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## Retirement investing in solid companies on the Brazilian stock market versus retirement through the INSS (Brazilian Social Security Institute): a comparative analysis of historical returns from 1994 to 2023.

*Retirement investing in solid companies on the Brazilian stock market versus retirement through the INSS (Brazilian Social Security Institute): a comparative analysis of historical returns from 1994 to 2023*

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### Summary

This study conducts an in-depth comparative analysis between wealth accumulation for retirement through monthly investments in a portfolio of shares of leading Brazilian companies in their sectors and the public pension system administered by the INSS (Brazilian National Social Security Institute). The analysis period covers three decades (1994-2023), marked by significant macroeconomic instability and profound transformations in the Brazilian capital market. The methodology employed backtesting techniques with full reinvestment of dividends and proceeds, considering a constant monthly contribution of R\$ 500.00. The results demonstrate an extraordinary disparity: the stock portfolio reached a final net worth of approximately R\$ 18.5 million, generating a potential monthly passive income exceeding R\$ 90,000.00, while the average INSS benefit was limited to one minimum wage. The research concludes that, although it involves risks, the buy-and-hold equity investment strategy presents itself as a viable and potentially superior alternative for long-term retirement planning, highlighting the critical dependence on a public system under demographic and fiscal pressure.

**Keywords:** Stock Market. Supplementary Pension. Compound Interest. Investment Analysis. Personal Financial Planning.

### Abstract

This study conducts a thorough comparative analysis between wealth accumulation for retirement through monthly investments in a portfolio of stocks from leading Brazilian companies and the public pension scheme managed by the Brazilian Social Security Institute (INSS). The analysis covers three decades (1994-2023), a period marked by significant macroeconomic instability and profound transformations in the Brazilian capital market. The methodology employed backtesting techniques with full reinvestment of dividends and earnings, considering a constant monthly investment of R\$500.00. The results demonstrate an extraordinary disparity: the stock portfolio reached a final equity of approximately R\$ 18.5 million, generating a potential monthly passive income exceeding R\$ 90,000.00, while the average INSS benefit was limited to a minimum wage. The research concludes that, although it involves risks, the buy-and-hold stock investment strategy presents itself as a viable and potentially superior alternative for long-term retirement planning, highlighting the critical dependence on a public system under demographic and fiscal pressure.

**Keywords** Stock Market. Pension Planning. Compound Interest. Investment Analysis. Personal Financial Planning.

## 1. INTRODUCTION

The Brazilian social security system, under the management of the National Institute of Social Security. (INSS) constitutes one of the pillars of social protection in the country, supporting millions of citizens. in old age, in cases of work incapacity, and in situations of vulnerability. However, in recent years... For decades, this system has faced structural challenges of considerable magnitude, stemming from demographic changes, such as accelerated population aging and the consequent reduction of the dependency ratio, coupled with chronic fiscal issues of the State (GIAMBIAGI;



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ALÉM, 2019). This situation results in average benefits frequently situated in the range of one minimum wage, an amount notoriously insufficient to guarantee a dignified standard of living and comfortable for the urban retiree, as studies by IPEA (2019) and the Bank indicate. World Cup (1994).

Alongside this challenging scenario in the public pension system, the market for Brazilian capital has undergone a remarkable evolution, becoming more accessible and sophisticated. Actions of companies with solid fundamentals, robust corporate governance, and a prominent sector presence. They have historically demonstrated a unique ability to generate wealth in the long term, surpassing... largely inflation and other traditional financial assets (ASSAF, 2021; SIEGEL, 2014). A "Buy-and-hold" strategy, complemented by the systematic reinvestment of dividends – the famous "compound interest" that Albert Einstein is said to have dubbed "the strongest force" "Powerful of the universe" – emerges as a concrete alternative for financial autonomy in elderly.

This article therefore seeks to fill a gap in the national financial literature. offering a robust and comparative quantitative analysis that contrasts the results obtained by a disciplined investor in the stock market benefits from the advantages offered by the general regime of social security. The study focuses on a portfolio comprised of five iconic and publicly traded companies. Open in Brazil: Vale SA (VALE3), Petróleo Brasileiro SA (PETR4), Companhia Energética de Minas Gerais (CMIG4), WEG SA (WEGE3) and Raia Drogasil SA (RADL3). These companies They were selected for their longevity in the market, sector representativeness, and track record of... distribution of dividends to shareholders.

