

Capitalismo de gestão de ativos e robôs de investimentos: modelos de negócio nos EUA e no Brasil.

Asset management capitalism and investment robots: business models in the US and Brazil

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Abstract

The expansion of investments adopting a passive management strategy has contributed to the growth of the investment robot market, transforming lay investors into rational economic actors, as the algorithms follow the prescriptions of the Modern Portfolio Theory (MPT). This article aims to analyze the business model of investment robots operating in the United States of America (US) and Brazil. In the US, clients' investment portfolios are built exclusively with exchange-traded funds (ETFs) from various financial asset classes. In Brazil, although robots initially adopted a strategy like that of the US, they gradually began to build investment portfolios using active management strategies and non-indexed products. By abandoning the use of ETFs, investment robots operating in the Brazilian market forfeit the legitimacy provided by Modern Portfolio Theory (MPT) and expose clients to the risks associated with active management.

Keywords: Indexed investment; Passive management; Exchange-traded fund.

Resumo

A expansão dos investimentos com estratégia de gestão passiva contribuiu para o crescimento do mercado de robôs de investimentos transformando investidores, leigos em finanças, em atores econômicos racionais, uma vez que os algoritmos seguem prescrições da Teoria Moderna do Portfólio (TMP). Este artigo tem como objetivo analisar o modelo de negócios dos robôs operando nos Estados Unidos da América (EUA) e no Brasil. Nos EUA, as carteiras de investimentos de clientes são construídas apenas com fundos de índices (ETFs) de diferentes classes de ativos financeiros. No Brasil, os robôs, apesar de iniciarem com estratégia similar à norte americana, passaram a construir as carteiras de investimentos com estratégia de gestão ativa, com produtos não indexados. Os robôs de investimentos que operam no mercado brasileiro, ao abandonarem o uso de ETFs, perdem a legitimidade garantida pela TMP e expõem os clientes aos riscos da gestão ativa.

Palavras-chave: Investimento indexado; Gestão passiva; Fundo de índice.

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1 Introduction

Sophisticated algorithms and computational resources have been increasingly applied across various sectors in society. The economy is one area where the advancement of such applications, as well as the controversies surrounding emerging technologies such as Artificial Intelligence (AI), is particularly evident. According to Cao (2020), the relationship between finance and AI is not recent; at least three generations of AI technologies have already been applied to economics and finance. Cao, Yang, and Yu (2021) identified the key areas in which data science and AI have evolved within the financial domain. According to the authors, the FinTech ecosystem encompasses a broad range of economic and financial activities that offer intelligent solutions for banking services, insurance, trading, credit operations, risk management, asset and wealth management, payment systems, as well as technological innovations in finance, cryptocurrencies and blockchain, compliance and regulation, and ethics and security frameworks (Cao, Yang, & Yu, 2021, p. 84).

Investment robots have become increasingly prevalent among technology-driven companies (fintechs) offering innovative solutions that challenge established industry leaders. Simultaneously, major global asset managers, such as BlackRock, Vanguard, Fidelity, and Charles Schwab, have also introduced investment robot services. However, these systems vary significantly in application and sophistication. At one end of the spectrum are high-performance, short-term trading robots programmed to execute transactions within fractions of a second, relying on advanced hardware and software. Due to their high cost, these systems are accessible only to a select group of financial actors. BlackRock stands out as a market leader with its powerful computational platform, Aladdin (Asset, Liability, and Debt and Derivative Investment Network). The platform's success has enabled BlackRock to provide computational support across a broad client base, including asset managers, service providers, banks, brokerages, insurers, pension funds, private markets, and wealth managers (BlackRock, 2023). Concurrently, BlackRock has expanded its roster of investment management robots, leading to layoffs of professionals previously managing active funds (Thomas, 2017), which are being phased out in favor of passive management strategies, especially exchange-traded funds (ETFs). These ETFs track key capital market indices of major economies and are predominantly controlled by large global financial groups (Fichtner; Heemskerk and Garcia, 2017; Fichtner and Heemskerk, 2020; Petry; Fichtner and Heemskerk, 2021), including within Brazil (Mundo Neto; Donadone and Desidério, 2022; Mundo Neto and Donadone, 2023 and Mundo Neto, Donadone, Cândido and Erturk, 2023).

At the other end of the investment robot spectrum are those designed for medium- and long-term operations, specifically, robo-advisors and robo-investment managers. In such cases, algorithms must perform at least at a level equivalent to that of a certified professional. Robo-advisors, for instance, recommend investment portfolios based on the investor's stated profile, but the user is responsible for executing the investments. In contrast, robo-investment managers stand out as they automatically execute investment operations based on the user's defined profile. The expansion of passive management strategies has contributed to the growth of the investment robot market, as ETFs generally involve lower management fees compared to active management, i.e., the cost of hiring a specialized professional. Hayes (2020) argues that robo-advisors have been transforming lay investors into rational investors modeled in a Weberian ideal type. This transformation is made possible by algorithms that adhere to MPT principles while also integrating more recent risk-pricing models, such as the Black and Litterman (1992) framework, which aim to enhance the MPT approach. Implementing canonical financial theory



assumptions within these algorithms has led investors using robo-advisors to behave as economic agents who attempt to maximize gains and minimize risks. Including ordinary investors in the investment market by popularizing robo-advisors has been driven primarily by the growth of passive management strategies using ETFs (Hayes, 2019). Furthermore, using digital tools such as games and simulators to broaden the investor base has emerged in new settings. Drawing on Foucault's (2008) analysis of neoliberal theories of human capital, Leite (2024, p. 6) explores how the institutionalization of financial education for children functions as a mechanism for shaping them into "prudent and self-managing individuals". The author highlights how large financial groups have adopted a range of strategies to include new investors in the market, whether they are adults with limited financial knowledge or children being prepared to become cautious investors in the future.

