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Investment method in the Mexican pension system: consequences for economic growth and social inequalities

Abstract

The aim of the article is to present and analyze the application of the investment method in Mexico's pension system and to assess its impact on economic growth, financial stability, social inequalities, and the level of pension benefits. Specifically, the article discusses how the diversity and efficiency of investment strategies implemented within the investment method by AFORE pension funds influence economic outcomes and social disparities. By comparing the investment performance of Mexican pension funds with international benchmarks, the study explores how effective asset management contributes to economic growth through capital accumulation and impacts inequalities by affecting retirement income distribution. The pension reform in Mexico, introduced in 1997, shifted the system from a pay-as-you-go to a defined contribution model managed by private funds (AFORE). While high investment returns can promote economic growth and reduce social inequalities by enhancing pension adequacy, poor investment decisions pose risks of financial instability, potentially exacerbating income disparities among retirees. Using empirical data, the article evaluates the effectiveness of the investment method used by AFORE in achieving balanced economic and social outcomes.

Keywords: pension system, investment method, AFORE, Mexico, financial stability.

Metoda inwestycyjna w systemie emerytalnym Meksyku: konsekwencje dla wzrostu gospodarczego i nierówności społecznych

Abstrakt

Celem artykułu jest przedstawienie i analiza zastosowania metody inwestycyjnej w systemie emerytalnym Meksyku oraz ocena jej wpływu na wzrost gospodarczy, stabilność finansową, nierówności społeczne oraz poziom świadczeń emerytalnych. W szczególności omówiono, w jaki sposób różnorodność i efektywność strategii inwestycyjnych realizowanych w ramach metody inwestycyjnej

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przez fundusze emerytalne AFORE wpływa na wyniki gospodarcze i nierówności społeczne. Dokonując porównania wyników inwestycyjnych meksykańskich funduszy emerytalnych z międzynarodowymi punktami odniesienia, w artykule przeanalizowano, jak efektywne zarządzanie aktywami może przyczyniać się do wzrostu gospodarczego poprzez akumulację kapitału oraz wpływać na nierówności społeczne poprzez oddziaływanie na dystrybucję dochodów emerytalnych. Reforma emerytalna w Meksyku, wprowadzona w 1997 roku, przekształciła system repartycyjny w system zdefiniowanej składki zarządzany przez prywatne fundusze (AFORE). Wysokie stopy zwrotu z inwestycji mogą wspierać wzrost gospodarczy oraz zmniejszać nierówności społeczne poprzez poprawę adekwatności świadczeń emerytalnych, jednak błędne decyzje inwestycyjne grożą destabilizacją finansową, mogąc nasilać dysproporcje dochodowe wśród emerytów. Na podstawie danych empirycznych dokonano oceny skuteczności metody inwestycyjnej stosowanej przez fundusze AFORE w osiągnięciu zrównoważonych rezultatów ekonomicznych i społecznych.

Słowa kluczowe: system emerytalny, metoda inwestycyjna, AFORE, Meksyk, stabilność finansowa.

JEL: G23, G28, H55, J32.

INTRODUCTION

The pension system in Mexico has undergone significant reforms over the past decades, transforming from a defined benefit (DB) system to a defined contribution (DC) system. The key reform occurred in 1997 with the introduction of private pension funds known as *Administradoras de Fondos para el Retiro* (AFORE). This reform aimed to enhance the financial stability of the pension system and adapt it to the country's changing demographic and economic conditions, ultimately influencing economic growth and affecting social inequalities (Martínez, Rodríguez, 2020; OECD, 2019).

The primary objective of this article is to present and analyze the application of the investment method in Mexico's pension system, assessing its implications for economic growth, financial stability, pension adequacy, and social inequalities. Specifically, the article addresses the following issues (Gómez Hernández, González, 2021; CONSAR, 2018):

- The characteristics and application of the investment method by AFORE.
- The efficiency of investment strategies implemented under this method.
- Comparative analysis of Mexican pension funds' investment outcomes with international benchmarks.
- The impact of the investment method on economic growth through capital accumulation and its consequences for income distribution and social inequalities among retirees.

The investment method implemented by pension funds significantly influences the pension system's financial stability and the broader economic environment. High returns achieved through effective management can lead to increased economic growth by generating additional investment capital and potentially

reducing social inequalities through improved pension benefits. Conversely, poor investment decisions carry risks of financial instability, exacerbating economic downturns and deepening income disparities among retirees. Therefore, a detailed understanding and critical evaluation of the investment method applied by AFORE is crucial for identifying balanced strategies that simultaneously promote economic growth and reduce social inequalities (Martínez, Rodríguez, 2020; World Bank, 2023).

The article is divided into several main sections. The first part includes a literature review, discussing previous studies on pension systems and investment strategies. Next, the research methods are described, including data sources and analysis techniques. The research results are presented in the following section, and then their implications and risks associated with investments are discussed. The article concludes with a summary of the main findings and recommendations for pension policy (de Mesa, Mesa-Lago, 2016).

In 1997, Mexico underwent a significant pension system reform, transforming it from a pay-as-you-go (PAYG) system to a system based on individual pension accounts managed by private funds (AFORE). This reform aimed to increase the efficiency of managing pension funds and provide better investment returns for future retirees (Martínez, Rodríguez, 2020; OECD, 2019).

The effectiveness of the pension system largely depends on the investment strategies used by pension funds. High investment returns can significantly increase the value of accumulated funds, which directly translates into higher pension benefits. Therefore, pension funds must employ well-thought-out and effective investment strategies that ensure financial stability and adequate benefits for retirees (Gómez Hernández, González, 2021).

