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Original Article

Women and the capital market: study on the profile of brazilian female investors

As mulheres e o mercado de capitais: um estudo sobre o perfil das investidoras brasileiras

Flávia Mônaco Vieira[I], Vanessa Martins Pires[II], Luis Carlos Schneider[II], Guilherme Costa Wiedenhöft[II]

[I] Hospital de Clínicas de Porto Alegre, Porto Alegre, RS, Brazil
[II] Universidade Federal do Rio Grande, Rio Grande, RS, Brazil

ABSTRACT

Purpose: The growing participation of women in the Brazilian capital market contrasts with the limited knowledge about the profile of these investors. To fill this gap, this study aims to understand the profile of Brazilian female investors, analyzing factors that influence their investment decisions, such as education, age, social class, family background and geographic region.

Methodology: To test the research hypotheses, a quantitative approach was used with the aid of the Sider® tool and libraries in Python, NumPy for numerical operations, SciPy for statistical tests such as Chi-square, Statsmodels for advanced analysis and Matplotlib/Seaborn for data visualization. Clustering techniques with the K-Means algorithm were applied to identify the profiles of the investors, based on sociodemographic factors.

Findings: Factors such as education, economic class and family background significantly influence investment intention. Although most investors have a conservative profile, focused on low-risk assets, investors with higher income and education tend to diversify their portfolios, including more sophisticated assets. Three investor profiles were identified: experienced and financially stable (Cluster 1), young investors seeking to build wealth (Cluster 2) and young investors just starting out on their financial journeys (Cluster 3).

Originality: The research contributes to the literature on personal finance by understanding the profile of Brazilian female investors based on sociodemographic factors, given the low density of studies on this subject. The results of the research allow for various applications, supporting the creation of public policies on financial education and aimed at building a more inclusive capital market.

Keywords: Personal finance; Investments; Women; Capital market; Sociodemographic factors

RESUMO

Finalidade: A crescente participação das mulheres no mercado de capitais brasileiro contrasta com o conhecimento limitado sobre o perfil dessas investidoras. Para preencher essa lacuna, este estudo visa compreender o perfil das investidoras brasileiras, analisando fatores que influenciam suas decisões de investimento, como escolaridade, idade, classe econômica, contexto familiar e região geográfica.
Metodologia: Para testar as hipóteses de pesquisa foi utilizada uma abordagem quantitativa com o auxílio da ferramenta Sider® e bibliotecas em Python, NumPy para operações numéricas, SciPy para testes estatísticos como o Qui-quadrado, Statsmodels para análises avançadas e Matplotlib/Seaborn para visualização de dados. Técnicas de clusterização com o algoritmo K-Means foram aplicados para identificar os perfis das investidoras, baseados nos fatores sociodemográficos.
Resultados: Fatores como escolaridade, classe econômica e contexto familiar influenciam significativamente a intenção de investimento. Embora a maioria tenha um perfil conservador, focado em ativos de baixo risco, as investidoras com maior renda e escolaridade tendem a diversificar suas carteiras, incluindo ativos mais sofisticados. Foram identificados três perfis de investidoras: experientes e estáveis financeiramente (Cluster 1), jovens, buscando a construção de patrimônio (Cluster 2) e jovens iniciantes em suas jornadas financeiras (Cluster 3).
Originalidade: A pesquisa contribui com a literatura de finanças pessoais, ao compreender o perfil das investidoras brasileiras com base em fatores sociodemográficos, dada a baixa densidade de estudos com essa finalidade. Os resultados da pesquisa permitem variadas aplicações, sendo subsídio para a geração de políticas públicas de educação financeira e voltadas à construção de um mercado de capitais mais inclusivo.

