/1951 fixing the rate of employer's contribution. It was only in 1990, when the above-mentioned law 11.71 was amended, that the obligation to pay an employer's contribution equivalent to the employee's contribution was introduced. The reorganization of CMR in 1996 resulted in a regular payment of employers' contributions to CMR while ensuring a regular follow-up of the financial situation of the schemes managed by the Fund.
- Repayment of arrears for the period 1957-1996: to identify the State's commitments to CMR, a commission was set up in 2001 at the Ministry of Economy and Finance to examine the State's arrears to the Fund for the period 1957-1996. In 2005, the public authorities set the amount of these arrears at 6 065 billion MAD.
- Voluntary departure of government employees in 2005: in an effort to modernize the Moroccan public administration and control the wage bill, a voluntary departure operation was launched in 2005 for government officials. The cost of this operation on the CMR's civil pension scheme is estimated at 7 483 billion MAD. The State paid 8 billion MAD to CMR over 4 years (2006-2009), at a rate of 2 billion MAD per year. The difference between the calculated amount and the amount paid is the financial interest resulting from the spreading of the payment.
- Deficit of the military pension scheme: since 1993, the military pension scheme has had a structural deficit which is regularly made up by civil pension scheme resources: advances reimbursed, with delay and without updating, by the State to CMR in the form of subsidies, thus representing a real shortfall for the civil pension scheme. It should be noted that the same situation is observed with regard to the financing of non-contributory schemes managed by CMR and the financing of measures dictated by the public authorities, notably the increase in the minimum pension.

5. Data and methodology

For this study, we have retained the basic Moroccan compulsory pension schemes, i.e., the civilian pension scheme managed by CMR, the general scheme of RCAR, the long-term benefits scheme of CNSS, and the two internal pension funds of OCP and ONE.

In this article, we will refer to period 1 as the period before 1990. Similarly, the period 2 will refer to the period 1991-2000. Thus, period 3 is between 2001 and 2010 and period 4 between 2011 and 2019.

The list of variables used to assess the effect of the factors identified in the literature review as having an impact on the sustainability of pension plans, as well as the source of data, can be presented as follows:

Table 1: Presentation of retained variables

Sustainability Indicator / Explanatory Factors	Variable	Explanation of the variable	Data source
Pension system sustainability indicator	Technical balance of pension plans	Difference between the sum of contributions of all pension plans and their benefits (in million MAD)	<ul style="list-style-type: none"> • CMR, CNSS and RCAR Activity Reports; • Moroccan Insurance and Social Security Supervisory Authority “ACAPS” Annual Reports on Social Welfare; • Annual reports on financial stability (joint production of ACAPS, Bank Al-Maghrib and Moroccan Capital Market Authority “AMMC”); • Report : “Aging of the Morocco population: effects on the financial situation of the pension system and on macroeconomic developments” (HCP, 2012); • Report: “Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions” (produced by the CMR on behalf of the HCP, 2005); • Dashboards of the Directorate of Financial Forecasting Studies of the Ministry of Economy and Finance.
Economic factors	GDP	Gross Domestic Product (in MAD)	Open data of World Bank
	Weight of informal employment	Weight of informal sector in GDP (%)	Study: “The Size and Development of the Shadow Economy in Morocco” (a Bank Al-Maghrib study)
Demographic factors	Elderly dependency ratio	Population aged 60 and over / population aged 15 to 59	Moroccan High Commissioner for Planning data
	Total fertility rate	The average number of children a woman would have at the end of her fertile life if the initial reproductive conditions remained constant	Moroccan High Commissioner for Planning data
	Life expectancy at birth	the average number of years that an individual can live at	<ul style="list-style-type: none"> • Moroccan High Commissioner for Planning data;

Sustainability Indicator / Explanatory Factors	Variable	Explanation of the variable	Data source
		birth, under the initial conditions of mortality	<ul style="list-style-type: none"> Report: "Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions" (produced by the CMR on behalf of the HCP, 2005).
Financial factors	Rate of return on UCITS (Undertakings for Collective Investment in Transferable Securities)	Annual rate of evolution of net assets of UCITS in Morocco	<ul style="list-style-type: none"> Annual activity reports of the Moroccan Ethics Council for Securities "CDVM" ; Annual activity reports of the Moroccan Capital Market Authority "AMMC".
Political factors	Political stability index	World Bank indicator to rank countries according to their political stability. This indicator varies between -2.5 to characterize a fragile political stability and +2.5 to characterize a rigid stability.	World Bank
Managerial Factors	Coverage rate of the employed population by a pension plan	% of employed population covered	<ul style="list-style-type: none"> Report : "Aging of the Moroccan population: effects on the financial situation of the pension system and on macroeconomic developments" (HCP, 2012); ACAPS Annual Reports on Social Welfare; CNSS Statistical and Demographic Report (2019); Report: "Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions" (produced by the CMR on behalf of the HCP, 2005).
	Demographic ratio	Total contributors / total pensioners	Same sources as for the sustainability indicator
Factors related to legislation	Number of legislative texts related to the pension sector	The number of Royal decrees (Moroccan Royal decrees) or laws published in the Official Bulletin that have a direct impact on the pension sector or on one or more funds managing a pension scheme	<ul style="list-style-type: none"> Online platform of the Moroccan company of legal information services "Artemis"; Online search engine of the General Secretariat of the Moroccan Government.

