

## **Comparative analysis of pay-as-you-go and funded pension systems: literature review.**

### **Analyse comparative entre les systèmes de retraite par répartition et par capitalisation : revue de littérature.**

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**Abstract:**

There are two main types of pension system, a funded system and a pay-as-you-go system. The difference between these two systems is linked to the way they operate: the first is based on sums collected by the working population in special funds that generate interest, so that the contributor can benefit from this deposit when he or she retires, either immediately or in the form of a life annuity.

However, the pay-as-you-go pension system is based on the principle of solidarity, whereby each working population finances the retirement of pensioners by means of a contribution that varies according to the economic and demographic situation.

The objective of our work is to determine, through a literature review based on academic and institutional contributions on the subject of pension reforms from 1990 to 2023, the most secure and efficient pension system, by comparing the two systems in terms of efficiency, return and risk. According to the comparison, neither of the two systems meets the conditions for efficiency, but in terms of risk, the funded pension system is the more secure.

**Keywords:** retirement; risk; returns; capitalization; pay-as-you-go.

**Résumé :**

Il existe deux principaux types de système de retraite, celui par capitalisation et un autre par répartition, la différence entre ces deux systèmes est liée par leurs modes de fonctionnement, pour le premier il est basé sur des sommes collectées par des populations actives dans des fonds spéciaux qui génèrent des intérêts, pour que ce cotisants il se bénéficie de ce dépôt lors de sa retraite, soit immédiatement ou sous forme de rente viagère.

Cependant le système de retraite par répartition, il est basé sur le principe de solidarité, dont lequel chaque population active finance la retraite des pensionnés moyennant une cotisation qui varie selon la conjoncture économique et démographique.

L'objectif de notre travail est de déterminer à travers une revue de littérature sur la base des contributions universitaires et institutionnelles au sujet des réformes de retraite, de 1990 à 2023, le système de retraite le plus sécurisé et performant, en effectuant une comparaison entre les deux systèmes, en terme d'efficacité, de rendement, et de risque. Selon la comparaison effectuée aucun des deux systèmes ne valides les conditions d'efficacité, mais en termes de risque le système de retraite par capitalisation est le plus sécurisé.

**Mots clés :** retraite ; risque ; rendements ; capitalisation ; répartition.

## Introduction

The first is the pay-as-you-go system, introduced in the aftermath of the Second World War as part of the reform introduced by France, since the war generated a pressing need for social protection. At the time of the Second World War, the idea of the right to a pension had been established. However, this right was only substantial for a small fraction of the population, in the civil service or in certain sectors or large companies that had long had pension schemes.

The second type of pension system is that of capitalization. In fact, the capitalized pension system existed before the Second World War, i.e. before the pay-as-you-go system, and although it had made it possible to accumulate significant sums of money, and because of the circumstances of the war, it introduced a real problem of galloping inflation, aggravating the misery of many elderly people.

Because of other harmful effects of the funded pension system on the country's economic situation, in particular its contribution to the great stock market crisis of the 1930s, the system was replaced by the pay-as-you-go system. This change was made by the Act of 14 March 1941, and pay-as-you-go was reaffirmed by the Ordinance of 19 October 1945, which laid the foundations for the current insurance system. Many countries in the world are currently suffering with their pension systems, which has become a major concern in developed countries such as France, as well as in developing countries such as Morocco. The ageing of the population and the decline in the working population are becoming a dangerous threat to pension systems, especially pay-as-you-go systems, because the burden of pensions distributed is becoming increasingly heavy, resulting in a depletion of the reserves intended to make up the difference between the funds' resources and expenditure.

In order to restore balance to their pension systems, several countries have introduced reforms, the main ones being a multi-pillar system in Chile and a notional account system in Sweden. These two types of reform are systemic, completely changing the way the funds operate. Other countries have carried out parametric reforms, which aim to restore balance by modifying the system's operating parameters. These parameters are the contribution rate, the retirement age, the replacement rate and the settlement base. Despite the efforts made by a number of countries to reform their pension systems, the situation is still far from satisfactory.

This is due either to the inadequacy of the reform carried out with the system, or to the worsening of the country's economic or demographic situation.