Palavras-chave: Finanças pessoais; Investimentos; Mulheres; Mercado de capitais; Fatores sociodemográficos

1 INTRODUCTION

Women represent a fundamental force in Brazilian society, playing an important role in shaping the nation's social and economic landscape. According to the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística [IBGE], 2022), they constitute 51.5% of the Brazilian population. Furthermore, data from the National Household Sample Survey of 2022 (Pesquisa Nacional por Amostra de Domícilios - PNAD) (IBGE, 2023) revealed that women are heads of household in 51.08% of Brazilian homes, demonstrating a significant increase of approximately 38% compared to 2012. The female figure has been often associated with roles such as housewife, wife and mother. However, women started to be acknowledged at professional sphere and reaffirmed their autonomy, including their financial one, before the male figure, over time (Lipovetsky, 2000; Smeha & Calvano, 2009).

Brazilian women investors' participation in the capital market has evolved over the years, besides showing higher concentration of investments in higher value ranges than male investors. In total, 165,284 female investors lived on variable income in 2018; this number reached 1,253,375 in 2023, which represents increase by 658% over 5 years. When it comes to gender, the men: women ratio in this sector remained virtually constant in the long term – women accounted for 23% and 25% investors in 2018 and 2023, respectively (Brasil, Bolsa, Balcão [B3], 2024a).

Diversification of products invested in the stock market has also increased, over time. In 2023, more than half of female investors had more than one variable income product in their portfolio. In 2016, for example, 75% of women's investment portfolios comprised stocks; this number dropped to 69% in 2023 due to investments in other products, such as Real Estate Investment Trusts (REITs), Brazilian Depositary Receipts (BDRs) and Exchange Traded Funds (ETFs) (B3, 2024a).

It is important emphasizing that female investors also actively participate in the fixed-income market by investing their resources in Bank Deposit Certificates (BDCs), Government Bonds, Real Estate Letters of Credit (RELCs), Agribusiness Credit Letters (ACLs), among others. Tesouro Diretol program, for example, welcomed more than 650 thousand female investors in 5 years – it reached 903,597 women, in 2023. However, this program's profile remains mostly male, since female participation in it accounted for 37% of the total number of investors in 2023 (B3, 2024b).

Female participation in the financial market is growing, but it is still lower than that of men, although women have higher schooling than men, on average (IBGE2020). Some factors can help explaining women's lower participation in the financial market, such as their double or triple shifts (mother, wife, professional) and unequal wages between men and women (Schneider, Pires & Regert, 2021).

According to an analysis carried out by the Pew Research Center, American women still earned 84% of what men earned in 2022. Although women often have more academic

[I] Tesouro Direto is a program under Brazil's National Treasury aimed at providing everyone with access to government bonds online.

training than men, the pay gap persists. This issue points towards the influence of additional factors, such as motherhood, since mothers experience lower participation in the labor market and fewer hours worked, whereas fathers often experience the "paternity wage premium," which contributes to the gender pay gap (Pew Research Center, 2023).

The reluctance of some women to investing can be attributed to their perceived lack of experience in the financial market and to lack of confidence in doing so. A research conducted by Financial Industry Regulatory Authority [FINRA's], (2020) has pointed out that female investors show less confidence in investing than men, regardless of factors like schooling, income and investable assets.

The study "Women and Investing" conducted by Fidelity Investments® reinforced this argument, since it pointed out that only one-third of women see themselves as investors and are confident in their ability to save, in the long term, and to make investment decisions. Only 14% of women reported to have substantial knowledge about saving and investing. The aforementioned study also emphasized that most women want to be more active in their finances, but they feel the need to better understand stock selection and to improve their knowledge about investing. Despite women's lack of confidence in the financial market, their portfolios outperformed those of male investors. Female investors recorded positive returns and outperformed men by 0.4%, on average (Fidelity Investments®, 2021).

Given women's social and economic importance and their growing participation in the financial and capital markets, although in a scenario featured by inequality, it is timely understanding the profile of Brazilian female investors, which is the herein investigated topic. The aim of the current study was to identify the factors determining Brazilian women's investment in financial assets. The analysis applied to these factors enabled outlining Brazilian female investors' features, as well as identifying three (3) different investment profiles.