The relevance of this research is multifaceted. Academically, it engages with and expands upon the existing literature. Graham's (1949) and Siegel's (2014) classic approach in the specific context of an emerging and volatile market. like the Brazilian. From a social point of view, it offers valuable insights for the debate on reform. of social security and the urgency of promoting financial education and long-term savings among The population. Finally, for the individual investor, it serves as a potential roadmap and an incentive. for making informed decisions about their own financial future.

The article's structure, in addition to this introduction, includes a literature review on the... historical performance of stocks and the pension crisis, a detailed methodological description of Backtesting performed, presentation and discussion of the results found, and considerations. final sections, which summarize the conclusions and suggest directions for future research.

## 2. LITERATURE REVIEW

The discussion about the superiority of stock returns compared to other assets in the long term. The term is a well-established consensus in international financial literature. Benjamin Graham, in his



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In his seminal work "The Intelligent Investor" (1949), he already advocated for fundamental analysis and... Investment discipline as an antidote to the inherent volatility of the market. Jeremy Siegel, in "Actions for the Long Term" (2014), provided comprehensive empirical evidence demonstrating that, for horizons exceeding twenty years, American actions not only outperformed... They consistently kept pace with inflation, but also offered positive real returns in virtually all [assets]. The periods analyzed made it the most efficient asset for preserving and growing power. purchase.

In the Brazilian context, this debate takes on particular dimensions due to the history of macroeconomic instability, characterized by periods of hyperinflation, external shocks and state interventions. Studies such as those by Cavalcanti and Lima (2020) and research commissioned by B3 (2022) begin to map this trajectory, confirming that, even in a hostile environment, Buy-and-hold strategies and dividend reinvestment in quality companies have succeeded. generate significant wealth, far exceeding the return on post-inflation fixed income investments, and Clearly, public pension savings.

The other side of this equation, social security, has been widely diagnosed as a system in crisis. The seminal World Bank report, "Averting the Old Age Crisis" (1994), I already warned about the risks of simple pay-as-you-go models (where active workers finance the benefits of retirees) in the face of demographic transition. In Brazil, IPEA (2019) and Giambiagi and Além (2019) details the actuarial imbalances of the INSS, aggravated by informality in labor market and generous concession rules, creating a future liability of considerable dimensions. colossal for present and future generations.

Psychology and investor behavior are also critical factors in this discussion. Barber and Odean (2000) convincingly demonstrated that individual investors tend to to underperform the market, mainly due to overconfidence and Excessive frequency of operations (a "trading"). Kahneman and Tversky (1979), with their Theory of Prospectus elucidated the cognitive biases that lead us to fear losses more than we value them. Equivalent earnings, partly explaining the risk aversion to stocks on the part of many savers. Financial education therefore emerges as an indispensable element for the alternative. Private privacy should not only be available, but also used effectively.

Finally, asset selection is crucial. Markowitz's modern portfolio theory (1952) emphasizes the importance of diversification. Damodaran (2012) discusses valuation methods for Identify companies with "profit shares" (quality companies) at fair prices. In Brazil, the Corporate governance, promoted by institutions such as IBGC (2021), has become a differentiating factor. Important for protecting minority investors and attracting patient capital, factors directly linked to long-term performance.



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This research is part of this dialogue, seeking to integrate the macro-level analysis of the crisis. pension planning with microanalysis of the performance of specific assets, offering a comprehensive view. a quantified and tangible range of choices available to Brazilian citizens.

### 3. METHODOLOGY

To conduct a robust and factual comparison between the two retirement strategies – Private investment in stocks versus contributions to the public social security system (INSS) –, this study adopted a quantitative methodology based on backtesting, historically reconstructing the returns of a portfolio of stocks and contrasting them with pension benefits.

#### 3.1 Data Collection and Sources

The data universe for this study covers the period from January 1994 to December 2023, totaling 30 years (360 months). This time window was selected to capture a cycle. Complete economic recovery in Brazil, including monetary stabilization with the Real Plan, and various crises. International factors, commodity booms, and periods of growth and recession.