Given the limited number of observations, the conditions for applying regression models aimed at delimiting the contribution of each variable in explaining the results of the target variable (technical balance of the pension plans) are not met.

Thus, the analysis of the impact of factors on sustainability will be based on the correlation of their evolution. The choice of periodic observations instead of annual observations was adopted taking into account the unavailability of annual data for all variables.

Thus, the effect of these contributions will be estimated on the basis of the developments described below. This estimation will not call into question the results obtained since the value retained for the variables describes the general trend during each of the study periods.

6. Data analysis

The analysis of the data collected reveals the following elements and results:

6.1 Analysis of the sustainability indicator

Over the four periods, the evolution of the technical balance of all Moroccan pension schemes evolved by 74% between period 1 and period 2, which is explained by the fact that the schemes are still in the start-up phase and have more contributors than beneficiaries. Between period 2 and period 3, this evolution becomes less pronounced, with an increase of 29%. Between period 3 and period 4, the evolution of the technical balance of the Moroccan pension schemes experienced a deceleration of -45%, reflecting all the structural and functional imbalances of the national pension system.

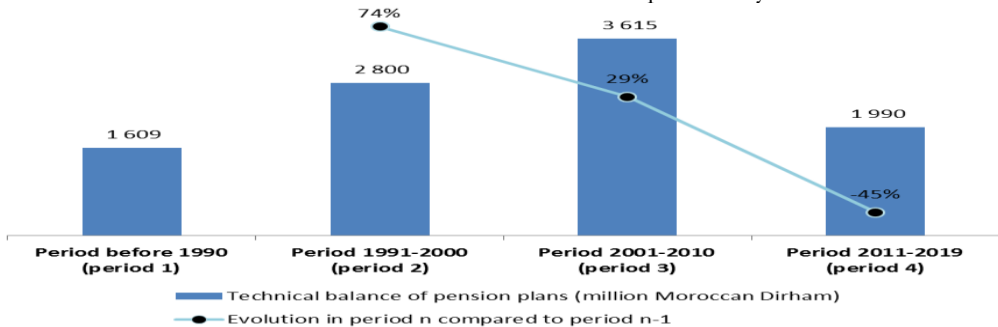


Figure 1. Evolution of the sum of technical balances of Moroccan pension schemes

Source: CMR, CNSS and RCAR Activity Reports; Moroccan Insurance and Social Security Supervisory Authority "ACAPS" Annual Reports on Social Welfare; Annual reports on financial stability (joint production of ACAPS, Bank Al-Maghrib and Moroccan Capital Market Authority "AMMC"); Report : "Aging of the Moroccan population: effects on the financial situation of the pension system and on macroeconomic developments" (HCP, 2012); Report: "Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions" (produced by the CMR on behalf of the HCP, 2005); Dashboards of the Directorate of Financial Forecasting Studies of the Moroccan Ministry of Economy and Finance.

Indeed, with the mass outflow of contributors, the generosity of these schemes has caused alarming deficits. Admittedly, the technical balance has always been positive but hides disparities. In fact, all pension schemes have negative technical balances, with the exception of CNSS which had opted since its creation for a non-generous pension calculation method. For example, in 2019, the technical balance of the CMR's civilian pension scheme is -5.2 billion MAD and that of the RCAR's general scheme is estimated

at -2.7 billion MAD. Only CNSS has a technical surplus of 6.2 billion MAD (ACAPS statistics).

Through the analysis of other variables, we will try to determine the trends that led to this fact.

6.2 Analysis of the economic factors: evolution of GDP

The evolution of the average GDP was increasing between period 1 and period 2, recording an evolution rate of 263% thanks to the efforts to launch the Moroccan economy undertaken by the public authorities in the aftermath of independence, despite the fact that the decade of the 1980s was marked by a pronounced deterioration of the national economy due to unfavorable international conditions (rise in the US dollar, high oil prices...). This period has also known the launch of structural adjustment plan in Morocco, with the support of the International Monetary Fund and the World Bank, in 1983 to mitigate these effects. This performance was repeated between period 2 and period 3, but with a less pronounced increase, showing a growth rate of 82%. The same observation was made between period 3 and period 4 (+58%), knowing that the country was beginning to reach cruising speed, thus complicating any development at a very sustained rate, before the covid19 pandemic changed the situation.