Initially, the present research focused on better understanding Brazilian female investors' profile by using sociodemographic variables, such as age group, marital status,

schooling and social class. The current results were compared to findings in similar research carried out in other emerging economies (Nosita, Pirzada, Lestari & Cahyono, 2020; Quang, Linh, Nguyen & Khoa, 2023; Doan & Yeasmin, 2024). This study differs from others in that it analyzes the factors that influence women's financial decisions in Brazil, especially regarding sociodemographic aspects, culminating in the identification of the main investment profiles. As management-related contribution, identifying determining factors for investment can help developing strategies aimed at meeting investors' specific needs. Therefore, it is an important subsidy to help institutions operating in the financial market to develop public policies and strategies. Similarly, understanding the features of different profiles enables developing personalized financial education programs. Finally, spreading the current findings can help building a more inclusive capital market and increasing female investors' participation in it.

2 LITERATURE REVIEW

2.1 Risk and return

In theory, the higher the risk of a given investment, the higher the investor's return expectation to compensate for the risk. The return on an individual asset can be defined as the total return obtained over a given period-of-time, whereas the return on an investment portfolio refers to the return on the assets comprising it, based on the share (weight) of each asset in the composition of such portfolio (Berk, Demarzo & Harford, 2010).

The risk of a given asset is measured through standard deviation, which is a statistical measurement used to measure the volatility of the asset's historical returns. The correlation between assets must be taken into consideration within the investment portfolio context, since the diversification effect enables reducing portfolios' unsystematic risk by investing in assets with different correlations (Berk et al., 2010).

Markowitz (1952) concluded that portfolio risk becomes diversified (diluted) as invested capital is split into several assets. Therefore, the standard deviation

recorded for a given investment portfolio is lower than the risk of individual assets. Diversifying investments within a portfolio of assets enables minimizing unsystematic (diversifiable) risk. Non-diversifiable risk, which is measured through Beta coefficient, is the systematic risk affecting the market as a whole (Carmona, 2009).

Risk-free assets are the ones assumingly presenting zero risk, i.e., assets with beta equal to zero, such as U.S. Treasury bonds. Some scholars in Brazil consider federal government bonds as risk-free assets (Carmona, 2009). However, virtually, all debt securities present credit risk; in other words, it is likely that issuers will not pay the debt's interest or main value (Comissão de Valores Mobiliários [CVM], 2018). Thus, investors must analyze issuers' credit rating and payment capacity to help mitigating this risk (Vieira, Lolatto, Souza, Mello & Nagai, 2022).

In addition to credit risk, financial assets can show market risk, mainly variable income assets, which present higher volatility than fixed income assets. This risk is associated with price fluctuations in the financial market, a fact that can lead investors to capital loss (CVM, 2018). Diversification across different asset classes is an effective strategy to help mitigating market risk, since it reduces the total risk of the portfolio in comparison to that of individual assets (Vieira et al., 2022).

Accordingly, risk tolerance emerges as crucial factor in financial decision-making. Risk tolerance refers to investors' willingness to accept the likelihood of loss in pursuit of higher returns. Investors with high risk-tolerance tend to allocate capital to variable income assets that, despite being more volatile, offer greater potential for return. On the other hand, risk aversion features investors who prefer the most conservative investments, due to lower exposure to volatility and to higher predictability of return (Doan & Yasmin, 2024).

Demographic factors, such as income, schooling and even personal features, can significantly influence risk tolerance. Understanding these aspects enables investors to adjust their choices according to their profile by balancing risk and return based on their financial goals and comfort level (Nosita et al., 2020).

2.2 Fixed income and variable income

Financial investment involves allocating capital in some financial investment type, such as stocks, investment funds, foreign currency, government bonds, among others, and it allows accumulating income in the future through compound interest, as well as multiplying the invested capital. According to Gitman and Joehnk (2005), financial investment can be understood as any instrument resources are applied in to generate positive income or to preserve and increase the invested value.

Discussions about investments often split assets into two classes, namely: fixed and variable income. The main difference between them lies in the predictability of returns. The profitability and maturity criteria of fixed income assets are defined at investment time, whereas variable income assets do not offer previously known return. This variable income unpredictability is actually one of its attractions, given the potential for higher returns resulting from the greater risk involved in it (Carota, 2021).