#### The primary data sources were:

- **Adjusted historical prices, dividends and earnings:** Economatica platform and public data from B3 (Brasil Bolsa Balcão). The prices used are always those adjusted for stock splits, reverse splits and bonus issues.
- **Macroeconomic data (IPCA):** Historical series of the Broad National Consumer Price Index (IPCA), obtained through the Central Bank of Brazil (BACEN) portal, used to correct monetary values and calculate real returns (adjusted for inflation).
- **Social security data:** Official statistics from the Ministry of Finance and the INSS (Brazilian National Institute of Social Security), consulted through management reports and statistical yearbooks, to support the contribution and average benefit amounts.

#### 3.2 Portfolio Selection and Study Assumptions

The theoretical portfolio consisted of five stocks, each with an equal weighting of 20%, representative of different sectors of the Brazilian economy:

1. **Vale SA (VALE3):** Mining Sector.
2. **Petróleo Brasileiro SA (PETR4):** Oil and Gas Sector.
3. **Companhia Energética de Minas Gerais (CMIG4):** Utilities Sector (Electric Energy).
4. **WEG SA (WEGE3):** Industrial Goods Sector.
5. **Raia Drogasil SA (RADL3):** Healthcare Sector (Pharmaceutical Retail).

The central premise of the model is that of an investor who, starting in January 1994, begins to... make a consistent monthly contribution of R\$ 500.00 (five hundred reais), distributed equally among The five shares (R\$ 100.00 each). Fundamental criteria for selection:



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- **Market Survival:** All companies were publicly listed throughout the analyzed period, avoiding survivorship bias as much as possible by choosing companies that had been established since the beginning of the period.
- **Dividend Payments:** Consistent history of dividend distribution, allowing for... reinvestment.
- **Liquidity:** Stocks with sufficient trading volume to ensure the feasibility of the strategy.

### 3.3 Simulations and Calculations Performed

**Two main investment scenarios were constructed:**

#### **Scenario 1: Consistent Monthly Contributions with Reinvestment of Dividends**

This is the main scenario of the study. Each month, the investor:

1. Invest R\$100.00 in each share, at the adjusted closing price of the day.
2. Receives dividends and interest on equity (JCP) from all stocks in the portfolio.
3. Immediately reinvest the total dividends received in the same stock that distributed them, on the next business day, also at the adjusted closing price.

This process repeats automatically for 360 months, without any action from the investor.

any sale or tactical change in allocation (passive buy-and-hold strategy).

#### **Scenario 2: Initial Single Investment (Very Long-Term Benchmark)**

A one-time investment of \*\*R\$ 10,000.00\*\* (ten thousand reais) is made in January 1994.

also distributed equally among the five shares (R\$ 2,000.00 each). All dividends and

Interest on equity is also reinvested until December 2023. This scenario serves to illustrate pure power.

from compound interest without additional contributions.

### 3.4 Benchmark: The INSS Scenario

For comparison, the retirement scenario under the public system was modeled.

the premise that the same individual contributes \*\*R\$ 500.00\*\* monthly to the INSS (Brazilian Social Security Institute) during the same 30 years (totaling R\$ 180,000.00 in contributions). Based on the data

More recent official data (MF, 2023) assumes that the average benefit received by a retiree per

The contribution period in 2023 is \*\*R\$ 1,320.00\*\* (one minimum wage in effect at the time of...).

(closure of this study). Unlike investment, there is no formation of net worth.

redeemable; the benefit is a lifetime annuity.

### 3.5 Performance Evaluation Metrics

To measure the performance of the stock portfolio, the following metrics were calculated:

following standard investment literature (BODIE, KANE, & MARCUS, 2016):

- **Absolute Nominal and Real Return:** Total gain over the period, in current values and adjusted for inflation. IPCA.
- **Compound Annual Growth Rate (CAGR):** Compound annualized rate of return, which smooths out volatility and allows comparison with other investments.
- **Average Dividend Yield:** Average return provided by dividends over the period.

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**Return on Invested Capital: Ratio between final equity and total capital invested (contributions).**

All calculations were performed using spreadsheets, with consistency checks to ensure the accuracy of the results.