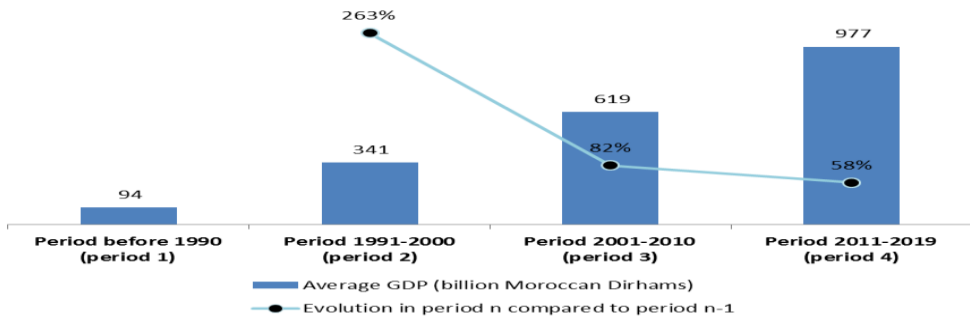


Figure 2. Evolution of the average GDP of Morocco

Source: Open data of World Bank

6.3 Analysis of the economic factors: evolution of the weight of informal employment

The weight of informal employment has fallen steadily over the years thanks to the efforts made by the public authorities to integrate the concerned population into the formal sector and hence boost the State's fiscal and social resources. Thus, the weight of informal employment has dropped by 10 points in almost 20 years, from 40% to 30%. This decline has contributed to the increase in the population contributing to the various national pension schemes, and consequently to the increase in the resources of these schemes.

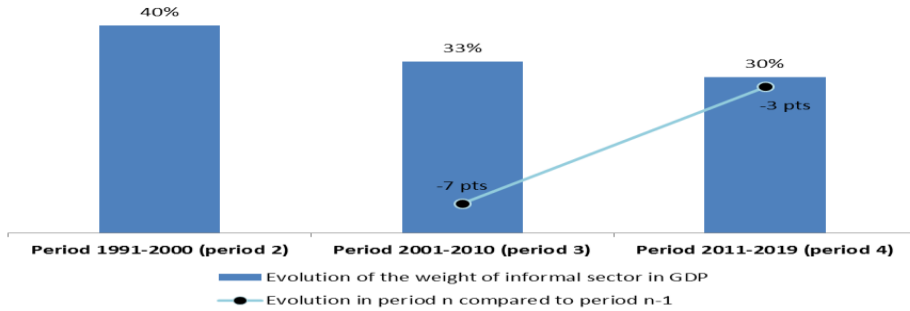


Figure 3. Evolution of the weight of informal sector in GDP in Morocco
 Source: Data collected from the Moroccan Central Bank “The Size and Development of the Shadow Economy in Morocco”

6.4 Analysis of the demographic factors: evolution of the elderly dependency ratio

The elderly dependency ratio (persons aged 60 years old and over / persons aged between 15 and 59 years old) fell slightly by 1 percentage point between period 1 and period 2, from 10% to 9%, and stagnated at 9% between period 2 and period 3, before rising again to 10% in period 4.

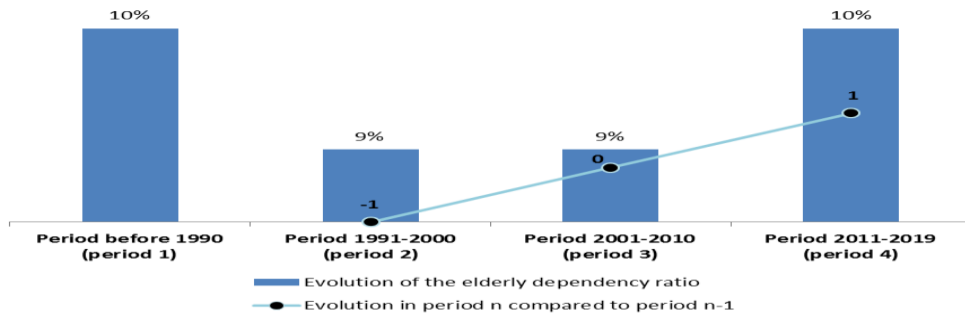


Figure 4. Evolution of the elderly dependency ratio in Morocco
 Source: Moroccan High Commissioner for Planning (HCP) data

6.5 Analysis of the demographic factors: evolution of the total fertility rate

The total fertility rate has declined dramatically in Morocco, from 6.21 per woman in period 1 to only 2.21 in period 4. This decline is explained by the change in the lifestyle of the Moroccan population and by the phenomenon of nuclearization of Moroccan families. This decline has had a significant impact on the size of the employed population and, consequently, on the number of contributors to pension plans.