The pension system is becoming a concern for the Moroccan state, due to the imbalance recorded since 2014 between the contributions collected and the pensions distributed in the

Moroccan pension fund, the thing that has aroused our interest in carrying out this study whose objective is to determine the most effective pension system between that of distribution and capitalization. Through a theoretical comparison, our analysis will attempt to answer the following question: which pension system performs better in terms of efficiency, return and risk management?

### **Research methodology:**

In order to answer our research question, a literature review was carried out, based on academic and institutional contributions on the subject of pension reforms and the pay-as-you-go versus funded debate, from 1990 to 2023. The review of the literature on pension systems is vast, which is why we have selected works that deal with a problem similar to that of our article.

In order to achieve the objective of this article, we have chosen to treat the subject in three sections. The treatment of our problem begins with a definition of pay-as-you-go and capitalisation as an economic concept, followed by a presentation of the pay-as-you-go pension system and the historical context of its implementation, then a presentation of the capitalisation pension system and how it works. Finally, we will present and discuss previous work that has analysed the two systems in terms of efficiency, return and risk, in order to determine the most efficient pension system with the least risk.

#### **1. Literature review and development of hypotheses:**

##### **1.1 Presentation of the pay-as-you-go pension system:**

There are several definitions of the pay-as-you-go pension system, including that of Pierre Laroque (1992), for pensions, the pay-as-you-go system is a source of solidarity between generations: "Contributions from working people are used to pay pensions immediately, while giving them rights for their future retirement".

In addition, according to Laffargue (1990), the pay-as-you-go pension system was created and generalised after serious events, such as the world war and the financial crises, which meant that a significant proportion of the population did not have the capital to ensure a decent retirement. Faced with what was perceived as the instability of capital, pay-as-you-go pensions are financed by growth in the wage bill, which over the long term can be considered similar to that of GDP. According to Laffargue (1990), the pay-as-you-go pension system is therefore a system imposed by the financial and social circumstances that existed. In a pay-as-you-go pension system, if equilibrium is assured and contribution rates are stabilized, the return on pay-as-you-go pensions becomes equal to the rate of growth of the economy (Olivier Davanne & Thierry Pujol, 1997). To simplify matters, we can consider that, in exchange for paying their

current total contributions, today's contributors acquire the right to share in the contributions paid by future contributors in twenty or thirty years' time. In a steady state, this mass of contributions grows in parallel with the economy as a whole (Olivier Davanne & Thierry Pujol, 1997).

On the basis of these definitions, we can conclude that the pay-as-you-go pension system is a method of financing pension funds. Its main resources are the contributions made by the working population to the fund at a set contribution rate, in the following way: today's working population uses its contributions to finance the pensions of the former working population, so that today's working population will benefit from the contributions of the future working population, and it is the pension fund that manages this whole process. However, in order to manage and finance the operation in the pay-as-you-go system, a proportion of the contributions collected is set aside to cover the management costs, while reserving the right to adapt it to future circumstances. In principle, the balance in the pay-as-you-go system must be established directly between contributions and pensions, without recourse to financial reserves. From this point of view, management is simple, without forecasts. A system with consecutive deficits creates cash flow problems due to the lack of reserves. This is why the various pension funds have changed the way the system operates, incorporating periodic forecasting studies and the setting up of provisions to ensure the long-term equilibrium of the scheme. By analyzing the evolution of the fund's variables and balances, the fund will be able to draw up an actuarial balance sheet that will enable it to make projections, and therefore have forecasts of annual income and expenditure for a certain number of years.

Assuming that the fund keeps the same membership criteria, the latter proposes two hypotheses, the maximum and the minimum, and from these hypotheses, we draw levels of contributions and benefits that should allow the cash flow to be sufficient at all times, i.e. that the reserves will be constantly positive and consequently ensure long-term equilibrium. The conclusions on the extreme forecasts will indicate, taking into account the security of the fund, what should be retained: the most unfavorable assumption or the average of the two.

For funds operating on a pay-as-you-go basis, it ensures a certain parallelism between retirement benefits and nominal salaries, and for each financial year, they generate a profit in the event of a growth in members or, on the contrary, a loss presented by an average annual rate.