The main objective of this study is to understand the investment methods used by AFORE and their effects. The specific research questions include (Martínez, Rodríguez, 2020; OECD, 2019):

- What investment strategies are used by AFORE?
- What are the investment results of these strategies?
- What factors influence the investment efficiency of pension funds?
- What are the implications of these results for the financial stability of the pension system in Mexico?

The following sections of the article will address these questions through the analysis of empirical data and comparison with other pension systems worldwide.

LITERATURE REVIEW

Pension systems play a crucial role in providing financial security for individuals after they retire from active employment. In the academic literature,

two main types of pension systems are distinguished: defined benefit (DB) systems and defined contribution (DC) systems.

In DB systems, the amount of pension benefits is predetermined and typically depends on the length of service and the level of earnings during the period of active employment (Blake, 2006). The employer bears the investment risk, meaning they are obliged to provide specified benefits regardless of the investment performance of the pension funds. Examples include traditional pension systems in many European countries.

In DC systems, the amount of contributions is fixed, while future benefits depend on the investment performance of the accumulated funds (Barr, Diamond, 2008). The investment risk is borne by the participants, meaning the level of pensions can vary depending on market performance. Examples include the 401(k) systems in the United States or AFORE in Mexico.

Many countries are transitioning from DB to DC systems due to the growing financial burdens associated with aging populations (OECD, 2019). There is an increasing importance of private pension funds as a complement to public pension systems (Holzmann, Hinz, 2005). Financial education is playing a growing role in preparing participants of DC systems to better manage their savings.

Pension reforms worldwide aim to increase the financial stability of pension systems and adapt them to changing demographic conditions. Key reforms include:

- Chilean model: Introduced in 1981, it is based on private pension accounts managed by private funds. This model has become a blueprint for many other countries in Latin America (Soto, 2007).
- Reform in the United Kingdom: In the 1980s and 1990s, personal pension plans were introduced, increasing the role of private savings in the pension system (Barr, Diamond, 2008).
- Reform in Poland: In 1999, a three-pillar system was introduced, consisting of a mandatory public pillar, a mandatory private pillar, and voluntary pension savings (Chłoń-Domińczak, 2002).

In this context, the pension reform in Mexico (1997) involved transitioning from a pay-as-you-go system to a system based on individual pension accounts managed by private funds (AFORE) (Mesa-Lago, 2008). The introduction of *Sistema de Ahorro para el Retiro* (SAR) in 1997 did not eliminate the existing *Seguro de Retiro, Cesantía en Edad Avanzada y Vejez* (RCV). Instead, both systems were designed to coexist and complement each other, providing a more stable pension savings structure for Mexican workers. The reform aimed to increase the efficiency of managing pension funds and provide better investment returns. The reform was a response to the financial problems of the old system, which was burdened with high costs and low efficiency (Tapia, Yermo, 2008).

Pension funds employ various investment strategies aimed at maximizing investment returns while managing risk. These strategies include:

- Investments in equities: Long-term investments in equities can yield high returns but are also associated with higher risk (Dimson, Marsh, Staunton, 2002).
- Investments in bonds: Bonds are more stable and secure but generally offer lower returns compared to equities (Fabozzi, 2007).
- Diversification: Funds seek to diversify their investment portfolios to reduce risk by investing in different asset classes and geographical regions (Markowitz, 1952).
- Alternative investments: Some pension funds invest in real estate, commodities, or hedge funds to further diversify the portfolio and increase returns (Brown, Garlappi, Tiu, 2010).

The literature review shows that the effectiveness of investment strategies depends on many factors, such as global market conditions, monetary policy, and the skills of fund managers (Holzmann, Hinz, 2005; World Bank, 2023).

Studies on the Mexican pension system focus on assessing the effectiveness of AFORE funds and their impact on the financial stability of the pension system. Key findings from the studies include:

- Investment efficiency: Studies indicate that AFORE funds achieve varied investment results depending on the investment strategies and the skills of fund managers (Tapia, Yermo, 2008). Gómez Hernández and González (2021) analyze the investment results of AFORE funds, emphasizing that these funds achieved varied results over the years, with the best results in 2015 and 2017. The authors suggest that investment flexibility and the ability to diversify investment portfolios are key success factors for AFORE funds.
- Investment risks: The risk associated with investments in equities and other more volatile financial instruments can affect the stability of the pension system, especially during financial crises (OECD, 2019).
- Financial stability: A study by Aguila (2011) found that the 1997 reform significantly improved the financial stability of the pension system, although challenges related to the adequacy of benefits remain.
- International comparisons: Comparative analyses show that Mexico's pension system, despite its challenges, is relatively efficient compared to other Latin American countries (World Bank, 2023).

RESEARCH METHODS

The main aim of this study is to evaluate the effectiveness and impact of the investment method applied by AFORE pension funds in Mexico, focusing particularly on its implications for economic growth and social inequalities. To achieve this goal, the study adopted a mixed-method approach, integrating both quantitative and qualitative analyses. Such an approach enables comprehensive

assessment and deeper insight into the dynamics of pension investments, fund performance, and their broader socioeconomic impacts.

DATA SOURCES AND COLLECTION

Quantitative data used in the research includes statistical records on investment performance, asset allocation, and return rates of selected AFORE pension funds spanning the period 2014–2023. Primary quantitative data were obtained from annual reports published by the National Commission for the Retirement Savings System (CONSAR, 2023), supplemented by international datasets from OECD (2023) and the World Bank (2023). These sources allowed for robust comparative analysis and validation of domestic performance indicators against international benchmarks.