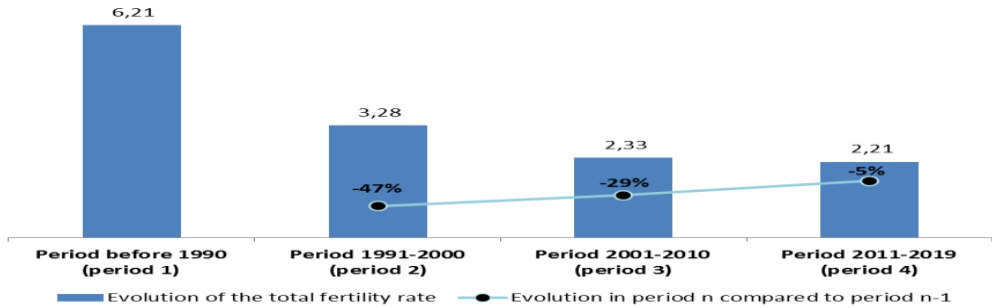


Figure 5. Evolution of the total fertility rate in Morocco

Source: Moroccan High Commissioner for Planning (HCP) data

6.6 Analysis of the demographic factors: evolution of life expectancy at birth

Life expectancy at birth rose from 52.44 years in period 1 to 74.8 years in period 4, a gain of 22.4 years. The most increasing evolution of life expectancy at birth is between period 1 and period 2, with an increase in life expectancy at birth of 16 years, thanks to the large access of the Moroccan population to medical services. This evolution has created a lengthening of the duration of service of the pension benefits, thus creating a pressure on the resources of the pension plans initially parameterized according to different assumptions.

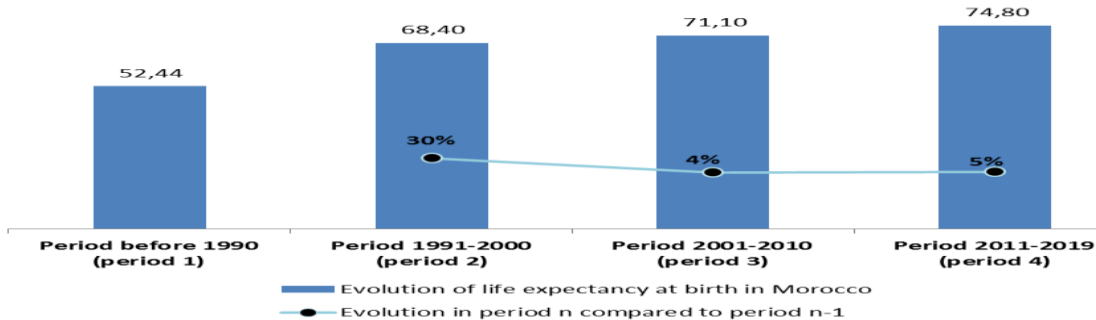


Figure 6. Evolution of life expectancy at birth in Morocco

Source: Moroccan High Commissioner for Planning (HCP) data and data collected from the report "Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions" (produced by the CMR on behalf of the HCP, 2005)

6.7 Analysis of the financial factors: Analysis of the evolution of UCITS returns

Undertakings for Collective Investment in Transferable Securities (UCITS) were only developed in Morocco in 1995. Their performance was increasing at the beginning, recording an average annual return of 105% during period 2. This performance dropped to 21% as an average annual growth rate during period 3, before recording 6% during period 4. This evolution reflects the opportunities offered to the reserves of the pension schemes during each of the periods mentioned.

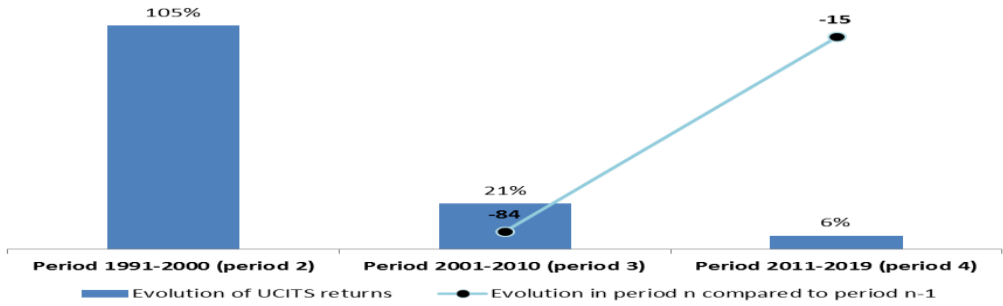


Figure 7. Evolution of UCITS returns in Morocco

Source: data collected from annual activity reports of the Moroccan Ethics Council for Securities “CDVM” and from annual activity reports of the Moroccan Capital Market Authority “AMMC”.

6.8 Analysis of the political factors: evolution of the political stability index

Since 1996, the World Bank had a political stability index in place to rank countries and the evolution of their political situation. The evolution of this index for Morocco is relatively stable, going from 0.01 in period 1 to -0.39 in period 4. This evolution reflects the resilience and resistance of the Kingdom to the political tensions experienced by the various countries in the region of MENA, confirming Morocco's exceptionality in terms of political stability.