Vanguard is the global leader in the ETF market, offering computational services geared toward passive investment management. These include robo-investment managers designed for retail investors, with a minimum investment requirement of USD 3,000 (Vanguard, 2023). In retail, brokerages that operate with robo-advisors offer zero commission fees, which is a model that became dominant in the United States following a pioneering initiative by Charles Schwab. In this business model, only an annual management fee is charged based on the total assets under management. In Brazil, zero-commission trading was adopted more recently, initially by the brokerage firm called Clear, a subsidiary of XP Inc., which holds the leading position in the Brazilian retail investment market (Barreiros, Mundo Neto, 2022).

Considering international capitalist trends in the early 21st century, particularly the prominent role of large asset managers (Haldane, 2014; Braun, 2016), the growing importance of passive investment strategies, and the increased power of index providers in capital markets, especially for indices tracked by ETFs (Fichtner *et al.*, 2017; Rügemer, 2019; Fichtner and Heemskerk, 2020; Pretz *et al.*, 2021). This study examined the Brazilian robo-advisory market to assess the extent to which it follows trends observed in the U.S. market: zero commission trading, algorithms based on MPT, a preference for low-cost products, and portfolios built primarily with ETFs (Hayes, 2020).

The research findings indicate that although robo-advisory firms in Brazil initially adopted strategies like those in the United States, they later shifted to actively managed portfolio construction, selecting fixed-income products, multimarket funds, and equity funds. According to Quirós *et al.* (2020) transparency about assets is not among the main attributes for investment decision-making by individual investors in Brazil, contributing to robo-advisory firms changing their investment strategies without providing information about the risks involved in operations. By abandoning ETFs, these firms relinquish the legitimacy conferred by MPT and expose their clients to the risks associated with active management.

2 Indexing, Modern Portfolio Theory, and Investment Automation

The 2008 financial crisis is said to have triggered increased skepticism toward investment strategies devised by financial experts, as these strategies are not only expensive but can also have disastrous consequences for clients. As a result, high-cost active management, carried out by specialists who build investment portfolios with specific financial products, began facing strong competition from passive management strategies, in which indexing plays a key role. In passive management, selecting specific financial assets such as stocks, public and private bonds, and mutual funds is replaced by investments in index funds. As analyzed by Pretz *et al.* (2021), in passive management, index providers play a key role in investment



intermediation, as they determine which financial assets are included in or excluded from the indices, and thus, which assets will or will not receive investment flows. This shift from active to passive management has been led by the "Big Three"—BlackRock, Vanguard, and State Street, which have simultaneously acquired minority stakes in thousands of companies listed on the main stock exchanges in both developed and emerging economies (Fichtner and Heemskerk, 2020; Mundo Neto and Donadone, 2023).

The widespread adoption of ETFs has not only strengthened the dominance of the 'Big Three', particularly through their shareholder positions in major global corporations, but has also catered to the interests of both large institutional investors and individuals with limited resources and financial literacy. As analyzed by Deville and Oubenal (2008), ETFs are traded in both the primary and secondary markets. In the primary market, only authorized participants are involved, handling large volumes of capital by "creating" or "redeeming" ETF units, engaging in arbitrage to ensure that the ETF's market price remains aligned with the value of the underlying "basket" of assets it represents. In the secondary market, all investors can operate, trading only ETF units (a single lot may include thousands of ETF shares). When an investor purchases a share of an ETF, they are effectively acquiring fractional ownership of each asset that comprises the index tracked by the ETF, in the same proportions as in the index itself. As such, in addition to offering high liquidity due to being traded as stocks, ETF shares also carry very low management costs when compared to active management. Most of these costs are related to the fee the ETF administrator pays to the index provider. When this fee is spread across thousands or even millions of ETF shares, depending on the fund, the unit cost for the individual investor in the secondary market becomes relatively low. This low cost is also associated with relatively low risk, given that diversification is ensured by the large number of assets included in the indices—some equity indices include dozens or even thousands of financial instruments.

Diversification is an intrinsic characteristic of ETFs and is what makes them financial products aligned with the classical MPT proposed by Markowitz (1952). The core principle of MPT is to balance two variables in portfolio construction: minimizing risk and maximizing return. This can be attributed to the inherent diversification of indices, as most comprise a relatively large set of assets. It can also be explained by the Efficient Market Hypothesis (Samuelson, 1974), which argues that financial markets are efficient, and over the long term, investors using active management strategies fail to outperform the market as represented by major indices. MPT proposes that investment decisions should be based on the combination of risk tolerance and desired return. It recommends that investors construct portfolios by combining financial assets with relatively low correlations, aiming to achieve the maximum possible return for a given level of risk—or, conversely, to find the asset mix that provides the minimum risk for a target rate of return. This is especially relevant in the context of equity investments, where the level of risk is relatively high. In this case, index funds are offered as inherently diversified products, as the investments are spread across the various assets included in the index tracked by the fund. As a result, they tend to present a relatively lower risk compared to active management strategies that rely on selecting specific assets.