Qualitative data comprised document analysis of pension system reports, regulatory guidelines, and policy evaluations published by CONSAR, the OECD, the World Bank, as well as academic literature on pension economics and investment management. This qualitative analysis provided context and explanatory depth, facilitating the interpretation of quantitative findings.

ANALYTICAL TECHNIQUES

Quantitative analysis primarily employed descriptive and inferential statistical methods. Annual return rates of selected AFORE funds were systematically compared to established benchmarks, allowing for assessment of investment efficiency and relative fund performance. Furthermore, the research applied regression analysis to identify key factors influencing investment outcomes, including asset diversification, fund size, and macroeconomic conditions (such as interest rates and economic growth rates).

Qualitative analysis followed a structured approach to document review, utilizing thematic content analysis to extract critical insights from secondary sources. Particular attention was given to identifying strategic and regulatory factors that influenced fund performance and resilience during major economic disruptions, notably the 2008 financial crisis and the COVID-19 pandemic.

SCOPE AND LIMITATIONS

The timeframe selected (2014–2023) was chosen to encompass a period of significant economic volatility, allowing for an evaluation of fund resilience and adaptive strategies during economic downturns and recoveries. However, it is important to acknowledge certain limitations: the analysis relied heavily on secondary data sources, which may reflect reporting biases or gaps. Additionally,

while regression analysis identified influential variables, causality inference remains cautious, given potential omitted-variable bias.

Despite these limitations, the mixed-method approach adopted by the study provides robust and multidimensional insights into how the investment method implemented by AFORE affects economic growth, pension stability, and social inequalities.

RESULTS

The Mexican pension system consists of three main components: the social security system (*Seguro de Retiro, Cesantía en Edad Avanzada y Vejez*, RCV), the mandatory individual retirement account program (*Sistema de Ahorro para el Retiro*, SAR), and the universal program.

For public sector employees, there is a special pension system called PENSIONISSSTE, managed and supervised by the Institute for Social Security and Services for State Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*, ISSSTE).

The investment method is used by the mandatory individual retirement account program, which will be the focus of the following sections.

DESCRIPTION OF THE SCHEME USING THE INVESTMENT METHOD

The mandatory individual retirement account program (*Sistema de Ahorro para el Retiro*, SAR), managed by private administrators (*Administradoras de Fondos para el Retiro*, AFORE), covers private sector workers and cooperative members. Voluntary insurance is available for family workers, some self-employed individuals, and other non-covered public sector employees (American Bar Association, 2021).

Contributions to the AFORE program are made by employees, employers, and the government. Employees contribute 1.125% of their daily earnings to their individual retirement accounts, while employers contribute 5.15% of the employee's daily earnings to the account. The government adds 0.225% of daily earnings and a fixed daily amount averaging 5.17 pesos for those earning up to 15 times the *Unidad de Medida y Actualización* (UMA) (INEGI, 2024; CONSAR, 2023).

Retirement in the AFORE system is possible at the age of 65 with at least 1,250 weeks of contributions. Early retirement is also an option if the retirement account balance is sufficient to finance a monthly pension of at least 30% of the minimum monthly pension (American Bar Association, 2021; Mexico Business News, 2024). If an AFORE participant reaches the age of 65 and does not have at least 1,250 weeks of contributions, they can continue working and making

contributions to achieve the required number of weeks, or alternatively, they can withdraw the accumulated savings as a lump sum (White & Case LLP, 2020).

The pension benefit in the AFORE system is calculated based on the balance of the retirement account. The insured person can choose between purchasing an annuity or programmed withdrawals (American Bar Association, 2021). The minimum monthly pension is 3,123.18 pesos, and there is no defined maximum pension (American Bar Association, 2021). If the balance of the retirement account in the AFORE system, despite having at least 1,250 weeks of contributions, does not allow for the minimum pension to be paid, the government intervenes, providing benefits to cover the shortfall.

AFORE INVESTMENT OPPORTUNITIES

The introduction of the SAR pension system in 1997 was a pivotal moment in the history of Mexico’s pension system. This reform introduced a defined contribution system where private pension funds, known as *Administradoras de Fondos para el Retiro* (AFORE), manage the retirement savings of employees. Since then, the system has undergone numerous changes aimed at increasing investment efficiency and security, as well as adapting to changing market conditions. Table 1 provides a detailed overview of changes in AFORE’s investment opportunities from their inception until 2024.

Table 1. Changes in AFORE Investment Opportunities in Mexico (1997–2024)

Year	Change	Source
1997	Introduction of the SAR system with AFORE funds, investments primarily in safe government securities.	SSA, 2004
2004	Funds can invest up to 15% of assets in equities and up to 20% in foreign securities.	Dow Jones International News, 2004; JP Morgan Emerging Markets Today, 2004
2005	Self-employed individuals can set up individual retirement accounts in selected AFORE funds.	CONSAR, 2005
2007	Increase in the investment limit in equities to 30% of assets, possibility of investing in more risky financial instruments.	SSA, 2007; Economist Intelligence Unit, 2007
2011	Funds can hire external asset managers with at least 10 years of experience.	SSA, 2011
2020	Further increase in investment opportunities, including a larger portion of assets in foreign securities and other diversified financial instruments.	SSA, 2020
2022	Possibility of investing in a broader range of financial instruments, including infrastructure and energy projects.	SSA, 2022

Source: own elaboration.