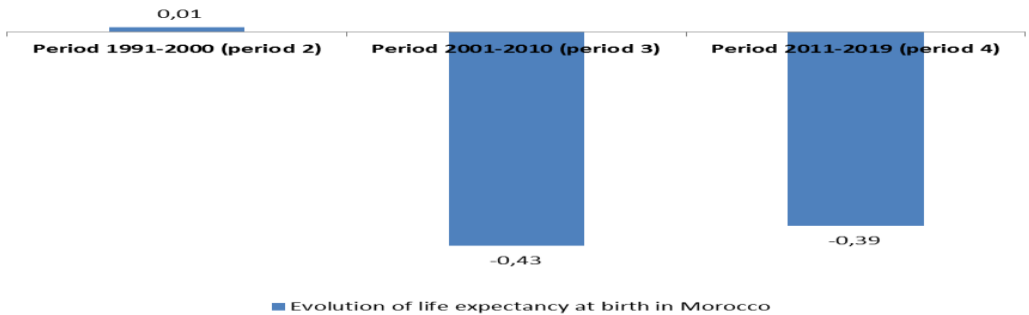


Figure 8. Evolution of the World Bank political stability index

Source: World Bank

6.9 Analysis of the managerial factors: evolution of the coverage rate of the employed population by a pension plan

The rate of coverage of the Moroccan working population by a pension scheme has increased from an average of 22% during period 1 to an average of almost 40% in period 4, i.e. almost double. This increase is explained in part by the evolution of the weight of informal employment described above as well as by CNSS inspection efforts to reduce the non-declaration of private sector employees.

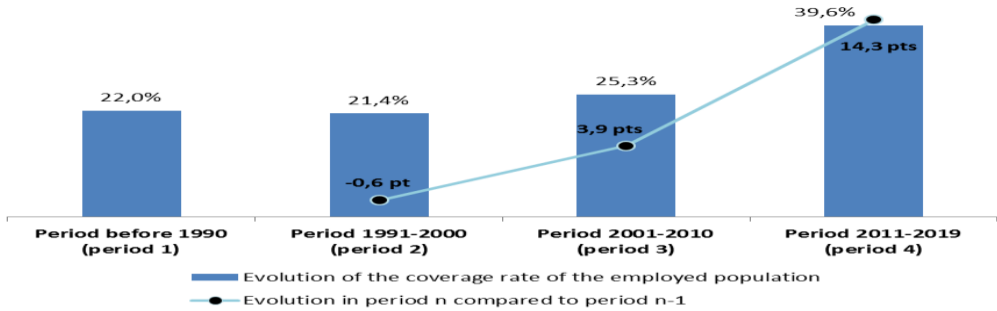


Figure 9. Evolution of the coverage rate of the employed population in Morocco

Source: data collected from the report “Aging of the Moroccan population: effects on the financial situation of the pension system and on macroeconomic developments” (HCP, 2012), ACAPS Annual Reports on Social Welfare, CNSS Statistical and Demographic Report (2019) and from the report “Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions” (produced by the CMR on behalf of the HCP, 2005).

6.10 Analysis of the managerial factors: evolution of the demographic ratio

The demographic ratio (contributors/old age pensioners) of the Moroccan pension system has been continuously decreasing, from 7.81 in period 1 to 6.01 in period 4, knowing that this relatively controlled decrease hides disparities between the different pension schemes. Indeed, and by way of illustration, the demographic ratio of the CMR’s civilian pension scheme has gone from 12.5 in 1983 to only 2.2 in 2019 and that of the RCAR’s general regime has gone from 7 in 1990 to only 2 in 2019. In contrast, the CNSS demographic ratio did not experience the same deterioration moving from 10.2 in 1985 to 6.95 in 2019.

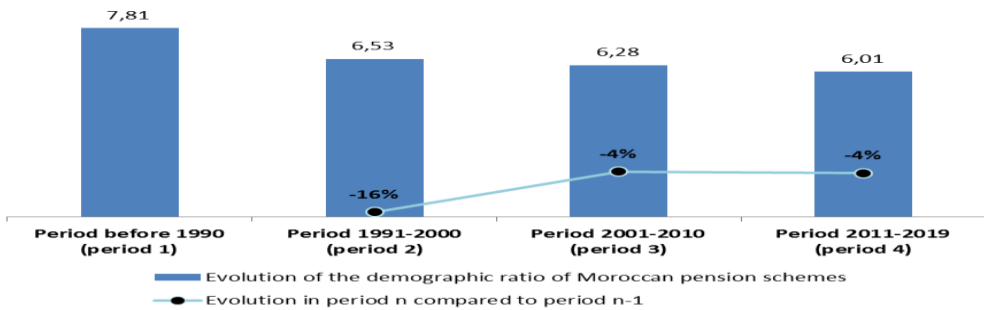


Figure 10. Evolution of the demographic ratio of Moroccan pension schemes

Source: CMR, CNSS and RCAR Activity Reports; Moroccan Insurance and Social Security Supervisory Authority “ACAPS” Annual Reports on Social Welfare; Annual reports on financial stability (joint production of ACAPS, Bank Al-Maghrib and Moroccan Capital Market Authority “AMMC”); Report : “Aging of the Moroccan population: effects on the financial situation of the pension system and on macroeconomic developments” (HCP, 2012); Report : “Prospective Morocco 2030: demographic change and its long-term repercussions on the burden of social protection: the case of pensions” (produced by the CMR on behalf of the HCP, 2005); Dashboards of the Directorate of Financial Forecasting Studies of the Moroccan Ministry of Economy and Finance.