The growth of the ETF market has enabled asset managers and participants in the financial intermediation chain to offer automated investment services that combine ETFs with varying degrees of risk, constructing portfolios tailored to different levels of risk tolerance. Van der Zwan (2017, p. 558) highlights that the shift in pension fund investment strategies is related to the broader process of the financialization of economies. According to the author, pension fund managers' strategies have increasingly been influenced by MPT, leading to greater allocation of resources in ETFs. This includes both fixed-income ETFs, which combine



different types of fixed-income assets, and equity ETFs, which track major financial market indices, offering low risk and low cost for these institutional investors. ETF managers have come to view pension funds as part of a select group of clients for their products (Fichtner *et al.*, 2017; Fichtner and Heemskerk, 2020; Petry *et al.*, 2021). The rise of robo-advisors as low-cost, relatively low-risk financial advisory services has been propelled by the growth and diversification of the ETF market. As analyzed by Hayes (2020), investment firms began marketing these services as products that follow MPT principles, thereby conferring legitimacy on these automated tools. In addition to institutional investors, high-net-worth individuals have also adopted indexing strategies, as wealth managers themselves acknowledge the difficulty of outperforming ETFs that track major market indices such as the S&P 500 (Ingizza, 2025). This is an index comprising 500 stocks listed on U.S. exchanges (NYSE and NASDAQ), selected based on market capitalization, liquidity, and sector representation. ETFs have thus become an investment strategy adopted by various categories of investors, and robo-advisors have played a major role in popularizing these products among those with limited investment capacity.

3 Materials and Method

This research is exploratory in nature and adopts a multiple case study approach. To analyze the diffusion of robo-advisors among retail investors, the study considered the main robo-advisors operating in the United States and Brazil. Based on the analysis of the platforms' client-facing interfaces, information was obtained regarding the types of assets available for portfolio construction, the minimum investment required to begin operations, the fees involved, and whether the companies disclose that their algorithms follow MPT. Data were collected from the websites of the companies offering robo-advisory services and from business news outlets. The empirical sample consisted of companies responsible for the main robo-advisors available in the U.S. and Brazilian markets. For the United States, the sample was based on Hayes (2020), which analyzes the main robo-advisors in the U.S. market, as well as the ranking of the top ten robo-advisors according to NerdWallet, Inc. (Benson, 2023). For Brazil, the study included robo-advisors identified and analyzed by Guterman (2017), specifically Alkansa, Vérius, Magnetis, and Warren. The robo-advisory market is closely linked to the expansion of fintechs, and companies in this segment have become highly sought-after in the mergers and acquisitions market. According to Sciarretta (2016), fintechs have challenged the traditional business models of major banks while simultaneously attracting their interest, leading to the development of partnerships and acquisitions. Accordingly, the pioneering robo-advisors in the Brazilian market were analyzed considering updates resulting from merger and acquisition operations involving the asset managers responsible for them. Data on the robo-advisors operating in Brazil were collected in August 2023 from the websites of the respective companies.

To illustrate how robo-advisors construct their user investment portfolios, simulations were conducted with three robo-advisory firms. In the U.S., the simulations involved Wealthfront, one of the two companies rated highest by investors in the North American market (Hayes, 2020). Wealthfront offers a user-friendly interface that highlights different categories of ETFs and the products available within each category, as well as their respective annual management fees. In Brazil, simulations were performed with Rico, a subsidiary of the *XP Investimentos* group and operator of the Alkansa robo-advisor, and Toro, a subsidiary of the Santander group, which entered this segment by acquiring the fintech companies Monetis and Mobills. These robo-advisory firms are subsidiaries of dominant financial groups in the national investment fund market (Anbima, 2024). For the Brazilian market simulations, investor profile and investment amounts were maintained according to the parameters used by Guterman



(2017), allowing for a comparative analysis of the resulting portfolio compositions. In comparing the simulations of robo-advisors operating in the U.S. and Brazil, the study assessed whether the companies used exclusively ETFs to compose the investment portfolios suggested to their clients. For the Brazilian case, the products used in the portfolio simulations by Guterman (2017) were compared with those observed in the simulations carried out in this study.

4 Investment Robo-Advisory Market in the USA

Fligstein and Goldstein (2015) describe the development of financial culture in the United States and highlight the strong connection with the evolution of financial products, notably the investment fund and private pension markets. After the 2008 financial crisis, a shift in the investment fund market began in the U.S. and spread to major financial markets, making passive management and index funds one of the principal financial innovations of the early 21st century (Deville, 2008; Fichtner et al., 2017; Fichtner; Heemskerk, 2020).