## **1.2 Presentation of the capitalization system:**

Capitalization in its broadest sense means the insurance system in which the premiums or contributions paid by the member to the insurer are held in reserve, with interest earned and periodically capitalised, so that the capital corresponding to the payments and interest is paid to the member either immediately or in the form of an annuity. There are several types of capitalisation, including stock market capitalisation, which is a system whereby an undertaking for collective investment in transferable securities (UCITS) reinvests the income from its investments instead of distributing it, or the capitalisation company, which is a financial institution that guarantees subscribers payment of a fixed sum either on the agreed due date or on a due date determined by drawing lots.

In addition, the funded pension system is one in which working people and retirees have assets to meet their future needs (Davanne Olivier, Pujol Thierry.1997).

According to BIALES (2023), the funded pension system or the pre-funded system or the savings-based funded pension plan is a way of operating a pension fund by building up reserves (or provisions), the amount of which is equal to the sum of the flow of contributions paid by future retirees, plus the financial income generated by these reserves.

In practical terms, the funded pension scheme is a system in which the insured or the working population undertakes to pay a certain number of premiums so that the pension fund to which they are affiliated provides them with a life annuity. The relationship between the policyholder and the pension fund is based on an individual contractual relationship, with all its terms and conditions modified according to the policyholder's situation.

The terms of the contract include the duration of the payments, the capitalization rate and the amount of the annuity... In the case of collective capitalisation, the contribution paid by each insured person will be a fraction of their salary defined by their own individual contribution rate, and when it is also compulsory, it ensures a certain economy of scale as well as a pooling of risks. The main forms of this system include, there are compulsory and/or tax-exempt pension funds. Pension funds can also be individual, based solely on an individual's desire to save.

In the capitalisation technique, the data is established by reference to a mortality table, which is a list giving the probability of death according to each age, established on the basis of statistical data. This table is established on the basis of observations of a large population, over several financial years, in order to eliminate cyclical phenomena.

Each age in this mortality table contains either the number of living individuals, by sex, by socio-professional category, conventionally noted  $l_x$ , or the probability of death in the year, conventionally noted  $q_x$ , or a life expectancy noted  $e_x$ , and it can even be a combination of these elements (Aref M. Sadek, 2006). For Morocco, the latest mortality table produced is that for 2009-2010, drawn up by the High Commission for Planning.

According to the literature review cited and economic theory, the hypotheses of our theoretical study will be as follows:

**H1: The pay-as-you-go pension system is less risky than the funded system.**

**H2: The funded system is the most efficient pension system.**

**H3: The return on the pay-as-you-go pension system is greater than the return on the funded system.**

## **2. Analysis of the efficiency of the two types of pension system:**

First and before analysing the efficiency of a pension system, we need to know what an efficient pension system is, or in other words what are the efficiency criteria of a pension system.

According to Christel Bonnet (2016), there are three main criteria that make up the score awarded to each system:

-The first is performance: or economic efficiency and it is assessed according to the generosity of the system. (40% of the total score)

-The second is the system's long-term viability, or sustainability, which is based on reserves (35% of the total score).

-The third and final criterion is the integrity of the system: "This is the regulation of the transparency and communication of the system, and reflects the degree to which the system can be understood by everyone" (35% of the total score).

Based on these criteria, we can say that neither the pay-as-you-go system nor the funded system can meet these three criteria simultaneously. For economic efficiency, the pay-as-you-go system and the funded system cannot guarantee a high income for retirees, because the first depends on the balance between contributors and retirees, and the second depends on the amount collected by the employee during his or her period of employment. The second criterion, viability, is based on the constitution of reserves, which cannot be guaranteed under the pay-as-you-go principle, even though the capitalisation system validates this criterion, but it is still far from guaranteeing the integrity criterion, because simply if it had been able to validate this criterion, the world would not need to create a new pension scheme, which is the pay-as-you-go system. In fact, in order to have an efficient system, it would have to be a

combination of these two systems to build a social security system based on several pillars: a public pay-as-you-go pillar, a compulsory funded pillar and a purely voluntary private savings pillar (H. EL AMRAOUI & S. HINTI, 2022).

As neither system meets the three efficiency criteria, we will compare the advantages and disadvantages of each system.

The real advantage of the funded system in the case of monetary stability lies in its positive role on the development of savings and therefore on growth in the case of an economy constrained by the supply of capital (Cendron Jean-Pierre, 1985).

Unlike the pay-as-you-go system, the funded system is not affected by fluctuations in the demographic structure, and its management is based on an actuarial balance sheet. In other words, a funded scheme can be wound up at any time, thanks to its reserves and assets, which enable it to honour its commitments.