2.3 Female investor's profile

Financial investors can be featured as individuals, legal entities or entities willing to invest capital in order to get profit, maximize return and minimize risks. Investors can grant loans, buy financial assets or participate in investment funds. They operate both in the primary (by injecting capital into companies) and secondary (by buying financial assets from other investors) markets, as well as make commitments in exchange for profit sharing, fixed return or subsequent investment sale at higher price (Market Business News [MBN], 2023).

Investors' profile is a categorization type used to describe how individuals react to risks and opportunities in the financial investment context. According to the Brazilian Association of Financial and Capital Market Entities (Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais [ANBIMA], 2021), investors can be classified into three main profiles: conservative, moderate and bold.

Conservative investors are featured by their aversion to risk, since they prefer assets that offer greater security, despite leading to lower returns. Typical

investments made by this profile comprise public and private bonds guaranteed by the Deposit Insurance Survey (DIS), because they are mostly stable.

The moderate profile, in its turn, focuses on achieving balance between security and profitability. These investors tend to diversify their portfolio by combining low-risk investments to high volatility assets in order to maximize returns without excessively exposing themselves to losses.

On the other hand, bold investors show greater willingness to accept risks in order to get higher returns. This profile is more comfortable with the volatility inherent to variable income assets, such as shares. It often shows better knowledge about financial market, in addition to a financial situation that allows them to take greater risks without compromising their financial stability.

Studies suggested that investment preferences are influenced by demographic and behavioral factors (Quang et al., 2023). In addition, psychological, social and geographic factors, as well as investors' financial capacity, play relevant role in defining their risk profile and decision-making processes (Bunyamin & Wahab, 2021).

Investors' profile is shaped by personal attributes capable of influencing their investment choices. Elements like financial situation, risk tolerance and knowledge about finance can help mapping investors' profile. In theory, financially educated individuals are expected to economically prosper because they know the money value effect, over time, the composition of interest rates, their financial profile and the available investment options, among others. The Organization for Economic Co-operation and Development (OECD, 2005, p. 5) defines financial education as follows:

> The process by which financial consumers/investors improve their understanding of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being. Financial education thus goes beyond the provision of financial information and advice, which should be regulated, as is already often the case, in particular for the protection of financial clients (i.e. consumers in contractual relationships).

Financial education can be understood as the knowledge transmission process enabling individuals to make informed decisions to better manage their personal finances. Studies like the one conducted by Lusardi and Mitchell (2014) pointed out the significant causal impact of financial education on economic decision-making, and it enabled identifying the effect of this education type in comparison to other factors, such as schooling and cognitive ability. Given the growing importance of financial education in investment decisions, it is possible deducing that individuals' schooling has straight impact on the development of financial skills. Thus, formal education can help better understanding financial concepts and enable individuals to better assess the options available for investment. Based on this factor, one can expect positive association between schooling and willingness to invest in financial assets, as set out in Hypothesis 1 (H1):

H1: The higher the individual's schooling, the higher its investment levels in financial assets.

Investors' demographics have been facing significant changes at global scale, as reported in the study conducted with investors in the United States by (FINRA, 2022). The aforementioned study highlighted a new generation of younger and less experienced investors whose behaviors and attitudes toward investing differ from those of previous generations. Younger investors, mainly those in the age group 18-34 years, are more prone to adopt riskier investment behaviors, as shown by their interest in high-risk investments, such as crypto-currencies, options and meme stocks (which are famous on social media). It is worth emphasizing that younger investors show greater confidence in using mobile trading apps and in investment information collected through social media.

The literature suggests that younger female investors tend to prioritize riskier investments in order to maximize long-term returns, whereas older female investors can show preference for the most conservative strategies, aiming at capital preservation and income generation for retirement purposes (Guiso, Sapienza & Zingales, 2008; Doan & Yeasmin, 2024). In light of this, hypothesis 2 (H2) is presented within this context:

H2: Female investors' age group has influence on their profile – risk-return ratio inherent to investments.