Braun (2016) draws attention to the growth of investments in index funds and their fundamental role in the diffusion of robo-advisors for retail investors. According to the author, ETFs are products that comply with the MPT prescriptions by adopting diversification as a basic strategy to minimize risk, as they track indices that may include dozens or even hundreds of assets. This ensures that the index's performance results from the weighted performance of various companies included in the indices, rather than from any single company or specific asset. Moreover, ETFs are low-cost products because, by tracking indices, they do not rely on the costly consulting services of financial professionals, which is the basis of active management. Moreover, they have enabled large volumes of investment operations with relatively small contributions. Thus, ETFs have made possible the automation of a low-risk, low-cost strategy designed to serve less affluent segments of society with limited financial knowledge. These investments, legitimized by MPT, have transformed ordinary people into rational investors (Hayes, 2020).

In the United States, among the 12 best robo-advisors of 2023 (Benson, 2023), presented in Table 1, ten were included in the sample analyzed by Hayes (2020, pp. 13–14), where the author confirmed that the asset managers responsible for these robo-advisors declared adherence to MPT. Among the twelve companies in the sample, ten explicitly cited MPT as a reference for their strategy, while no such indication was found for Titan and Axos. It was also observed that, in addition to not charging brokerage fees, five of these companies (Betterment, SOFI, Charles Schwab, Fidelity Go, and Ally Invest) do not charge annual management fees, indicating a market trend toward associating the use of robo-advisors with low asset management costs. Another notable aspect in the strategy to attract new users is that some asset managers (Betterment, SOFI, Ellevest, Fidelity Go, Acorns) do not require a minimum investment to use their automated system.

Braun (2016) highlights the key role that instruments such as ETFs have played in transforming financial intermediation in recent years, where costly advisory services provided by professionals responsible for active management strategies are being replaced by passive management and indexed investments, particularly ETFs. These products are low-cost and enable the automated construction of investment portfolios using a selection of ETFs tailored to investors' varying risk profiles. Most robo-advisory firms that operate with ETFs emphasize the low fees charged by these companies. For firms offering zero annual management fees, the operational costs are limited to the specific fees charged by each ETF manager included in the portfolio. The diffusion of robo-advisors in the retail market involves the direct participation of large asset managers, notably one of the "Big Three," Vanguard, alongside the established



group Fidelity. However, their involvement also extends to the supply of ETFs, as many robo-advisory firms are fintechs that construct their ETF portfolios primarily with products from large asset managers, especially those of the “Big Three” BlackRock and Vanguard.

Table 1. Ranking of the Best Investment Robots in the U.S. in 2023

Robo / Manager	Evaluation (0 - 5)	Annual Admin fee	Deposit min. US\$	Follows MPT
Betterment	5	0,00%	\$0,00	Yes
Wealthfront	5	0,25%	\$500,00	Yes
SOFI	4.9	0,00%	\$0,00	Yes
Charles Schwab	4.9	0%	\$5.000,00	Yes
Ellevest	4.8	"\$12 month	\$0,00	Yes
Vanguard	4.7	0,15%	\$100,00	Yes
Titan	4.7	0,24%	\$500,00	*
Fidelity Go	4.6	0,00%	\$0,00	Yes
Acorns	4.6	"\$3,00 month	\$0,00	Yes
Axos	4.5	0,24%	\$500,00	*
Extrade	4.4	0,30%	\$500,00	Yes
Ally Invest	4.4	\$0	\$100,00	Yes
* Information not available				

Source: prepared by the authors based on Hayes (2020) and Benson (2023).

The current generation of investment robots in the U.S. can be mentioned due to their transparency in presenting portfolio composition options. This clearly shows the limited selection of ETFs by asset class and specifies the annual management fees associated with each product. Most brokerages also offer short explanatory videos detailing how the investment portfolios are constructed.