Despite these solid advantages of the funded system, it remains weak in the face of inflation, which poses a real danger to the assets of this system, especially as it was the main cause of the collapse of this system after the World War, when the 1952 franc was only 4% of the 1938 franc. The capitalisation system cannot be generalised in the form of a single system.

### **3. Comparison in terms of return and risk of each system:**

#### **3.1 Returns on pension systems:**

To begin with, we need to determine the price of each system, or in other words its rate of return, and in order to determine this rate we can start with the factors dependent on each system. For the funded system, we can talk about financial products, which may be shares, bonds or other, and so automatically we are talking about the rate of return on the financial market and therefore the real interest rate, whereas for the pay-as-you-go system it depends above all on productivity growth, and demographic trends, which are linked to the rate of economic growth. According to economic theory, and the models presented by various economists such as Von Neumann, J. (1938) who presented a model of balanced growth taking into account the following conditions:

- Natural factors (land, labour) are available in unlimited quantities.
- Each production process uses at least some of the goods produced in the previous period. However, it is not possible to use more goods than were produced previously (closed economy).
- Labour is paid at a subsistence level.
- Profits are fully reinvested. .

- Constant returns and the absence of technical progress, final consumption and external relations.

This model establishes equality between the growth rate and the interest rate, when the ideal conditions are met ("at equilibrium", "at the optimum", etc.), but once the conditions are not validated the interest rate becomes higher than the growth rate, according to J. Tobin & al (1966), and this is also the case in an economy characterised by regular, homothetic or harmonised growth.

In practical terms, we can conclude that the interest rate cannot remain lower than the growth rate for long, because a low interest rate encourages people to go into debt, which would lead to a positive trend in the interest rate that would exceed the growth rate.

The rate of return on funded pension schemes also depends on the weighting of government bonds in the benchmark portfolio.

The superiority of the funded rate of return over the pay-as-you-go rate can have harmful effects. Firstly, from an economic and social point of view, a higher rate of return for capitalisation than for pay-as-you-go means that the cost of capital rises faster than the cost of labour, which would lead to the development of a rent-based economy and a deterioration in the situation of employees because of the fall in their returns, which would lead to austerity and, consequently, a weakening of the dynamism of the economy and of intergenerational solidarity.

According to Biales (2023), the return on assets depends above all on the socio-economic situation, and especially on the demographic base, which is favourable when the working population is large and saving in anticipation of their retirement, which would lead to a relative weakness in consumption, implying a turnaround and growth in unemployment with low inflation, and therefore high real interest rates. And thanks to the high level of savings, a certain stock market fever could take hold, as happened between 1980 and 1990. But a demographic shock can completely transform the economic situation and the return on capitalisation. And this is what has already happened in some countries, and is expected to happen in others, and it is the situation in which the working population becomes equal to that of pensioners, the latter normally reacting by dissaving. The dissaving behaviour adopted by retirees would lead to a reduction in overall savings, and consequently a significant increase in consumption, and an acceleration in growth as well as full employment, which becomes more feasible again as there are fewer working people, which would lower real interest rates. To pay pensioners, pension

funds are obliged to sell financial assets, even though there is no demand for them, which would lead to a fall in stock prices and stock market capitalisation.

We can therefore conclude that the introduction of a funded pension system must take place in a demographic environment characterised by a low percentage of ageing and an interest rate that exceeds that of economic growth to ensure a positive return. In the opposite case, and if it is the economic growth rate that exceeds the interest rate, the return on the pay-as-you-go pension system would be greater. Consequently, we can neither affirm nor reject hypothesis 3, since the return on the two forms of pension system depends on variables that differ from one country to another.

### **3.2 Risks in pension systems:**

In order to properly analyse the difference between the two pension systems, we also need to look at the risk side, and the various risks that can lead to a malfunctioning of the two systems, among which there are nine main risks:

**A financial risk:** This risk arises from various factors, in particular market fluctuations, falling interest rates, the increasing longevity of scheme members and the rising costs associated with annuities. According to B. Thierry (2016), the financial risk may arise in the disappearance or difficulty of the collecting structure, either because of poor investments or as a result of scams, of which the Anglo-Saxon world has recently provided several widely publicised examples.