6.11 Analysis of factors related to legislation: analysis of the Moroccan pension legislation

Using the Moroccan legal information platform "Artemis" and the online search engine of the General Secretariat of the Government (SGG), we conducted a query on the legal documentation contained in these two sources in order to collect the legislative texts related to the pension sector in Morocco.

The results of this research allowed us to collect 60 resources. By drawing on their content, we were able to classify them according to the pension fund they deal with, as follows:

Table 2: Census of the legislative texts related to the pension sector in Morocco

Period	CMR	CNSS	RCAR-CNRA	TOTAL
Before 1990	33	3	2	38
1991-2000	2	1	3	6
2001-2010	9	1	0	10
2011-2019	2	1	3	6
TOTAL	46	6	8	60

Source: authors

An analysis of the legislation by period shows the following results:

➤ **Period 1: before 1990**

The first pension fund in Morocco was established in 1917 through the creation of a Provident Fund (Caisse de prévoyance) for the benefit of the agents of the French Protectorate, who did not benefit from any pension scheme. In 1930, a civil pension scheme was instituted and compulsorily applied to civil officials who were French citizens and belonged to the general staff of the Protectorate's administrations. This scheme was managed by the Caisse Marocaine des Retraites (Moroccan Retirement Fund) created in the same year. At the same time, the Provident Fund provided a supplementary pension for insured persons subject to the CMR scheme.

As for the former insured of the main pension of the Provident Fund, the Royal decree (royal decree) of March 4, 1930 gave them the right to opt for the civil pension scheme managed by the CMR. A year later, in 1931, Moroccan civil officials were entitled to benefit from the civil pension scheme with the same rights as the civil officials of the Protectorate. Likewise, the complementary pension provided by the Provident Fund was granted to them.

In this sense, and in order to meet the financial commitments of the Provident Fund and to ensure the service of the pensions at its charge, a Special Retirement Fund was created in the same year.

In order to extend the pension coverage to other socio-professional categories, the Moroccan Life Annuity Fund (Caisse Marocaine de rentes viagères) was created in 1932 for the benefit of the auxiliary personnel of the public administrations of the Protectorate. In the same sense, a retirement fund for the civil officials of the northern zone administration was established in 1938.

Otherwise and in order to ensure a social wellbeing to its employees, the OCP created in 1947 an internal pension fund financed by defined benefits PAYG system. This was the first internal pension scheme at the level of Moroccan State owned enterprises.

In 1950, the first reform of the civil pension scheme took place by setting up a scheme operating by PAYG instead of capitalization. The contribution rate was set at 6%, the retirement age was fixed at 60 years and an annuity rate of 2% per year. In 1951, the life annuity scheme for auxiliary staff of public administrations was also reformed, following some rules similar to those set for the CMR's 1950 reform.

Two years later, and following the same vision as the OCP, the ONE created an internal retirement fund for its staff and for the personnel of companies in charge of the water and electricity production, transport and distribution. The financing of the fund is based on the principle of PAYG.

In 1955, civil officials and agents affiliated to the Provident Fund were given an opportunity, for a period of one year, to apply for affiliation to the reformed civil pension scheme administered by the CMR.

In 1958, the Provident Fund was dissolved and its financial obligations were transferred to the Special Retirement Fund. In the same year, the Northern Zone Retirement Fund was dissolved as well and its financial obligations were transferred to CMR. During the same year also, a pension scheme for officers of the Royal Armed Forces was established and managed by the Military Retirement Fund under the Ministry of Defense. In 1964, the responsibilities of this military fund were transferred to CMR.

One year later, the social security scheme for private sector personnel was created and its management was entrusted to a public institution created for this purpose, namely CNSS. In 1971, the Special Pension Fund was dissolved and its liabilities and financial assets were transferred to CMR. In the same year, the laws governing the civil and military pension system were adopted to further organize this sector with a post-colonialist vision. In 1976, the Moroccan Life Annuity Fund was dissolved and its assets and liabilities were transferred to CMR.

The social security system managed by CNSS underwent its first reform in 1972, increasing from 20% to 50% the rate applied to the average declared salary taken into account for the calculation of the pension. The pension ceiling was also increased from 40% to 70% of the average declared salary. In 1981, employers and workers of agricultural and forestry enterprises were entitled to long-term benefits from the CNSS (old age, disability and survivors' pensions).

In 1977, the Collective Retirement Allowance Scheme "RCAR" was created and its management was entrusted to the CNRA, a public agency managed by the deposit and management national Fund "CDG". This scheme targets the contractual personnel of the State, local authorities and the personnel of State owned enterprises subject to the financial control of the State. It consists of a general scheme and a supplementary scheme, the purpose of which is to insure against the risks of old age and disability for the insured and their dependents.

In 1982, the provisions of the law instituting the civil pension scheme were extended to civil officials in training at the State and local government levels.