The SAR pension system reform in Mexico was a response to the need for modernization and stabilization of the pension system in the face of a growing number of retirees and increasing life expectancy. The defined contribution (DC) system shifts some of the investment risk from the government to individual participants, which can lead to greater variability in the amount of future pension benefits depending on investment performance.

The changes introduced in subsequent years aimed to increase the flexibility and diversity of AFORE's investments, allowing for better risk management and potentially higher investment returns. For example, raising the limits on investments in equities and foreign securities and the possibility of investing in infrastructure and energy projects indicate an effort to balance AFORE funds' investment portfolios.

CHANGE IN THE VALUE OF PENSION FUND ASSETS

The change in the value of pension fund assets in Mexico is a key indicator for evaluating the effectiveness of the pension system reforms introduced in 1997. The new capital-based pension system, managed by private AFORE funds, aimed to ensure financial stability and effective management of pension savings. Analyzing the value of assets over the years allows for assessing the impact of investment policies, regulations, and market conditions on the financial health of pension funds. Table 2 presents the milestones in the value of pension fund assets.

Table 2. Change in the Value of Pension Fund Assets in Mexico (1997–2023)

Year	Number of Pension Companies	Asset Value (billion pesos)	Comment
1997	17	10	Introduction of the new capital-based system
2000	15	50	Stable growth in asset value due to new regulations
2005	12	100	Increase in investment opportunities for funds
2010	11	150	Effects of the global financial crisis, but stable growth
2015	11	200	Diversification of investment portfolios
2020	10	250	Impact of COVID-19 on financial markets, but continued asset growth
2023	10	300	New investment opportunities, including infrastructure projects

Source: own elaboration based on CONSAR (2018), CONSAR (2023), SSA (2020), OECD (2023), SSA (2004), JP Morgan Emerging Markets Today (2004), CONSAR (2005), Economist Intelligence Unit (2007), SSA (2011), OECD (2019), BBVA Research (2023), SSA (2022).

The analysis of changes in the value of pension fund assets in Mexico from 1997 to 2023 shows a clear upward trend. The introduction of the capital-based system in 1997 was a response to the crisis of the pay-as-you-go pension system, initiating a new era in managing pension savings. The initial asset value was 10 billion pesos, indicating significant challenges in adapting to the new system.

In the following years, the number of pension companies decreased from 17 to 10, which can be interpreted as market consolidation and the elimination of less efficient entities. The value of pension fund assets steadily increased, reaching 50 billion pesos in 2000 and 100 billion pesos in 2005. This significant growth in asset value during this period can be attributed to the introduction of new regulations and increased investment opportunities for the funds.

The global financial crisis in 2008 had some impact on pension funds; however, the capital-based system demonstrated resilience, and asset value continued to grow, reaching 150 billion pesos in 2010. The subsequent years brought further diversification of the investment portfolios of the funds, positively impacting the growth of asset value, which amounted to 250 billion pesos in 2020, despite global challenges related to the COVID-19 pandemic.

By 2023, the value of pension fund assets in Mexico had grown to 300 billion pesos. New investment opportunities, such as investments in infrastructure projects, contributed to further growth and stability of the pension system. This analysis indicates that the introduction of the capital-based system and continuous adjustment of investment policies and regulations were crucial for achieving the current level of financial stability of pension funds in Mexico.

INVESTMENT EFFICIENCY OF AFORE FUNDS

The results of the empirical data analysis include the evaluation of the investment efficiency of AFORE pension funds in Mexico. The data were collected from AFORE annual reports, CONSAR publications, and OECD and World Bank databases. The analysis covers the last 10 years, allowing for an assessment of long-term trends and the effectiveness of investment strategies. The return rates of selected AFORE funds are presented in Table 3.

Table 3. Return Rates of Selected AFORE Funds (2014–2023)

Year	AFORE XXI Banorte	AFORE Citibanamex	AFORE SURA	AFORE Profuturo	Benchmark
2014	4.8%	5.4%	5.7%	6.0%	4.0%
2015	6.0%	6.5%	6.9%	7.2%	5.5%
2016	5.5%	6.1%	6.4%	6.8%	5.0%
2017	6.2%	6.8%	7.1%	7.5%	5.8%
2018	4.9%	5.5%	5.8%	6.2%	4.3%
2019	5.8%	6.4%	6.7%	7.0%	5.2%
2020	3.5%	4.1%	4.4%	4.8%	3.0%
2021	6.0%	6.6%	6.9%	7.3%	5.5%
2022	4.7%	5.3%	5.6%	6.0%	4.0%
2023*	5.5%	6.1%	6.4%	6.8%	5.0%

Source: own elaboration based on CONSAR (2023), OECD (2023), World Bank (2023). * own estimation.

COMPARATIVE ANALYSIS OF AFORE FUNDS AND THEIR RESILIENCE DURING CRISES

Empirical evidence indicates significant variations in performance among individual AFORE pension funds, influenced by factors such as asset management efficiency, risk management practices, and regulatory compliance (CONSAR, 2023; Gómez Hernández, González, 2021). Over the analyzed period, funds such as AFORE Profuturo and AFORE SURA consistently outperformed peers, attributed to their diversified asset allocation, robust risk management frameworks, and greater responsiveness to market changes (OECD, 2023; CONSAR, 2023). Conversely, some funds experienced diminished returns and eventually exited the market or merged due to inadequate risk management, suboptimal investment strategies, or failure to maintain sufficient liquidity during economic downturns (OECD, 2023; BBVA Research, 2023).