**An economic risk:** linked to an unfavorable economic climate, in which salaries and the income of self-employed workers are tending to stagnate and even sometimes to fall, with unemployment taking hold and rising. All these factors contribute to the fact that the usual resources of pension funds in the form of contributions are tending to fall or remain stable, while on the other side of the ledger, pensions are rising steadily as a result of the noria effect. The unanticipated arrival of other senior citizens affected by this crisis, and who have chosen to anticipate their retirement rather than be unemployed while being shuffled from temporary jobs to other non-renewed fixed-term contracts, would lead to a fundamental imbalance, due to the lack of resources, which would deplete the pay-as-you-go pension funds. The capitalisation system is also threatened by this risk, which is linked to the rate of inflation, which can lead to a depreciation of capital invested in fixed-income securities, and this was the case for policyholders in capitalisation techniques after the last world war, who were disappointed, since the promised capital concluded in the contract before the war no longer has the same value because the 1952 franc was only 4% of that of 1938.

Legislative risk: in many cases, legislative decisions and adjustments have turned our pension systems into patchworks, patching them up as the need arises (Thierry Benne, 2016). These include changes to the calculation base, increases in the retirement age, reductions or increases in the investment rate, increases in the contribution rate, and increases in the share of national compensation. The latter was initially created to help funds suffering from the effects of demographics, and the State was responsible for its funding, but it quickly drifted onto the other schemes, which were taxed according to their demographic wealth, so that it eventually became a confiscatory tax instead of a social contribution (G. Maudrux, 2010). As for the other existing legislative risks, we have the growing costs of welfare, and an alarming lack of long-term vision on the part of legislators, as well as a lack of coherence.

It should also be noted that sometimes there is a kind of imitation of the reforms adopted by legislators in different countries, without proper study of the effectiveness of these reforms and their consistency with their economic and demographic situations.

The risk of public capture: or the holdup, it arises because of the intervention of the State in two main cases:

The first is where the State intervenes directly or indirectly in the management of funds which have significant technical provisions, in order to eventually back them into structures which they have more or less minimal financial difficulties with. The Moroccan pension fund has incurred this risk, with the intervention of the Moroccan State during the deficit of the military pension scheme since 1993, and in which the Moroccan State intervened in order to make up this deficit, with the resources of the civil pension scheme and the said advances are reimbursed by the State through a subsidy of the scheme. The RPC is often reimbursed late and without being updated, which creates a shortfall for this scheme, because the amounts are not invested, so the deficit is covered by the RPC and the payment is made at the end of the year, (In 2007, the State paid the CMR MAD 11 billion, of which MAD 5 billion was intended to cover all the deficits of the military scheme).

The second case of intervention is when the State backs a previously public scheme in a deficit situation, and with major financial difficulties, with private funds without transferring to them the cash flow corresponding to all the corresponding pension commitments (Trojan horse or siphoning technique) already recorded or to come. This has a negative impact on the financial situation of the host organisation, which quickly sees its provisions depleted and its deficits increase.

**Management risk:** The risk of poor management generally arises in the event of bankruptcy of the managing establishment, due to the poor measures put in place. These poor measures may be the result of non-compliant or unrepresentative studies, or the failure to regularly monitor macroeconomic trends such as growth and inflation, or microeconomic trends such as the purchasing power of pensioners, as well as the absence of forecasting procedures that should correspond to social events, or demographic trends, which generally require extremely brutal and unpopular measures. By way of example, consider the pensions paid between 1946 and 1975, which corresponded exactly to the "trente glorieuse" period, and whose amounts were such that they jeopardised the payment of subsequent pensions over the following decades. This danger often arises from long periods of economic growth when scheme managers have tended to be overly generous, offering rates of return of up to 15%.

**Conflict of interest risk:** The most important type of conflict of interest is the "principal-agent conflict". This type of risk corresponds to the tensions that arise between shareholders and the managers who operate the companies or, in other words, the pension schemes.

**Legal risk:** this is linked to the civil liability of scheme sponsors, and their legal action, in which they are accused of negligence or intentional wrongdoing, which would result in a loss for the insured, but the problem is that many times these sponsors are the victims of legal action even if they have acted in good conscience. Generally, this risk is created by the investment decisions made by financial managers, but it is the employees who bear the risk of making the wrong choices, and it is they who have the right to sue the plan sponsor if it has not followed a fair approach when making its decisions, or if he has not given clear explanations justifying the investment choices made.