Indeed, this period is very dynamic in terms of production of legal documentation as it is the embryonic phase of the Moroccan pension system.

➤ **Period 2: 1991-2000**

In 1993, the RCAR created separate funds to manage the reserves of its benefits (old age, disability-death and family allowances) as part of the active allocation and fructification of its financial resources.

In the same year, a law coordinating the social security systems was adopted in order to totalize the periods of contribution to the various Moroccan retirement funds and to be entitled to a single pension. Hence, Pensions from the different schemes can be cumulated and paid separately by the respective scheme.

In 1996, the CMR underwent a reorganization and now manages the civil scheme, military scheme, disability pensions for auxiliary forces personnel, pensions awarded to resistance fighters and their widows, lump-sum allowances for certain former resistance fighters, as well as any pension or allowance provided for by law or regulation, and supplementary schemes. The employee and employer contributions will henceforth be paid to CMR and no longer to the State budget. In addition, CMR will set up reserve funds that can be invested in government securities, in securities listed on the stock exchange and in real estate. In order to ensure a smooth start-up, the staff of the pension division of the Ministry of Economy and Finance was seconded to CMR.

In 1997, permanent allowances and bonuses were included in the emoluments used as a basis for calculating the pension.

➤ **Period : 2001-2010**

In 2001, CMR underwent a new reorganization aimed at the governance aspect. Thus, the deadlines for the CMR's Board of Directors were set for the closing of the financial statements for the year ended and for the examination and closing of the budget and the action program for the following year. In addition, law 99-77 was promulgated prohibiting the accumulation of remuneration and retirement pension or any other assimilated annuity in order to keep the social objective of the establishment of pensions, namely the protection of the elderly against poverty and not to enrich those who are already in a wealthy situation.

One year later, the basis for calculating the retirement pensions for CMR's insured persons was changed by including other allowances and bonuses that are received permanently. Thus, the amount of pensions will be increased. In 2003, the contribution rate of the affiliates and of the State was increased to 14% for affiliates of the military pension scheme, and then to 20% in 2006.

In 2004, CNSS changed some of its technical parameters by basing the rate on a period of 3,240 days before accessing 50% of the average declared salary, which is increased by 1% for each additional 216 days of contributions, without exceeding a ceiling of 70% of the average declared salary.

In 2006, the lecturer-researchers of education institutions became subject to the civil pension plan administered by CMR instead of RCAR.

➤ **Period 4: 2011-2019**

In 2016, the parametric reform of the civil pension scheme took place with the decrease of the annuity rate to 2%, the increase of the contribution rate to 14%, the calculation of the reference salary on the last eight years of career instead of the last salary and the retirement age was raised to 63 years for civil officials and staff affiliated to the civil pension

scheme of the CMR and to 65 years for lecturer-researchers and staff and civil officials nominated as ambassadors.

In addition, the minimum pension has been raised to 1,500 MAD for those affiliated to the CMR as well as to RCAR and this, for a minimum contribution period of 10 years. In addition, the age of access to retirement for lecturer-researchers affiliated to RCAR has been increased to 65 years.

The year 2017 known the institution of a pension scheme (for old age and survivors) for the categories of professionals, self-employed and persons engaged in a liberal activity. The management of this scheme has been entrusted to CNSS. The contribution is calculated on the basis of a fixed income depending on each professional category and the scheme operates based on points. The retirement age is 60 years, with the possibility of postponement until the age 75 years.

7. Results and Discussion

Taking into account the above analysis, we will try to identify the changes correlated with those of the technical balance of the pension plans during the 4 periods. The table below describes the evolution of the variables that have the same evolution as that of the target sustainability indicator variable (technical balance of the pension plans):

Table 3: Evolution of the variables having the same evolution as that of the target sustainability indicator variable

Period of evolution	Evolution of the technical balance of pension plans (sustainability indicator)	Variables having the same evolution of the sustainability indicator
Period 1 - Period 2	+74%	<ul style="list-style-type: none"> • GDP (+263%) • Life expectancy at birth (+16 years)
Period 2 - Period 3	+29%	<ul style="list-style-type: none"> • GDP (+82%) • Pension plan coverage rate (+4 points) • Life expectancy at birth (+2.7 years) • Number of legislative texts related to the retirement sector (+4)
Period 3 - Period 4	-45%	<ul style="list-style-type: none"> • Weight of informal employment (-3 points) • Demographic ratio (-0.3) • Rate of return on UCITS (-15.1 points) • Total fertility rate (-0.1)

By analyzing the variables having the same sustainability indicator's evolution and with the most occurrences over the study periods, we may retain two variables: GDP and life expectancy at birth, with two occurrences for each variable, mentioning that both variables appeared between period 1 and period 2 as well as between period 2 and period 3.

This finding indicates the apparent economic and demographic effect on the sustainability of pension plans in Morocco, given the importance of the contribution base to the solvency and sustainability of the financial equilibrium of pension plans.