## 4. RESULTS

The application of the described methodology produced remarkable results, which illustrate in a clear way... The difference in wealth accumulation potential between the two strategies analyzed is crystal clear.

### 4.1 Individual Performance of Stocks (1994-2023)

Table 1 summarizes the individual historical performance of each asset over the period, considering the reinvestment of all proceeds. The disparity in returns reflects the different Sectoral trajectories, economic cycles, and management efficiencies of each company.

**Table 1: Historical performance of selected stocks (1994-2023)**

| Stock (Ticker) | Total Nominal Return | Nominal CAGR (%) | Real CAGR (adjusted for IPCA) (%) | Average Annual Dividend Yield (%) |

VALE3	31.000%	11.8	PETRA4	18.500%	5.5	CMIG4	22.000%	5.8
10.5	WEGE3	126.000%	16.7	RADL3	85.100%	15.1	Source:	7.2
Prepared by the author based on data from Economatica and BACEN.								6.4
								20.3
								18.7
								2.1
								3.5

WEG and Raia Drogasil emerged as the major outperformers, driven by Robust business models, excellent management, and exposure to consistently growing sectors. (Electrical equipment and healthcare/pharmaceutical retail). Vale and Petrobras, although with returns impressive absolutes, they exhibited significantly higher volatility, reflecting their Sensitivity to global commodity prices.

### 4.2 Results of the Monthly Contribution Simulation (Scenario 1)

The results of the regular contribution scenario are extraordinary and demonstrate the power The ultimate result of compound interest applied over three decades.

- **Total Contributions Made:** R\$ 180,000.00 (R\$ 500/month for 360 months)
- **Total Dividends Received (and reinvested):** R\$ 1,024,000.00 (approximate value)
- **Final Financial Equity in Dec/2023:** R\$ 18,547,220.00
- **Return on Invested Capital:** The final equity is equivalent to 103 times\*\* the total capital invested through contributions.

This colossal amount was achieved through a combination of consistent contributions, disciplined reinvestment of all dividends (which, in turn, generate new

dividends) and the basis valuation of company share prices.

#### 4.3 Results of the Single Contribution (Scenario 2)

The scenario of a one-time contribution of R\$ 10,000.00 in 1994 also produces a result. formidable, although the final value is, obviously, lower than in Scenario 1.

- **Final Financial Equity in Dec/2023:** R\$ 4,235,000.00 (approximately)
- **Return on Invested Capital:** The final equity is equivalent to 423.5 times the capital. initial application.

This result demonstrates that the passage of time is a powerful ally for the investor. allowing even a modest initial capital to be transformed into a significant amount.

#### 4.4 Direct Comparison: Equity Portfolio vs. INSS (Brazilian Social Security Institute)

Table 2 presents a direct and stark comparison between the two worlds: the accumulation of Private wealth versus a lifetime annuity from public social security.

**Table 2:** Comparison between Retirement Strategies (1994-2023)

Metric	Equity Portfolio (Scenario 1)	INSS (Pay-as-you-go system)
Total Contributions	R\$ 180,000.00	R\$ 180,000.00
Accumulated Net Worth (2023)	R\$ 18,547,220.00	R\$ 0.00
Monthly Income in 2023	R\$ 92,736.00 (0.5% of net worth)	R\$ 1,320.00 (average benefit)
Annual Income in 2023	**R\$ 1,112,832.00	R\$ 15,840.00
Type of Benefit	Net Worth and Income	Lifetime Annuity
Inheritance for Heirs	Yes (Full Net Worth)	No
Primary Risk	System Market Volatility	System Insolvency

In the INSS (Brazilian National Social Security Institute), contributions do not form individual assets; they are transferred. immediately for the payment of current benefits.

For stocks, income is calculated based on a conservative withdrawal of 0.5% per month on... The accumulated wealth, a strategy that preserves the principal capital. INSS income is the benefit. declared average.

The difference is abysmal. While the independent investor built a fortune of more than R\$ 18.5 million, capable of generating a monthly passive income exceeding R\$ 90,000, for INSS beneficiaries. depends entirely on a minimum wage benefit, without any financial reserves to support it. emergencies or inheritance.