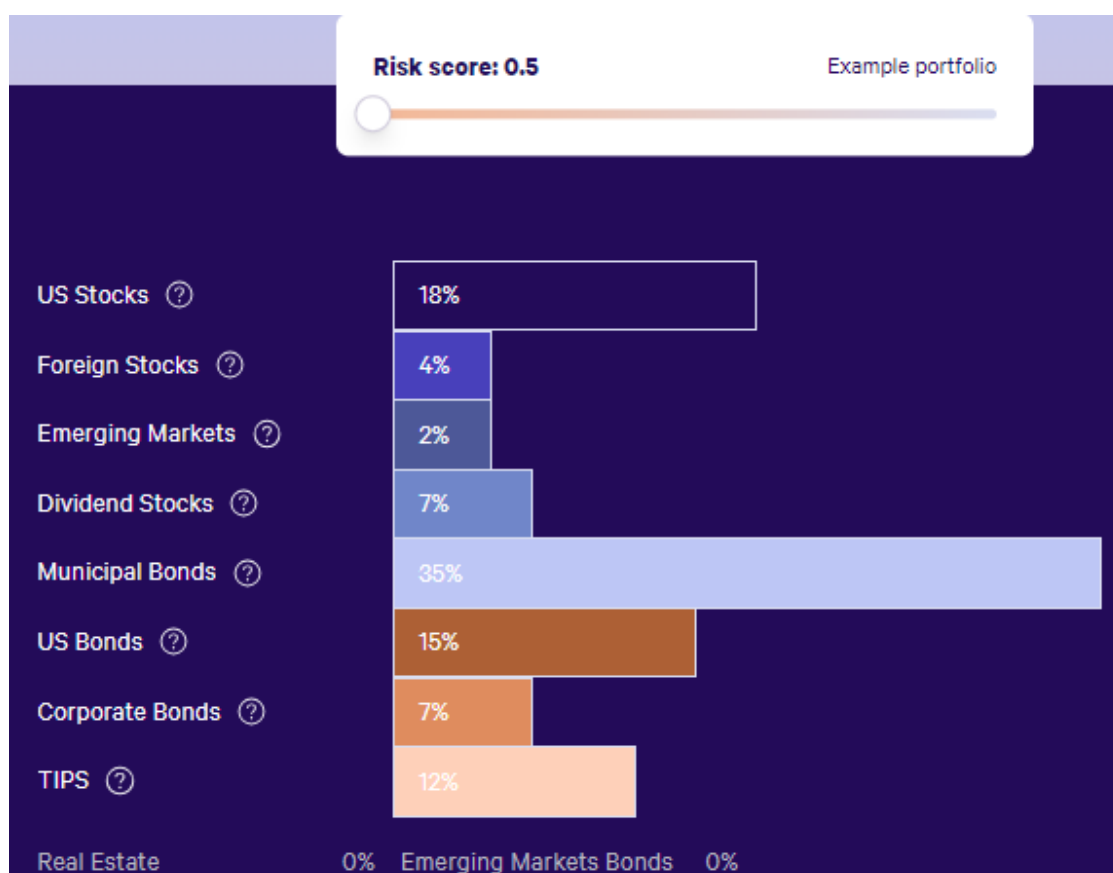
Wealthfront is among the highest-rated firms in the automated investment services market. It requires a minimum deposit of USD 500 and charges an annual management fee of 0.25% on assets under management. Each product in its portfolio carries an additional annual fee, which varies according to the policies of each ETF issuer. However, the portfolio primarily comprises ETFs with relatively low management fees. Wealthfront also offers a simulator that allows users to check how their funds would be allocated across different ETF asset classes, whereby allocations are adjusted according to the user's declared risk tolerance. This tool helps

users understand how investment managers using robo-advisors construct portfolios from a range of ETF categories. For more conservative profiles, the portfolio emphasizes fixed-income ETFs, for instance, tax-exempt municipal bond ETFs such as Vanguard's Tax-Exempt Bond ETF (expense ratio: 0.05% per year) and BlackRock's iShares National Muni Bond ETF (0.07% per year). Nonetheless, even conservative portfolios include a portion of equity ETFs, albeit in smaller proportions. These typically track major U.S. stock market indices, such as the Vanguard Total Stock Market ETF and the iShares Core S&P Total U.S. Stock Market ETF, both with annual fees of 0.03%.

Figure 1 presents a simulated investment portfolio for a client with low risk tolerance, showing the EFT classes included: U.S. equity ETFs, foreign developed markets equity ETFs, emerging markets equity ETFs, dividend-paying equity ETFs, municipal bond ETFs, U.S. Treasury bond ETFs, and Treasury Inflation-Protected Securities (TIPS). Regardless of the investor's risk profile, the portfolio always comprises a combination of ETFs offered by the brokerage. For each asset class, which varies in terms of risk, there are two ETF options that can be included in the portfolio.

Figure 1

Wealthfront simulator screen for a low-risk-tolerance investor profile, showing the percentage allocated to each ETF asset class.



Source: Wealthfront (2024).

Figure 2 illustrates the investment portfolio of an investor with an aggressive risk profile, showing the proportion of each ETF asset class used in portfolio construction. In contrast to the more conservative portfolio, this one focuses heavily on equity ETFs, significantly increasing exposure to both U.S. and international stock markets. The allocation to fixed-income ETFs drops from 69% in Figure 1 to just 2% in Figure 2. This comparison highlights that even portfolios designed for more risk-averse investors still allocate approximately 30% to equity ETFs.

Wealthfront utilizes ETFs from leading market providers such as Vanguard and BlackRock, however, some asset managers both operate ETFs and build portfolios using ETFs issued by their own firms, including groups such as Vanguard, Fidelity, and Charles Schwab. Portfolio construction based on ETFs can be seen as a dual application of MPT, because, as discussed by Deville (2008), both the algorithms implemented in robo-advisors, which account for varying risk tolerances, and the ETFs themselves are financial innovations grounded in MPT principles. Thus, financial theory is enacted both in the creation of ETFs and in the automated construction of ETF-based portfolios.

Figure 2

Wealthfront simulator screen showing the allocation percentages across ETF asset classes for a high-risk-tolerance investor profile.



Source: Wealthfront (2024).

Data indicate that passive management strategies prevail among robo-investors in the U.S. These platforms construct clients' investment portfolios exclusively using fixed-income and equity ETFs. Consequently, robo-advisors transform users into investors who adhere to strategies consistent with MPT principles, as outlined by Hayes (2019, 2020), effectively shaping clients into Weberian ideal types characterized by "goal-oriented rational action".