Assumingly, there is a positive correlation between income and investment in financial and variable income assets when it comes to female investors' economic class. The higher the income, the higher the likelihood of having an emergency fund or available financial resources exceeding monthly/annual expenses for investment purposes. In historical terms, from the economic and social perspective, Brazil is considered an unequal country. According to data provided by the Brazilian Association of Research Companies (Associação Brasileira de Empresas de Pesquisa, [ABEP]), for example, class A individuals had mean income 23 times higher than that of class D/E, in 2022 (Globo, 2024). Therefore, the higher the female investors' income, the higher the likelihood of having an emergency fund or available financial resources exceeding monthly/annual expenses for investment purposes, as set out in Hypothesis 3 (H3):

H3: The higher the economic class, the higher the likelihood of investing in financial assets.

Income discrepancies between men and women in different family arrangements are evident. Single-person male households have the highest income *per capita* (R$2,026.00), whereas single-person female households have significantly lower income per capita (R$1,149.00). Households headed by women with children have the lowest income *per capita* (R$789.00), whereas men with children earn R$1,198.00. Income in arrangements involving couples without children is more balanced - R$1,716.00 for male household heads and R$1,660.00 for the female ones (IBGE, 2022). These differences show how gender and family structure affect available income, besides influencing one's ability to save and invest, mainly among women living under higher economic vulnerability condition.

Accordingly, with respect to the family context, female investors with smaller number of children, and the married ones, are expected to invest more in financial assets, since they would have greater capacity to gather financial resources than others, as predicted in Hypothesis 4 (H4):

H4: Investors' family context (number of children and marital status) influences the financial investment volume.

According to IBGE, (2022), Brazil's Gross Domestic Product (GDP) in 2021 reached R$ 9 trillion; 52.3% of it steamed from the Southeastern region, which is home to some of the country's main national and international agents and services, as well as the country's Stock Exchange. On the other hand, GDP reached 17.31%, 13.79%, 10.34% and 6.26% in the Southern, Northeastern, Midwestern and Northern regions, respectively. Assumingly, the Southeastern and Southern regions, which present the highest GDP, are the ones bringing together the largest number of female investors in financial assets. This assumption will be tested through Hypothesis 5 (H5):

H5: Regions presenting the highest GDP concentrate the largest number of female investors in financial assets.

Risk preferences influence women's investment decisions. Gonzalez-Igual, Santamaria and Vieites (2021), for example, found that female investors recognize that they are more risk averse than male investors. The results of the study by P., Joy and Babu (2022) corroborate the above, revealing that the lack of strategies and inadequate disclosure of information are the main obstacles for female investors.

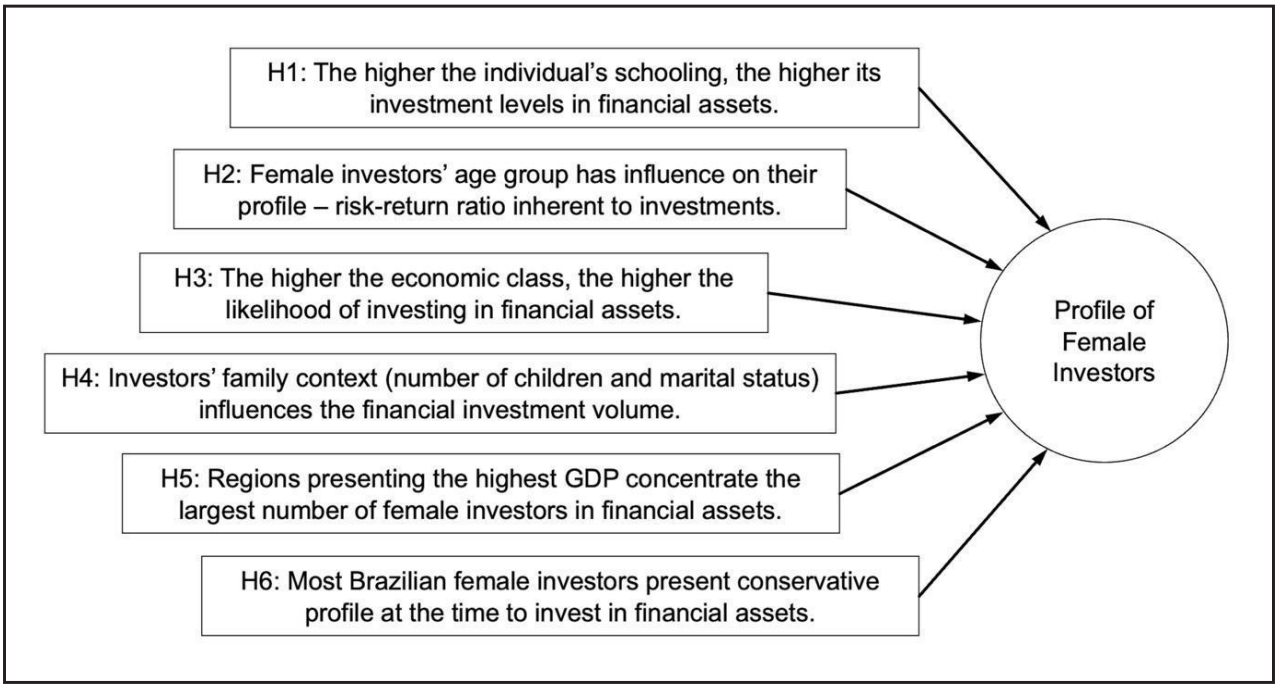
Finally, in historical terms, Brazilians have often shown conservative profile at the time to choose investments, since they prefer lower-risk assets, such as savings accounts, as well as public and private bonds (Cardoso et al., 2019; Paiva, Souza, Novôa