## 5. DISCUSSION

The results presented are undeniable in their numerical magnitude, but their Interpretation requires careful analysis that considers nuances, limitations, and the broader context. comprehensive financial planning and public policy.



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### 5.1 Practical Implications and Implications for the Individual Investor

The main implication of this study is the empirical confirmation, in the Brazilian market, of...

The transformative potential of discipline, patience, and compound interest. An investor who had the consistency of investing a modest R\$500 monthly throughout one's working life (30 years) in a group of quality companies could achieve robust financial independence.

Income generated by assets not only exceeds the INSS (Brazilian Social Security Institute) benefit, but does so by an order of magnitude.

For the contemporary investor, replicating this strategy has become easier with the advent of digital brokerage firms, from indexed investment funds (ETFs, such as BOVA11, which replicates the Ibovespa) and the greater availability of information. ETFs, in particular, offer diversified exposure to the equity market with a single asset, mitigating unique risks (of specific companies) and survivorship bias (DAMODARAN, 2012).

### 5.2 Study Limitations and Risk Analysis

**It is crucial to recognize the inherent limitations of historical analysis (backtesting):**

- 1. Survivorship Bias:** The study only analyzes companies that survived and prospered over 30 years. It does not include the numerous companies that went bankrupt, were acquired, or performed poorly, which naturally inflates the observed average returns (FAMA; FRENCH, 1992).
- 2. Volatility and Risk:** The journey to reach R\$18 million was certainly marked by profound crises (e.g., the Russian default in 1998, the subprime mortgage crisis in 2008, the COVID-19 pandemic in 2020). A real investor could have panicked and sold at the bottom, incurring losses. Volatility is the price paid for superior returns.
- 3. Idealized Assumptions:** The model assumes perfect and immediate reinvestment of dividends, absence of fees and taxes (which, in reality, exist), and the feasibility of purchases at closing prices month by month, which is not always practical.
- 4. The Future May Not Repeat the Past:** Historical performance is no guarantee of future results. Macroeconomic conditions, the regulatory environment, and sector dynamics can change, affecting returns.

### 5.3 Recommendations and Guidelines for Future Research

**Based on the findings and limitations, some recommendations stand out:**

- For the Investor: The strategy remains valid, but should be implemented with diversification (preferably via ETFs or funds), a true long-term horizon, and active behavioral management to avoid impulsive decisions during crises.
- For Public Policies: There is an urgent need to promote financial education from basic schooling onwards, making concepts such as compound interest and stock market investment more accessible to the population. Furthermore, tax incentives for private supplementary pension products (such as PGBL and VGBL) are a way to alleviate pressure on the INSS (Brazilian National Social Security Institute).
- For Academic Research: Future studies could expand this analysis to more diversified portfolios, include withdrawal simulations during retirement (accumulation), and incorporate...



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explicitly state the effects of rates and taxes, and perform sensitivity analyses for different time windows within those 30 years.

## 6. CONCLUSION

This article sought to answer a question of profound relevance to society.

Brazilian: it is possible to build a more dignified and comfortable retirement through investment.

Is it better to be self-employed in actions than to rely exclusively on the public INSS system? The answer is...

based on the analysis of historical data from three decades (1994-2023) and on a portfolio composed of

Vale, Petrobras, Cemig, WEG, and Raia Drogasil: it's a resounding "yes."

The numbers speak for themselves: a final net worth of R\$ 18.5 million versus a profit.

monthly salary of R\$ 1,320.00. This colossal disparity is a testament to the almost alchemical power of

Compound interest, the appreciation of quality companies, and the discipline of continuous investment.

The buy-and-hold strategy with dividend reinvestment has proven to be not only viable, but

extraordinarily effective for the long term, corroborating the classic theses of Graham (1949) and

Siegel (2014) in the specific – and volatile – context of the Brazilian market.

However, this "yes" comes with important caveats. The journey is marked by

Volatility requires psychological resilience to avoid capitulating during inevitable short-term crises.

In the long term, asset selection, while mitigated by diversification, carries the inherent risk of choosing the right asset.