Another notable aspect of the retail robo-investment market is the presence of major asset management firms. Among the leading robo-advisor providers in the U.S. are the Vanguard and Fidelity groups, dominant players in the ETF issuance market who are innovating retail investing through automated platforms. This illustrates how large asset managers have played a key role in the financialization processes at multiple analytical levels, as suggested by Van Der Zwan (2014). At the macro level, they have driven a new mode of accumulation based on investment indexing strategies (passive management) (Braun, 2016; Rügemer, 2019; Juste, 2019; Fichtner & Heemskerk, 2020; Petry et al., 2021). At the meso level, they have influenced the ownership structures of publicly traded companies by acquiring minority shareholdings in firms listed on major financial markets (Fichtner et al., 2017; Lazonick and Shin, 2020). At the micro level, they have propagated passive management within retail investment operations, leveraging digital platforms and robo-advisors (Braun, 2016; Hayes, 2019, 2020).

5 The Robo-Investment Market in Brazil

In Brazil, from 2017, there was a notable expansion of individual investors in the stock market, especially after 2020 when the basic interest rate (Selic) reached its historic low of 2% per annum (B3, 2024). The country's history of high inflation has made the Brazilian economy a unique environment for investment strategies compared to major developed economies. Until the late 20th century, Brazil's capital market held a secondary position due to the predominance of fixed-income products that provided investors with protection against recurring inflation. Thus, the consolidation of the Brazilian capital market was the result of actions by both public and private agents involved in privatization processes and the internationalization of the Brazilian economy, unified around the corporate governance ideal (Grün, 2005; Mundo Neto; Donadone, 2023).

Recently, the retail investment market in Brazil has become increasingly competitive among brokerages and securities distributors, and key intermediaries in investment transactions, who employ diverse strategies to attract new investors. Notably, these include partnerships with investment advisory firms acting as agents for brokerages and distributors, as examined by Mundo Neto, Donadone, and Alves (2022), as well as the widespread adoption of robo-advisors targeting general investors (Guterman, 2017). Guterman (2017) highlighted four leading robo-advisors in Brazil at the time: Alkanza, Magnetis, Vérios, and Warren.

The acquisition of fintech companies by major traditional financial players has become a prevailing trend and a strategic move to expand digital service offerings. Currently, the robo-advisor Alkanza, developed in the United States, continues to be offered through a partnership with Rico, a brokerage subsidiary of XP Inc., the leader in retail investments and a key driver in popularizing the investment advisory model in Brazil (Barreiros and Mundo Neto, 2022; Mundo Neto, Donadone and Desidério, 2022). Moreover, the company behind the Magnetis robo-advisor was acquired by the BTG Pactual group, which integrated the technology into its client interfaces to provide investment-related information. Similarly, Vérios was acquired by the brokerage Easyinvest, which was later absorbed by the Nubank group. Nubank discontinued the Vérios brand but adapted its technology within the client interface for those interested in investment funds. Among the major banks, Santander invested in two companies, Monetis and Mobills, while *Banco do Brasil* launched its own robo-advisor service. Currently, Warren does not offer a simulator; it requires a minimum deposit of R\$30.00 and charges an initial annual



management fee of 0.9%. The service presentation does not mention using ETFs but highlights active management of investment portfolios (WARREN, 2023).

For robo-advisors acquired by major financial firms, the interfaces related to investor profiling, especially risk tolerance, have largely been preserved. However, as analyzed by Nicolete (2023), alongside the change in ownership of robo-advisor management companies, there have been changes in the asset mix used to construct client portfolios compared to the products examined by Guterman (2017). According to Guterman, until 2016, most of the robo-advisors analyzed followed the prevailing U.S. market model. They used ETFs to construct clients' investment portfolios but only for equity investments, as fixed-income ETFs were not yet available on the Brazilian stock exchange. As announced on September 10, 2018,

As of today, B3 begins to trade the first Fixed Income ETF in Brazil. The product was developed by Mirae Asset Global Investments along with the index provider S&P Dow Jones Indices and was enabled by the B3 trading platform. The product will follow the S&P/B3 Fixed Income Index, which will measure the performance of a hypothetical portfolio holding three-year DI future contracts (B3, 2018).

Fixed-income assets were previously selected actively by firms. However, when analyzing simulations using the same robo-advisors, a clear shift is noticeable: despite the availability of fixed-income ETFs in the domestic market, these ETFs do not appear in the simulated investment portfolios, and the robo-advisors have also ceased using equity ETFs (Nicolete, 2023). The suggested portfolios still consider risk profiles (conservative, moderate, and aggressive) and provide portfolio recommendations combining fixed-income products (fixed-income funds, treasury bonds) and equity products (equity funds, real estate funds, and multimarket funds). As risk tolerance increases, so does the proportion allocated to equities, although the range of product options mostly remains unchanged. A characteristic related to the U.S. market is zero brokerage fees combined with an annual management fee that can decrease as investment volume grows. It is also observed that companies managing robo-advisors in Brazil tend to prefer their own branded products, recommending partner products only when none are available within their own portfolio.

To illustrate the shift in investment portfolio construction compared to the scenario recorded by Guterman (2017), a simulation was conducted using a profile similar to that analyzed by the author on the same robo-advisor platform (Rico Alkanza simulator), with an initial investment of R\$ 500,000 and an investment horizon of 15 years (retirement goal). The simulator suggested a potential portfolio configuration comprising financial products across different categories, as shown in Figure 3.