& Pereira, 2020). Many investors concentrate all their investments in savings, without diversifying their portfolio. The lack of financial education is a determining factor for this behavior, contributing to the low level of investment and the predominance of a conservative profile among Brazilians. Thus, Hypothesis 6 (H6) aims at analyzing whether this preference for fixed-income assets is also observed in choices made by Brazilian female investors, who might maintain the conservatism pattern observed in other studies conducted in the Brazilian financial market context (Cardoso et al., 2019; Paiva et al., 2020; Zanotelli, 2021).

H6: Most Brazilian female investors present conservative profile at the time to invest in financial assets.

Figure 1 presents the investigated research hypotheses, whose results enabled building the investment profiles of Brazilian female investors.

Figure 1 – Research hypotheses



Source: Elaborated by the authors

The methodological criteria adopted to identify factors determining Brazilian women's investments in financial assets and to build investment profiles will be introduced in the next chapter.

3 METHODOLOGY

The herein adopted methodology followed a descriptive approach, which, as proposed by Gil (2017), aims at classifying, analyzing and interpreting features of a given group. The emphasis, in this method, lies on identifying female investors' profile in Brazil, a fact that justifies adopting a descriptive approach to assess the sociodemographic and investment features of this population.

Documentary and content analysis techniques based on qualitative approach were used as research procedures. Document analysis enables collecting information from secondary sources, whereas content analysis uses systematic procedures to categorize and code messages (Bardin, 2009).

Data collection was based on the survey "Raio X do Investidor", conducted by ANBIMA, which has been issuing annual editions since 2018; the last edition was published in 2023. The aforementioned survey is based on information collected by Datafolha (a private Brazilian public opinion research institute), through qualitative interviews conducted with Brazilian citizens in the age group 16 or older, from all social classes and country regions. The aforementioned study adopted 95% confidence level and 1% margin of error, and it provided an overview of investment types made by, and socioeconomic reality of, respondents.

The herein investigated sample was defined based on two filtering criteria applied to the selected database. The first criterion lied on only selecting female respondents, based on using variable 'sex' to isolate women in the sample. Then, a second filter regarding investment type was applied by only taking into consideration female investors who reported to invest in financial products, such as savings accounts, private bonds, investment funds, private pension plans, government bonds, stocks, as well as digital and

foreign currencies. Responses mentioning investments in products like capitalization bonds, insurance or purchase of movable and immovable properties were excluded from the study, since they did not fit the herein adopted financial investment concept. Financial investment is herein understood as capital creation through the acquisition of financial products, based on the expectation of favorable future returns (Jain, 2014).

After the filters' application procedure was over, the final sample in the current study comprised 1,453 women who reported to have made some financial investment type. Table 1 presents the research-sample features.