**Demographic risk:** the decline in the demographic ratio is a major threat to pension systems, especially the pay-as-you-go system, because it leads to an imbalance between expenditure and resources, and this generally comes down to demographic deterioration, which would result in the number of pensioners exceeding that of the working population, which would lead to a fall in contributions received against an increase in expenditure, as well as a reduction in the financial surplus of the various funds. In fact, there is a significant negative correlation between the ageing of the population and pension schemes.

**Figure 1: Trends in demographic indicators around the world.**

Country	Total population (in thousands)	Taux de natalité	Taux de mortalité	Life expectancy	Infant mortality rate	Number of children per women	Growth rate	Population aged 65 and over
AFRICA	1460480	31.736	7.99	62.9902	43.0981	4.1843	23.39	51179.5
LATIN AMÉRIQUE and The CARRIBEAN	664997	14.408	6.626	75.7914	12.2029	1.8383	7.54	62909.4
NORTHERN AMÉRIQUE	378904	10.908	8.501	80.0719	4.7998	1.6444	5.7	67399.1
ASIA	4753080	14.039	6.922	74.9666	21.3616	1.9336	6.81	471889
EUROPE	742273	9.131	11.128	79.4918	3.1437	1.5038	-0.93	148409
OCEANIA	45575,8	15.313	6.685	79.3115	15.3389	2.1322	11.74	6004.02
WORD	8045310	16.69	7.552	73.357	26.7402	2.3118	9.14	807790

Source: World Population Prospects. United Nations.

The increase in the life expectancy of pensioners, who are living longer and receiving pension benefits for a longer period, would lead to financial pressure and even an imbalance in pension schemes (S. Zaoui & A. Delinda, 2023); this demographic risk also comes into play in the event of an economic recession characterised by a high unemployment rate, so this is a risk linked to changes in the human factor.

Based on the literature review, the number of risks that could impact the pay-as-you-go pension system is greater than those associated with the funded pension system. According to the risks studied, the pay-as-you-go pension system is the riskiest pension system, so hypothesis 1 is rejected. Hypothesis 2, on the other hand, is validated by the fact that the funded system is subject to fewer risks than the pay-as-you-go system, so it can be said that the funded pension system outperforms the pay-as-you-go system, under the constraint of a higher interest rate than that of economic growth.

### **Conclusion:**

The comparison between the pay-as-you-go pension system and the funded pension system to determine which is secure and advantageous, leads to an important observation: neither of the two systems analysed is characterised by these two criteria, due to demographic and economic fluctuations.

In fact, neither funded nor pay-as-you-go pension systems can meet the conditions for efficiency, and neither system can guarantee a fixed pension to retirees throughout their retirement periods, due to changing economic, demographic and social circumstances.

Furthermore, both systems are exposed to different risks: the funded pension system is highly exposed to economic risk, financial risk, management risk, legal and fiduciary risk and the risk of conflicts of interest.

The pay-as-you-go system, on the other hand, is heavily exposed to economic risk, legislative risk, public capture risk, management risk, legal and fiduciary risk, conflict of interest risk and demographic risk, and is only moderately exposed to financial risk, which generally depends on the investment strategy adopted by the structure.

We can therefore conclude that the risks associated with the pay-as-you-go system exceed those of the funded system, in other words the funded pension system is more secure than the pay-as-you-go system, but this result remains relative to the number of risks covered.

This observation can be taken into consideration in the case of the existence of a population with a significant ageing rate that exceeds that of the working population. But if we assume the opposite, and that the working population exceeds that of retirees, the demographic risk that constitutes the main challenge to the sustainability of a pay-as-you-go system would disappear, and the pay-as-you-go system would be able to distribute large pensions and build up reserves, without the risk of bankruptcy or changes to the parameters that would have a negative impact on the quality of life of retirees, and in this case the pay-as-you-go system would be the least risky system. On the other hand, in a country characterised by significant economic development, with an effective capacity to manage economic risks, the funded pension system would be the most advantageous.

The efficiency of a pension system depends on the demographic, economic, social and political situation of a country, which is why a chosen method of operating a pension system could at the same time be the solution for establishing a balance in pension schemes in one country, and a deficit pension system in another.