For each product category, there is a range of financial asset options available: post-fixed (11), pre-fixed (02), inflation-linked (03), multimarket (05), equities (04), international (03), and alternatives (03), as indicated in Table 2. Notably, there is no reference to equity ETFs listed in Brazil, unlike in 2017. For example, within the international investment category, the product "Trend High Yield Americano" is linked to a BlackRock fixed-income ETF. The suggested portfolio comprises both fixed-income and equity assets but does not include ETFs, instead opting for products classified as actively managed.

Figure 3

Portfolio suggested by the Rico Investimentos brokerage simulator (Alkanza robo-advisor), moderate risk profile, investment amount of R\$500,000, investment horizon of at least 15 years, retirement goal, 09/03/23. On the left: **"Investment Profile. Your**



investment profile is: **Moderate**. The moderate profile is always open to new opportunities and accepts taking a bit more risk, but always calculated. And your recommended portfolio is: **Strategist**. The recommended portfolio represents the combination suggested by our specialists aiming to seek higher returns given a certain level of risk and volatility, combined with our current perspective on the macroeconomic scenario. In the case of the moderate profile, there is a greater balance between risk tolerance and the pursuit of higher returns.” On the right: “**Portfolio Composition**. Total invested: R\$ 500,000.00”. Plot legend, from top to bottom: “post-fixed, pre-fixed, inflation, multimarket, equity, international, alternatives.”



Source: Rico (2023)

Table 2
Financial product options by investment category, offered by the Alkanza investment robot from the Rico brokerage.

Asset class	Financial products
Post-fixed	Tesouro Selic Mar/26; Trend Simple DI; XP Corporate Top; Selection Light
Pre-fixed	Pre-fixed Treasury Jan/26 10.17%; C6 Bank CDB 2Y 12.16%
Inflation	Tesouro IPCA+ with interest 2023; XP incentivized debentures; Ciclus debentures Mar/31 IPCA + 6.70%
Multimarket	Moat capital equity hedge advisory; JGP strategy advisory; XP Macro; Kinea Multimercados
Equity	Small Caps Portfolio; Oceana Long Biased Advisory; Guepardo Institutional; Brasil Capital 30 Advisory
International	Trend American High Yield; Trend Global Credit FIM; Wellington US BDR Dollar Level 1
Alternatives	Trend Agricultural Commodities; LVBI11; PVBI11

Source: prepared by the authors based on Rico (2023)

A similar simulation was carried out using the Toro Investimentos asset manager investment simulator, which is part of the Santander group. It acquired the Monetus companies and their investment robot. For the retirement-oriented simulation (10-year horizon), the suggested portfolio included only fixed income products (Figure 4), highlighting “own-brand” products for the multimarket segment, offered by the brokerage itself, or post-fixed income products from the Santander group, which is the parent company of Toro Investimentos. To explore changes in the investment portfolio composition, another simulation was conducted for an aggressive risk profile (Figure 5), aiming to identify whether variable income investments would be included and which products would be recommended. Although variable income appeared in the aggressive portfolio, there were no ETF options, confirming that investment robots in Brazil have diverged from the strategy used by U.S. robots, which rely exclusively on ETFs. However, once again, it is clear that the portfolio presented by the investment robot prioritizes “own-brand” products, but this time under the “Monetus” brand, referring to the investment robot company acquired by Toro/Santander.

Figure 4

Simulation on the Toro brokerage platform for an initial investment of R\$500,000, with a retirement goal (minimum of 10 years), 09/03/2023. On the left: “**Your profile is moderate.** According to your profile, this is the diversification of your portfolio. **Simulated amount:** R\$500,000.00. Toro Portfolio yields: 36.63% more than savings, 2.43% more than the CDI, estimated return for the chosen period: R\$1,216,425.55 over 10 years.” Plot legend, from top to bottom: “**Multimarket** – R\$140,000.00 (28%): TORO ONE FOF MULT FIC FIM CP – R\$140,000.00 (28%). **Post-fixed Income** – R\$140,000.00 (28%): CDB Santander 100% CDI – Yield: 100.0% CDI – R\$115,000.00 (23%); CDB Santinvest 119% – Yield: 119.0% CDI – R\$25,000.00 (5%). **Pre-fixed Income** – R\$140,000.00 (28%): CDB Agibank 12.28% – R\$90,000.00 (18%); NTN-F 33 – R\$50,000.00 (10%). **Inflation-linked Income** – R\$80,000.00



(16%): TESOIRO IPCA+ 2028 WITH SEMIANNUAL INTEREST – Yield: 5.87% IPCA+ – R\$80,000.00 (16%)”.

Source: Toro (2023).

In both the conservative and aggressive portfolios, the fund “Toro ONE FOF MULT FIC FIM CP” appears—a multimarket fund whose benchmark is the Interbank Deposit Certificate (CDI). For the “Equities” category, the robot recommends the “MONETUS FIA” fund, which invests in shares of companies listed on the Brazilian stock exchange as well as in companies listed on international markets through Brazilian Depositary Receipts (BDRs). These are examples of actively managed funds used in the product portfolio to build clients’ investment strategies. Figure 5 highlights a message encouraging clients to consult investment advisory services, stating that *“a personalized portfolio can yield much more.”* This statement suggests that automated services operate with a limited set of products to construct investment portfolios, whereas personalized advisory services evaluate a much broader range of financial assets and expand the possibilities for investment.