Table 1 – Respondents' descriptive data

(Continued)

Description	Number	% Total
Age		
16 to 20 years old	93	6,4
21 to 25 years old	163	11,2
26 to 30 years old	187	12,9
31 to 35 years old	150	10,3
36 to 40 years old	184	12,7
41 to 45 years old	138	9,5
46 to 50 years old	120	8,3
51 to 55 years old	115	7,9
56 to 60 years old	112	7,7
61 to 65 years old	106	7,3
Above 65 years old	85	5,8
Marital Status		
Married	691	47,6
Unmarried	536	36,8
Divorced	155	10,7
Widower	71	4,9
Children		
No children	565	38,9
1child	318	21,9
2 children	341	23,4
3 children	164	11,3
4 or more children	65	4,5
Education		
Elementary School	167	11,5
High School	439	30,2
Bachelor's Degree	575	39,6
Postgraduate Degree	272	18,7

Table 1 – Respondents' descriptive data

(Conclusion)

Description	Number	% Total
Economic Class		
C2/DE	273	18,8
C1	337	23,2
B2	451	31,0
B1	231	15,9
A	161	11,1
Geographic Region		
Southeast	720	49,6
Northeast	205	14,1
South	263	18,1
Central-West	182	12,5
North	83	5,7

Source: Elaborated by the authors

The research hypotheses were evaluated using the Sider® tool, an artificial intelligence assistant designed to simplify complex tasks such as statistical calculations, data visualizations, and code development across various programming languages. Common Python libraries facilitated the statistical tests and analysis. Notably, Pandas was employed for data manipulation, NumPy for numerical operations, SciPy for statistical tests like the chi-square test, Statsmodels for advanced analyses, and Matplotlib/Seaborn for data visualization. These libraries significantly enhanced the interpretation of the study results.

To conduct the statistical analysis, a frequency distribution of financial investments was examined based on female investors' education levels, age groups, economic classes, and family contexts. ANOVA was specifically utilized to assess the differences between means in hypothesis 3. The statistics presented in the "Statistics" column of Table 2 in the following section reflect various calculations derived from the hypothesis tests. For hypothesis H1, the statistics were obtained from the chi-squared test, demonstrating an association between education and investment behavior. In the case of hypotheses H2, H4, and H5, the statistics pertain to Pearson's correlation coefficient, which quantifies the relationship between the variables. Hypothesis H3

employs the ANOVA F statistic to evaluate differences in average investments across economic classes. Lastly, hypothesis H6 indicates the proportion of investors with a conservative profile relative to the total number of investors.

After assessing the hypotheses, clusters were formed to group female investors with similar features to help better understanding their investment behavior and profiles. The K-Means algorithm was used to perform the clustering process, which was carried out in different steps. Initially, relevant variables, such as schooling, age group, economic class, family context and financial asset types, were selected; they were standardized to ensure that all variables could equally contribute to form the clusters. Then, the ideal number of clusters to be formed was calculated based on using the Silhouette Score (0.337), Davies-Bouldin Index (1.543) and Calinski-Harabasz Index (451.75); these indicators suggested that the difference between cluster profiles was low or intermediary, a fact that pointed out similarities between clusters.

4 RESULT ANALYSIS AND DISCUSSION

4.1 Hypotheses analysis and checking processes

A table comprising a set of data on female investors, such as schooling, age group, economic class, family background, regional GDP and investment profile, was organized and loaded into the Sider® tool to assess the hypotheses in the current study. A given command was run to investigate significant differences between investment profile and sociodemographic variables.

Chi-square test was applied to categorical variables, whereas correlations were applied to continuous variables. Results were interpreted based on p-values, and it enabled assessing the significance of the herein proposed associations. Results of the aforementioned tests are shown in Table 2.