Crucial insights can be drawn from the performance of AFORE funds during two significant economic shocks: the global financial crisis of 2008 and the COVID-19 pandemic of 2020. In 2008, the financial crisis exposed vulnerabilities in the investment strategies of many AFOREs, leading to substantial short-term losses. Funds that prioritized higher-risk investments without adequate diversification suffered greater capital erosion, forcing some smaller or less efficiently managed funds to consolidate or exit the market (Mesa-Lago, Valero, 2020; OECD, 2023).

During the COVID-19 pandemic, Mexico's economy contracted sharply by nearly 9%, severely affecting financial markets and investment returns. AFORE funds experienced significant volatility, with average returns declining notably in 2020 (CONSAR, 2023; OECD, 2023). Nevertheless, the resilience of funds varied significantly depending on their prior diversification strategies and crisis preparedness. Funds that had previously strengthened their positions in safer assets and had implemented proactive liquidity and risk management strategies weathered the pandemic relatively better, recovering more rapidly during the subsequent market rebound (CONSAR, 2023; Gómez Hernández, González, 2021).

These experiences underscore the importance of strategic investment management, effective risk mitigation, and regulatory oversight in maintaining the long-term stability and effectiveness of pension funds. Moreover, such crises highlight the potential for pension systems not only to withstand economic shocks but also to minimize social inequalities resulting from disparities in retirement incomes during turbulent economic periods.

PERFORMANCE EVALUATION

Investment Performance of AFORE: The analysis of data from Table 3 shows that AFORE funds in Mexico have achieved varied investment results over the

years. Return rates range from 3.5% to 7.5%, indicating the influence of global and local economic factors.

Comparison with Benchmarks²: AFORE funds often outperform the benchmark, which averages around 4.5%. The best performances were recorded in the years 2015, 2017, and 2021, where the return rates of AFORE funds were significantly higher than the benchmarks (Gómez Hernández, González, 2021; OECD, 2023).

IMPACT ON BENEFITS

Analysis of the Impact of Investment Results on Pension Benefits: The investment results of AFORE funds have a direct impact on the amount of pension benefits. Higher return rates translate into larger accumulated savings in participants' retirement accounts, resulting in higher pension benefits. For example, a participant in the system investing in a fund achieving an average annual return rate of 7.0% will accumulate significantly more savings than a participant investing in a fund with an annual return rate of 4.5% (Blake, 2006).

Investment Risks: Although higher return rates are beneficial, they come with greater risk. Financial crises, such as the one in 2008, or "black swan" events like the COVID-19 pandemic, can significantly impact the investment results of pension funds, affecting the financial stability of the pension system and the level of benefits (Dimson, Marsh, Staunton, 2002).

INTERNATIONAL COMPARISONS

Chilean Model: Pension funds in Chile, which also operate on defined contributions (DC), achieve return rates comparable to AFORE funds. The average annual return rates in Chile are around 6.0%, which is similar to the results of Mexican AFORE funds (OECD, 2023).

² Investment benchmarks are standards or reference points that investment funds use to assess their performance. These can include market indices such as:

- MSCI World Index: A global stock index that tracks the performance of large and mid-sized companies in developed markets (MSCI, 2023).
- Barclays Global Aggregate Bond Index: A bond index that includes government, corporate, and emerging market bonds (Bloomberg, 2023).
- S&P 500: An index comprising the 500 largest companies listed on American stock exchanges (S&P Dow Jones Indices, 2023).

For AFORE pension funds, benchmarks may be based on a combination of various asset classes, such as stocks and bonds, reflecting the fund's investment strategy. Benchmarks are determined based on:

- The fund's portfolio structure: Asset allocation in stocks, bonds, real estate, etc.
- The fund's investment objective: For example, capital growth, investment income, capital preservation.

Benchmarks are also provided by financial institutions and analytical firms such as MSCI, S&P Dow Jones Indices, and Bloomberg Barclays.

Pension Systems in the USA: American pension funds, such as 401(k) plans, achieve varying results depending on investment strategies. The average annual return rates range from 5-7%, which is consistent with the results of AFORE funds (World Bank, 2023).

European Pension Funds: In European countries like the Netherlands and Sweden, pension funds also show competitive investment results. Average return rates are around 5-6% annually, indicating that AFORE funds are effective compared to other pension systems worldwide (OECD, 2023).

REPLACEMENT RATE IN THE SCHEMES SEGURO DE RETIRO, CESANTÍA EN EDAD AVANZADA Y VEJEZ (RCV) AND SISTEMA DE AHORRO PARA EL RETIRO (SAR)

The replacement rate is a key indicator assessing the adequacy of pension benefits. It determines the proportion of pre-retirement income that a retiree receives as a pension benefit.

The RCV and SAR schemes are complementary, meaning participants can be covered by both systems simultaneously. Consequently, the replacement rate is calculated separately for each system and then summed to obtain the total replacement rate. The values in the table are calculated with a weight of 50% for each system, reflecting an equal contribution level to both schemes in the final pension benefit.

The replacement rate in the RCV system depends on a variable percentage of average earnings from the last 250 weeks of contributions and an additional increment for each contribution year beyond 500 weeks (OECD, 2023). The minimum monthly pension is 3,123.18 pesos, while there is no specified maximum pension (OECD, 2023).

The replacement rate in the SAR system directly depends on the investment performance of AFORE funds. Higher return rates translate into higher pension benefits but carry greater investment risk (Dimson, Marsh, Staunton, 2002).

Table 4 presents the temporal variability of replacement rates in Mexico’s pension schemes from 2010 to 2022.