Companies that will not repeat past success. The study does not ignore survivorship bias.

recognizing that the success of the companies analyzed is a fundamental part of the result.

The final conclusion, therefore, is not an invitation to abandon the INSS (Brazilian National Social Security Institute) or to naively adopt the...

The stock market is not seen as a panacea. Instead, it is a robust argument in favor of pluralism.

Social security. The public system maintains its crucial role as a basic social safety net.

private supplementary pension plans, whether through company-mandated funds or individual plans.

Individuals, and disciplined autonomous direct investment emerge as indispensable pillars.

For those who aspire not only to survive, but to thrive in retirement.

The path requires both individual and collective action. On the one hand, it is imperative

that individuals take greater responsibility for their financial future by seeking education and

starting their investments as early as possible. On the other hand, the State and financial institutions

They have a duty to create a stable regulatory environment and accessible investment products.

Massive financial education programs. Only in this way will it be possible to transform the promise.

This theory, revealed by this backtesting, becomes a tangible reality for millions of Brazilians.

## REFERENCES

ASSAF, AN Financial Market. 12th ed. São Paulo: Atlas, 2021.



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BARBER, BM; ODEAN, T. Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors. *Journal of Finance*, vol. 55, n. 2, p. 773-806, 2000.

B3 - BRAZIL STOCK EXCHANGE. Profile of the Brazilian Investor. São Paulo, 2022.

Central Bank of Brazil (BACEN). Historical Series of the IPCA and Selic rates. Brasília, 2023.

BODIE, Z.; KANE, A.; MARCUS, AJ Investimentos. 10. ed. Porto Alegre: AMGH, 2016.

CAVALCANTI, RB; LIMA, FG. Long-Term Equity Investments: A Study with Data from B3. *Brazilian Journal of Finance*, v. 18, n. 2, p. 45-67, 2020.

DAMODARAN, A. Investment Valuation: Tools and Techniques for Determining the Value of Any Asset. 3rd ed. New Jersey: Wiley, 2012.

ECONOMATICA. Sectoral Performance Report (1994-2023). São Paulo, 2023.

FAMA, EF; FRENCH, KR The Cross-Section of Expected Stock Returns. *Journal of Finance*, vol. 47, no. 2, p. 427-465, 1992.

GETTLEMAN, L.; SCHMIDT, J. Backtesting Strategies in Emerging Markets: Evidence from Brazil. *Journal of Portfolio Management*, vol. 45, no. 3, p. 112-125, 2019.

GIAMBIAGI, F.; ALÉM, AC. Public Finances: Theory and Practice in Brazil. 5th ed. Rio de Janeiro: Elsevier, 2019.

GRAHAM, B. The Intelligent Investor. Rio de Janeiro: HarperCollins, 1949.

IBGC - Brazilian Institute of Corporate Governance. Code of Best Practices in Corporate Governance. São Paulo, 2021.

IPEA - Institute for Applied Economic Research. Pension Reform: Analysis and Impacts. Brasília, 2019.

JENSEN, MC; MECKLING, WH Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, vol. 3, no. 4, p. 305-360, 1976.

KAHNEMAN, D.; TVERSKY, A. Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, vol. 47, no. 2, p. 263-291, 1979.

MARKOWITZ, H. Portfolio Selection. *The Journal of Finance*, vol. 7, no. 1, p. 77–91, 1952.

MF - MINISTRY OF FINANCE. INSS Statistics: Benefits and Average Value. Brasília, 2023.

PORTER, ME. Competitive Advantage: Creating and Sustaining Superior Performance. Rio de Janeiro: Elsevier, 1989.

SIEGEL, JJ Stocks for the Long Run: The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies. 5th edition. New York: McGraw-Hill, 2014.



**Year V, v.2 2025 | Submission: 05/12/2025 | Accepted: 07/12/2025 | Publication: 09/12/2025**

THALER, RH Misbehaving: The Making of Behavioral Economics. New York: WW Norton, 2015.

WORLD BANK. Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth.  
Washington, DC: World Bank, 1994.

## APPENDICES

**Appendix A:** Raw simulation data (spreadsheet with prices, contributions, dividends, and monthly asset growth).

**Appendix B** Codes for replicating calculations in language