Figure 5

Toro (Monetus) simulator for an aggressive profile, with an initial investment of R\$500,000, aiming to increase wealth, 09/03/2023. **“Your profile is aggressive. According to your profile, this is how your portfolio is diversified. Simulated amount: R\$500,000.00. A personalized portfolio can yield much more.** This simulation was based on an initial investment of R\$500,000.00. Speak with our Exclusive Advisory for greater returns. Talk to an Advisor”. Plot legend, from top to bottom: **“Equities** – 120,000.05 (24%): MONETUS FIA – R\$120,000.05 (24%); **Multimarket** – 70,000.00 (14%): TORO ONE FOF MULT FIC FIM CP – R\$70,000.00 (14%); **Pre-fixed Income** – R\$110,000.00 (22%): NTN-F 33 – R\$60,000.00 (12%), CDB Agibank 12.80% – \$50,000.00 (10%); **Post-fixed Income** – R\$49,999.95 (10%): CDB Santander 100% CDI – Yield: 100.0% CDI – R\$49,999.95 (10%); **Real Estate** – R\$45,000.00 (9%) CANUMA CAPITAL USA REITS EM REAIS FIA – R\$45,000.00 (9%); **Global; Equities”**.





Source: Toro (2023).

In Brazil, as illustrated by simulations using two of the main investment robots available to retail investors, asset management firms have moved away from the business model predominant in the U.S., which is based on passive management strategies. In the U.S. model, algorithms implement MPT using only ETFs to construct investment portfolios. In contrast, Brazilian firms have adopted an active management model, using fixed income funds, multimarket funds, and equity funds to construct their clients' portfolios. While in the U.S., critical analyses of the expansion of the investment robot market highlight how these tools transform ordinary people into rational investors who follow the prescriptions of financial theory, in Brazil, users of these new technologies are not necessarily "protected" by strategies that aim to balance risk tolerance and return expectations. Instead, they are exposed to active management strategies embedded in the algorithms of investment firms' robots. Although MPT strategies carry an individualistic bias and societal implications by promoting a specific type of investor behavior, as discussed by Hayes (2020), they have gained legitimacy in the financial market by presenting themselves as low-risk, low-cost approaches that 'protect' investors who lack the expertise to assess investment risks. In Brazil, although investment robot firms also adopt zero brokerage policies, as their U.S. counterparts do, they implement active management strategies in their algorithms. These strategies often lack transparency regarding both the risks involved and the costs of the products included in clients' portfolios, which heightens uncertainty about investment returns.

6 Conclusions

Diffusing investment robots and ETFs illustrates the process of financialization at two distinct levels of analysis, as presented by van der Zwan (2014): first, the financialization of everyday life, in which people without specialized financial knowledge begin to invest as experts; and second, financialization as a new regime of accumulation in capitalism, where large financial asset managers, such as the “Big Three,” have adopted strategies to include new investors in the circuit of financial innovations, thereby expanding their power and legitimizing their role as organizers of capitalism (Rügemer, 2019).

In the U.S., retail investment robots are programmed to build investment portfolios using a mix of fixed income and equity ETFs, following MPT. In Brazil, investment robot companies (fintechs) have been acquired by large financial groups aiming to expand digital services to traditional retail clients. According to Guterman (2017), the U.S. model was only partially followed because, at the time of his research, fixed income ETFs were not yet available on the B3 (Brazilian stock exchange), and that part of the portfolio was constructed with specific products selected by asset managers, that is, through active management strategies. However, even after the launch of several fixed income ETFs, investment robot managers did not include these ETFs in their portfolio options; instead, they stopped using equity ETFs. As analyzed by Nicoletti (2023) and confirmed through simulators from Rico brokerage, which controls the Alkanza robot, and Toro brokerage, which controls the Monetus robot, in the Brazilian market investment robots do not use ETFs to construct client portfolios. Therefore, although investment robots consider different investor profiles (conservative, moderate, and aggressive), they do not follow the full diversification prescribed by MPT, since their algorithms select financial products based on active management strategies, that is, specific, non-indexed products. By adopting an active management strategy in their investment robots, Brazilian asset managers lose the legitimacy of MPT and increase distrust regarding the quality of investments offered by these devices.

In Brazil, the basic interest rate above double digits has contributed to the increased allocation of resources in fixed income products. However, despite the growth of the Brazilian ETF market and the expansion of the offering of ETF BDRs, the investment fund market in Brazil has shown aggregate growth in net asset value primarily driven by other fund classes. As of February 2024, the fund classes used by managers operating investment robots (fixed income funds, multimarket funds, and equity funds) represented 38.5%, 19.1%, and 7.2%, respectively, of the total national market. ETFs have accounted for only 0.5% of the total volume of the Brazilian fund industry, with a net asset value of approximately R\$43 billion out of a total of about R\$8.6 trillion in February 2024 (Anbima, 2024). Thus, despite the diffusion of financial innovations (ETFs and investment robots) led by large asset managers dominating the national market, the largest volume of resources remains concentrated in funds with active management strategies. This configuration of the Brazilian investment fund market may help explain the difference in the business model of investment robot managers operating in Brazil compared to the predominant model in the U.S.

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