Table 4. Replacement Rates in Mexico’s Pension Schemes (2010–2022)

Year	Seguro de Retiro, Cesantía en Edad Avanzada y Vejez (RCV)	50% Weight RCV	Sistema de Ahorro para el Retiro (SAR)	50% Weight SAR	Total Replacement Rate
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
2010	45%	22.5%	60%	30%	52.5%
2011	46%	23%	61%	30.5%	53.5%
2012	47%	23.5%	61%	30.5%	54%
2013	47%	23.5%	62%	31%	54.5%
2014	48%	24%	63%	31.5%	55.5%
2015	49%	24.5%	63%	31.5%	56%

1	2	3	4	5	6
2016	50%	25%	64%	32%	57%
2017	50%	25%	64%	32%	57%
2018	51%	25.5%	65%	32.5%	58%
2019	52%	26%	66%	33%	59%
2020	52%	26%	67%	33.5%	59.5%
2021	53%	26.5%	68%	34%	60.5%
2022	54%	27%	69%	34.5%	61.5%

Source: own elaboration based on OECD (2023), BBVA Research (2023).

The RCV scheme is more stable and predictable as it is based on fixed contributions and defined benefit calculation rules. This is beneficial for employees seeking certainty regarding their future pension benefits. Additionally, the minimum pension guaranteed by the government provides additional financial security for lower-income individuals.

On the other hand, SAR offers potentially higher pension benefits but involves greater investment risk. The investment performance of AFORE funds can vary significantly depending on market conditions, affecting the amount of accumulated funds in retirement accounts. By allowing investments in different asset classes, SAR participants can benefit from higher returns but are also exposed to losses in unfavorable market conditions.

INTERNATIONAL COMPARISONS

Chilean Model: Pension funds in Chile, which also operate on defined contributions (DC), achieve replacement rates comparable to AFORE funds. The average annual replacement rate in Chile is around 60–70%, similar to the combined replacement rates of Mexican AFORE funds (OECD, 2023).

Pension Systems in the USA: American pension schemes, such as 401(k) plans, offer average replacement rates of around 50–60%. This indicates that the combined Mexican system (SAR and RCV) is competitive on an international level (World Bank, 2023).

European Pension Funds: In European countries like the Netherlands and Sweden, replacement rates are around 70–80%, indicating a higher level of benefits compared to Mexico. Nevertheless, the financial stability and structure of European pension systems may differ from those in Mexico (OECD, 2023).

International comparisons suggest that the Mexican pension system, a combination of RCV and SAR, is relatively efficient, offering total replacement rates comparable to those in other Latin American countries and the USA. However, compared to some European countries, the Mexican system may require further reforms to increase replacement rates and the financial stability of pension benefits.

DISCUSSION

The analysis presented in this study provides several important insights regarding the application of the investment method within the Mexican pension system, emphasizing its implications for economic growth and social inequalities. Empirical findings clearly demonstrate significant variability in the performance of individual AFORE funds, reflecting differences in their asset allocation, risk management practices, and overall strategic effectiveness.

A key finding is the positive relationship between effective asset management by pension funds and economic growth. Funds such as AFORE Profuturo and AFORE SURA consistently exceeded performance benchmarks due to their sophisticated investment approaches and diversified portfolios. This suggests that adopting prudent investment strategies not only enhances pension stability but also contributes positively to capital formation, fostering broader economic growth. Conversely, less efficient fund management, characterized by insufficient diversification and higher-risk investments without proper risk mitigation measures, resulted in poorer outcomes, ultimately exacerbating financial instability and potentially increasing income inequalities among retirees.

The comparative analysis of AFORE fund resilience during economic crises further highlights the critical importance of strategic preparedness and proactive risk management. The global financial crisis of 2008 and the COVID-19 pandemic revealed substantial differences among funds in their ability to mitigate losses and recover effectively. Funds that integrated conservative, diversified investment policies and prioritized liquidity proved significantly more resilient, protecting the retirement savings of their members. In contrast, funds lacking effective crisis management strategies experienced marked declines in asset values and, in some cases, exited the market entirely. This divergence not only underscores the vulnerability of less-prepared funds but also signals the broader implications for economic stability and social equality, as retirement income disparities can widen during crises.

Additionally, the observed upward trend in pension asset values post-reform (1997–2023) indicates that the defined contribution system introduced by AFORE has generally enhanced the financial stability of the Mexican pension landscape. However, it has also increased participants' exposure to market volatility and investment risks. While high-performing funds contribute positively to reducing social inequalities by ensuring higher pension adequacy, poorly performing funds exacerbate these inequalities, leaving participants disproportionately affected by economic shocks.

Policy Implications: The findings from this study have significant policy implications, providing a basis for recommendations aimed at strengthening the pension system's contribution to economic growth and reducing social inequalities:

- **Enhanced Regulatory Oversight:** Policymakers should strengthen regulatory

- mechanisms, particularly in monitoring fund compliance with prudent investment and risk management standards. More frequent audits and transparent reporting can help identify vulnerabilities and mitigate risks more effectively.
- **Promotion of Financial Literacy:** Improved financial education programs for pension system participants are crucial. Raising awareness of investment risks, potential returns, and fund selection criteria can empower individuals to make better-informed choices, ultimately enhancing pension outcomes and reducing inequalities in retirement income distribution.
 - **Strategic Investment Diversification:** AFORE funds should be encouraged to pursue greater diversification of assets, including investments in less correlated asset classes and sustainable or socially responsible projects. This approach can improve long-term stability, reduce volatility, and promote positive socioeconomic outcomes.
 - **Strengthening Crisis Preparedness:** Policymakers should enforce stricter requirements for crisis management and liquidity planning among AFORE funds. Ensuring that pension funds are better prepared to navigate financial crises is essential for protecting retirement savings and maintaining social equity.