So the question is, how can these systems withstand these risks to ensure their longevity and generosity? And what other types of pension system could be efficient? Is the parametric reform of the pay-as-you-go pension system in Morocco sufficient to establish a balance in the unbalanced pension fund, or is conversion to a funded system necessary?

### **Perspective:**

The reform of pension systems in several countries is currently becoming a hotly debated topic, due to the various economic and demographic fluctuations that are taking place. Indeed, several countries have carried out multiple reforms, and among the most relevant reforms, we have the Chilean reform, which moved from a pay-as-you-go pension system to a multi-pillar system,

then we have the experience of the parametric reform of the pay-as-you-go pension system in Germany, and finally we have the notional accounts reform in Sweden.

The process of reforming the Moroccan pension system began in 1996 with the removal of the ceiling on the contribution base. However, the most recent reform was carried out in 2016, when several parameters were modified: the contribution rate, the liquidation base, the annuity rate and the retirement age.

The parametric reforms implemented in Morocco were unable to maintain the balance within the civil pension scheme, hence the need to build a new reform, based on the actuarial assessments of the scheme, demographic trends in the Moroccan population, and economic and social conditions, in order to choose between a new parametric reform or the implementation of a structural reform.

#### **BIBLIOGRAPHY :**

**Aref. M & Sadek.** (2006), Les retraites, crises, enjeux et perspectives. Centre d'étude et recherche documentaire.

**BIALES. C.** (2023), Les retraites. <https://christian-biales.fr>

**BIALES. CH.** (2014), Les retraites. p20 ;

**Cendron J.R.** (1985). La capitalisation au secours de la répartition ? .Économie & prévision, n°71, pp. 13 ;

**Christel. B.** (2016). Le meilleur système de retraite du monde est Danois et la France arrive loin derrière. <https://www.bfmtv.com>

**Cour des comptes.** (2017). Rapport sur la caisse marocaine des retraites.

**Davanne. O & Thierry. P** .(1997). Le Débat sur les Retraites : Capitalisation contre Répartition. Revue française d'économie, volume 12, n°1, 1997. pp. 57-116;

**Derycke. Ph.** (1966). Taux d'intérêt, taux d'actualisation et croissance économique. Revue économique, volume 17, n°4, 1966. p. 535-536;

**EL AMRAOUI. H & HINTI. S.** (2022). Répartition ou capitalisation : L'éternel dilemme Une approche historique des critiques des systèmes de retraite. Revue Française d'économie et de Gestion, Vol. 3 No 2.

**Haut-commissariat de plan.** (2012). Etude sur la soutenabilité du système de retraite au Maroc. Conférence-débat : La soutenabilité du système de retraite, 08 Août 2012.

[www.larousse.fr/dictionnaires/francais/capitalisation](http://www.larousse.fr/dictionnaires/francais/capitalisation)

**J. Tobin & al.** (1966). Taux d'intérêt, taux d'actualisation et croissance économique. Revue économique, 17-4, pp. 525-536.

**Laffargue. B, Thierry. G.** (1990). La prison républicaine et son environnement économique. Population en prison et marché du travail (1870-1914). Déviance et société, Vol. 14, N°1. pp. 39-58 ;

**Laroque.P** & al. (1992), Histoire orale ou archives orales ?. Rapport d'activité sur la constitution d'archives orales pour l'histoire de la Sécurité sociale, 2e édition.

**Maudrux. G.** (2010), Introduction de la réforme des retraites. <http://www.carmf.fr>

**Chélini. MP.** (1998). Inflation, état et opinion en France de 1944 à 1952. Institut de la gestion publique et du développement économique, Comité pour l'histoire économique et financière de la France. 17 avril 2013

**Morneau. S** (2007), Gestion des risques liés aux régimes de retraite. Un guide à l'intention des promoteurs de régimes.

**Organisation international de travail.** (2020). Table ronde tripartite sur les tendances et les réformes en matière de pensions. 30- 4 décembre 2020

**Thierry.B.** (2016). Analyse et évaluation des systèmes de retraite par les risques. Institut de Recherches Economiques et Fiscales

**Von Neumann, J.** (1938). A model of general economic equilibrium. The review of economic studies, volume 13, pp 1-9

**Zaoui. S & Delinda. A.** (2023). Retirement pension Systems facing demographic challenges: What Are the Consequences. Journal of Social Protection Research, volume 4, numéro 1.