However, it is necessary to mention that the variables retained between period 3 and period 4 are not to be dismissed and represent the new source of effect and threat for the sustainability of the Moroccan pension plans. These are the weight of informal employment, the demographic ratio, the return on UCITS and the total fertility rate. Indeed, while three of these variables reiterate the importance of economic and demographic factors, we retain a new factor of primary importance, namely the financial factor. Indeed, the strategic allocation of pension plan reserve funds, notably by resorting to innovative and adapted financing methods, is a determining factor in the implementation of an active management policy for these reserves. It is obvious that the growth of reserves strengthens the technical balance of pension plans.

Moreover, it should be noted that the factors retained between period 2 and period 3 and not yet mentioned in our analysis should be analyzed very carefully, namely factors related to pension managers and legislation. Indeed, the rate of coverage by pension schemes directly affects their level of resources, which are fed mainly by the contributions of the insured population.

In this respect, it is certain that the efforts made by the public authorities to ensure generalized coverage of the population by pension insurance, notably the self-employed workers will undoubtedly have positive effects on the sustainability of the pension system. In addition, the number of legislative texts relating to the pension sector also has an effect on its sustainability. The implementation of legislative in favor of this sector, in particular by the integration of new contributing populations and adaptation of the schemes' parameters to the new economic and demographic context, will clearly contribute to its sustainability.

8. Conclusions

Reforming a pension system in such a way as to make it sustainable and cost-effective is undoubtedly the ultimate goal of all policymakers. However, there is no magic bullet or key parameter that needs to be adjusted to ensure that this reform is implemented. Our paper attempts to identify the factors that can impact the sustainability of the Moroccan pension system. To achieve this objective, we have conducted an adequate literature review accompanied by a study of the history and current situation of the Moroccan pension system. Thus, we were able to identify certain factors that we quantified by corresponding variables. In total, ten variables representing all the factors were retained, as well as a variable representing the sustainability of the pension system. The factors selected relate to the country's economic context, demographic context, financial context, political context, the management of retirement funds and legislative context.

The time frame of the study involved four distinct periods, namely the pre-1990 period, the 1990s period, the 2000s period and the 2011-2019 period. As for the pension schemes studied, we chose the basic mandatory schemes currently operating in Morocco.

After an analysis of the temporal evolution of each variable and taking into account the evolution of the sustainability indicator, we detected that the two variables most correlated with this indicator are GDP and life expectancy at birth. This reflects the importance of economic and demographic factors in the sustainability of Moroccan pension schemes.

Another finding of the above analysis is that the variables that have had the greatest impact on the sustainability of the pension system over the past decade, according to this study, are the weight of informal employment, the demographic ratio, the return on UCITS, and the total fertility rate. This result reiterates the impact of economic and demographic factors, but also of the financial factor. Indeed, a strategic and efficient allocation of the reserves resulting from the accumulation of the surplus of contributions over benefits makes it possible to generate an additional financial flow for the pension schemes, thus making it possible to reduce the financial charges of the said schemes. In this sense, the use of innovative sources of financing adapted to the pension sector has become a necessity.

Moreover, between the 1990s and the 2000s, our study enabled to observe the effect of the legislative factor and pension manager funds on the sustainability of the Moroccan pension system. Indeed, the adoption of new legislative measures relating to the pension sector has a significant impact on its sustainability, especially by some specific measures like the integration of new populations, the reorganization of the concerned retirement funds, the adjustment of the technical parameters of a pension plan and the introduction of the minimum pension. Similarly, factors inherent to pension plan funds, such as the rate of population coverage by pension insurance, directly affect the sustainability of these plans, given the fact that the main source of funding for these plans comes from the contributing population.

Based on the current literature review on pension schemes sustainability and the studies conducted for the Moroccan case, the quantitative study presented in this paper has shown that for the Moroccan case, economic and demographic factors have a more important effect than the other factors identified by the literature review mentioned above. However, this finding does not underestimate the effect of the other factors identified by the literature review, either in isolation or in combination.

In fact, this paper has shown that during the last decade (2010-2019), the financial factor has a more pronounced effect on the sustainability of Moroccan pension schemes than in previous decades.

Otherwise, it should be noted that the Moroccan government has already taken action in line with the results of this study. Indeed, concerning the coverage of the employed population by a pension insurance, we specify the adoption in 2021 of a framework law on the reform of social protection, following the High Royal Orientations, aiming at extending and accelerating the implementation of the generalization of the pension system for the persons not yet covered, in particular for the non-salaried workers whose integration project to the CNSS regime has already been carried on for a few years but whose progressive execution is relatively slow.

As for the implementation of innovative financing, CMR signed in 2019 a memorandum of understanding with the Ministry of Economy and Finance for the acquisition of five university hospital centers with a lease agreement consisting of transferring the ownership of certain real estate assets while preserving their use over a long period. The transaction cost is estimated to 4.6 billion MAD and it is foreseen by CMR that this investment will generate attractive returns compared with the returns offered by money and bonds markets.

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