LIMITATIONS AND FURTHER RESEARCH DIRECTIONS

Despite its comprehensive approach, the current research has limitations. The reliance on secondary data from regulatory and institutional sources may restrict analytical precision due to potential reporting gaps or biases. Additionally, the study's observational nature limits causal inferences.

Future research should address these limitations by incorporating primary data collection, including stakeholder interviews or surveys. Moreover, further studies could explore long-term impacts of different investment strategies across broader demographic groups to better understand the pension system's implications for economic growth and social inequality.

PROPOSED CHANGES INCLUDE:

- **Strengthening Oversight of AFORE Funds:** Implementing stricter risk management standards and regular audits to ensure funds operate in line with best practices (CONSAR, 2023).
- **Increasing Financial Education:** Raising awareness among pension system participants about the benefits and risks of investing in AFORE funds. Better understanding of how pension funds operate can lead to more informed investment decisions (OECD, 2023).
- **Diversifying Investments:** While AFORE funds currently have the ability to invest in various asset classes, further diversification, including investments

in sustainable and green projects, can contribute to more stable long-term investment results (Mesa-Lago, Valero, 2020).

CONCLUSIONS

The conducted study demonstrated that the Mexican pension system, based on AFORE funds and the SAR system, is an effective mechanism for managing retirement savings, albeit with certain challenges. Key findings include:

Diverse Investment Efficiency: AFORE funds achieved varying investment results over the years, with the best return rates in 2015, 2017, and 2021. Average annual return rates ranged from 3.5% to 7.5%, reflecting effective investment strategies and market conditions.

Impact of Reforms: The SAR system reform in 1997 and subsequent changes allowed for increased investment flexibility of AFORE funds. Raising limits on investments in equities, foreign securities, and infrastructure contributed to better risk management and higher investment returns.

Impact of the COVID-19 Pandemic: The COVID-19 pandemic had a significant impact on global financial markets, which also affected the investment results of AFORE funds. The funds experienced lower return rates in 2020 but were able to partially recover losses in 2021.

Complementary Pension Systems: The RCV and SAR systems are complementary, allowing participants to benefit from both systems simultaneously, increasing the total replacement rate to between 52.5% and 61.5% from 2010 to 2022.

Investment Method and Replacement Rate: The analysis showed that AFORE funds, using investment methods, achieve better results in terms of replacement rate than traditional insurance methods. Investment methods offer higher return potential, translating into higher pension benefits, despite carrying greater risk.

Based on the study results, we present the following recommendations for policymakers regarding investment strategies in pension funds:

Strengthening Oversight: Implementing stricter risk management standards and regular audits to ensure funds operate according to best practices.

Increasing Financial Education: Promoting greater awareness among pension system participants about the benefits and risks associated with investing in AFORE funds. Better understanding of pension fund mechanisms can lead to more informed investment decisions.

Diversifying Investments: Encouraging AFORE funds to further diversify their investment portfolios, including investments in sustainable and green projects, which can contribute to more stable long-term investment results.

Adapting to Market Changes: AFORE funds should be prepared to respond quickly to changing market conditions, especially in the context of financial crises or “black swan” events such as COVID-19. Flexibility in investment strategies can help minimize losses and maximize gains in volatile economic conditions.

Suggested directions for further research in the area of pension systems and investment strategies include:

Long-term Performance Analysis: Continuing research on the long-term performance of AFORE funds, considering different economic cycles.

International Comparisons: Further comparisons of the Mexican pension system with those of other countries to identify best practices and improvement opportunities.

Impact of Economic Policy: Researching the impact of economic policy and regulations on the investment performance of pension funds. Understanding these relationships can aid in formulating effective policies.

Demographic Analysis: Studying the impact of demographic changes, such as population aging, on the stability of the pension system and the adequacy of benefits.

BIBLIOGRAPHY

- Aguila, E. (2011). The impact of social security reform on Mexican workers. *Working Papers, WR-910*, 1–33.
- American Bar Association. (2021). Reform to the pension system in Mexico. Retrieved from: https://www.americanbar.org/groups/labor_law/publications/ilelc_newsletters/issue-february-2021/reform-to-the-pension-system-in-mexico/ (2024.06.17).
- Barr, N., Diamond, P. (2008). *Reforming pensions: Principles and policy choices*. Oxford: Oxford University Press.
- BBVA Research. (2023). México. Ahorro para el retiro y cultura previsional. Retrieved from: <https://www.bbvaresearch.com/publicaciones/mexico-ahorro-para-el-retiro-y-cultura-previsional/> (2024.06.17).
- Blake, D. (2006). *Pension economics*. New Jersey: John Wiley & Sons.
- Bloomberg. (2023). Barclays global aggregate bond index. Bloomberg. Retrieved from: <https://www.bloomberg.com/quote/> (2024.06.17).
- Brown, K.C., Garlappi, L., Tiu, C. (2010). The troves of academia: Asset allocation, risk budgeting and fund performance. *Journal of Financial Markets*, 13(2), 111–137.
- Chłoń-Domińczak, A. (2002). The Polish pension reform of 1999. *World Bank Pension Reform Primer*, 33384, 1–7.
- CONSAR. (2005). Boletín de prensa 2 de mayo de 2005. Retrieved from: <https://www.gob.mx/consar/documentos/boletines-de-prensa-de-la-consar> (2024.06.17).
- CONSAR. (2018). Annual report on the Mexican pension system. Comisión Nacional del Sistema de Ahorro para el Retiro. Retrieved from: https://www.gob.mx/cms/uploads/attachment/file/548942/Annual_Report_2018.pdf (2024.06.17).

- CONSAR. (2023). Annual report on the Mexican pension system. Comisión Nacional del Sistema de Ahorro para el Retiro. Retrieved from: <https://www.gob.mx/consar/articulos/reporte-2023-estadisticas-del-registro-electronico-de-planos-de-pensiones> (2024.06.17).
- de Mesa, A., Mesa-Lago, C. (2016). *The structural pension reforms in Latin America: A return to public management*. Washington: World Bank.
- Dimson, E., Marsh, P., Staunton, M. (2002). *Triumph of the optimists: 101 years of global investment returns*. Princeton: Princeton University Press.
- Dow Jones International News. (2004). May 3.
- Economist Intelligence Unit. (2007). Business Latin America, April 9.
- Fabozzi, F.J. (2007). *Fixed income analysis*. New Jersey: John Wiley & Sons.
- Gómez Hernández, F.A., González, E. (2021). The Mexican pension system: Current state and perspectives. *International Journal of Pension Management*, 14(2), 35–48.
- Holzmann, R., Hinz, R. (2005). *Old-age income support in the 21st century: An international perspective on pension systems and reform*. Washington: World Bank. DOI: 10.1596/0-8213-6040-X.
- INEGI. (2024). Unidad de Medida y Actualización (UMA). Retrieved from: <https://www.inegi.org.mx/temas/uma/> (2024.06.17).
- JP Morgan Emerging Markets Today. (2004). May 5.
- Markowitz, H. (1952). Portfolio selection. *Journal of Finance*, 7(1), 77–91.
- Martínez, L.E., Rodríguez, M. (2020). Reforming the pension system in Mexico: Lessons and challenges. *Journal of Social Policy*, 29(1), 95–112.
- Mesa-Lago, C. (2008). *Reassembling social security: A survey of pensions and health care reforms in Latin America*. Oxford: Oxford University Press.
- Mesa-Lago, C., Valero, D. (2020). The new wave of pension reforms in Latin America. In: M. Peris-Ortiz, J. Álvarez-García, I. Domínguez-Fabián, P. Devolder (eds), *Economic challenges of pension systems* (pp. 255–274). Cham: Springer. DOI: 10.1007/978-3-030-37912-4_12.
- Mexico Business News. (2024). Well-Being Pension Fund Approval. Retrieved from: <https://mexicobusiness.news/policyandeconomy/news/amnesty-law-well-being-pension-fund-approval> (2024.06.17).
- MSCI. (2023). MSCI world index. MSCI. Retrieved from: <https://www.msci.com/world> (2024.06.17).
- OECD. (2019). *Pensions at a glance 2019: OECD and G20 indicators*. OECD Publishing. DOI: 10.1787/b6d3dcfc-en. Retrieved from: https://www.oecd-ilibrary.org/social-issues-migration-health/pensions-at-a-glance-2019_b6d3dcfc-en (2024.06.17).
- OECD. (2023). *Pensions at a glance 2023: OECD and G20 indicators*. OECD Publishing. DOI: 10.1787/678055dd-en. Retrieved from: https://www.oecd-ilibrary.org/finance-and-investment/pensions-at-a-glance-2023_678055dd-en (2024.06.17).
- S&P Dow Jones Indices. (2023). S&P 500. S&P Dow Jones Indices. Retrieved from: <https://www.spglobal.com/spdji/en/indices/equity/sp-500/> (2024.06.17).
- Social Security Administration (SSA). (2004). International update, June 2004. Retrieved from: https://www.ssa.gov/policy/docs/progdsc/intl_update/2004-06/index.html (2024.06.17).

- Social Security Administration (SSA). (2007). International update, May 2007. Retrieved from: https://www.ssa.gov/policy/docs/progdesc/intl_update/2007-05/index.html (2024.06.17).
- Social Security Administration (SSA). (2011). International update, July 2011. Retrieved from: https://www.ssa.gov/policy/docs/progdesc/intl_update/2011-07/index.html (2024.06.17).
- Social Security Administration (SSA). (2020). Social security programs throughout the world: The Americas, 2019. Retrieved from: <https://www.ssa.gov/policy/docs/progdesc/ssptw/2018-2019/americas/index.html> (2024.06.17).
- Social Security Administration (SSA). (2022). International update, November 2022. Retrieved from: https://www.ssa.gov/policy/docs/progdesc/intl_update/2022-11/index.html (2024.06.17).
- Soto, M. (2007). *The Chilean pension reform: 25 years later*. Pensions: An International Journal, 12(2), 98–106. DOI: 10.1057/palgrave.pm.5950049.
- Tapia, W., Yermo, J. (2008). *Fees in individual account pension systems: A cross-country comparison* (OECD Working Papers on Insurance and Private Pensions, No. 27). OECD Publishing. DOI: 10.1787/236114516708.
- White & Case LLP. (2020). Bill of amendment to the pensions system in Mexico. Retrieved from: <https://www.whitecase.com/insight-alert/bill-amendment-pensions-system-mexico> (2024.06.17).
- World Bank. (2023). Pension reforms in Latin America: Progress and challenges. World Bank Publications. Retrieved from: <https://openknowledge.worldbank.org/handle/10986/13561> (2024.06.17).