Table 2 – Results of testing the research hypotheses

Hypotheses	Statistic*	p-value	Conclusion
H1: The higher the individual's schooling, the higher its investment levels in financial assets.	264.332369	5.102939 e-34	Confirmed
H2: Female investors' age group has influence on their profile – risk-return ratio inherent to investments.	0.004871	8.528145 e-01	Rejected
H3: The higher the economic class, the higher the likelihood of investing in financial assets.	40.613408	2.724893 e-32	Confirmed
H4: Investors' family context (number of children and marital status) influences the financial investment volume.	- 0.169092	8.772678 e-11	Confirmed
H5: Regions presenting the highest GDP concentrate the largest number of female investors in financial assets.	0.153897	3.715215 e-09	Confirmed
H6: Most Brazilian female investors present conservative profile at the time to invest in financial assets.	0.609773	5.481998 e-17	Confirmed

* The values in the "Statistics" column in the table represent different statistics calculated from the hypothesis tests. For hypothesis H1, the statistics were derived from the chi-square test, indicating the association between education and investments. In H2, H4 and H5, it refers to the Pearson correlation coefficient, measuring the relationship between the variables. H3 uses the ANOVA F statistic to verify differences in investment averages between economic classes. Finally, H6 represents the proportion of investors with a conservative profile in relation to the total.
Source: Elaborated by the authors

In theory, female investors with higher schooling have better knowledge about financial market and financial literacy, and it increases their proclivity to invest. Hypothesis 1 (H1) was confirmed, and it showed that female investors with higher schooling tend to invest more and to diversify their asset portfolios. Table 3 shows the distribution of investments based on female investors' schooling.

Table 3 – Distribution of investments based on female investors' schooling

Education	Savings accounts	Private bonds	Investment funds	Private pension plans	Government bonds	Stocks	Digital currencies	Foreign currencies
Private Pension	143	8	10	7	2	0	5	3
High School	352	36	33	24	15	10	13	8
Bachelor's Degree	400	96	83	74	57	46	26	10
Postgraduate Degree	149	88	83	57	33	36	5	9

Source: Elaborated by the authors

The analyzed data pointed out that investment in stocks is only starting to stand out among female investors with high school diploma and that it increases among those with college and post-graduation degree. This finding reinforces the literature, which associates higher schooling with improved knowledge about investment risks and opportunities, which, in its turn, encourages portfolio diversification (Fajardo & Blanco, 2010; Van Rooij, Lusardi & Alessie, 2011; Nosita et al., 2020).

The number of female investors who exclusively allocate their resources to savings decreased as their schooling increased. These findings suggest that higher schooling is not only associated with greater willingness to invest, but also with best understanding the relevance of diversifying investments to help mitigating risks. Moreover, these findings corroborate studies, according to which, schooling is a determining factor in decisions made to diversify financial assets (Larkin, Luvey & Mulholland, 2013; Quang et al., 2023; Doan & Yeasmin, 2024).

In theory, female investors belonging to different age groups overall have different financial goals. Life experience and financial knowledge tend to increase as individuals age, and these factors can influence investment preferences and one's willingness to invest in different asset types. However, the association introduced in Hypothesis 2 (H2) was not confirmed. Investment in savings accounts was similar across all age groups, and

it suggested lack of prevalence of age groups mostly prone to take greater financial risks. This behavior differs from that observed in studies that suggested investors' transition into more conservative investments as they get older (Doan & Yeasmin, 2024). However, the findings are in compliance with studies conducted by Fajardo and Blanco (2010); Larkin et al., (2013); Nosita et al., (2020) and Quang et al., (2023), who found no evidence that investors' age or experience influenced their investment choices.

Financial resource allocation tends to change depending on female investors' economic condition, and it leads to differences in their capacity to take risks and to diversify assets. Accordingly, Hypothesis 3 (H3) was herein confirmed, since there was higher participation of classes A and B1 in the volume of invested assets. Table 4 shows economic class influence on the composition of investment portfolios.

Table 4 – Investments' distribution based on economic class

Economic Class	Savings accounts	Private bonds	Investment funds	Private pension plans	Govern-ment bonds	Stocks	Digital curencies	Foreign curencies
A	100	50	39	41	13	18	5	9
B1	136	56	62	39	25	23	7	8
B2	325	65	63	53	36	40	16	4
C1	254	42	33	20	22	5	13	5
C2/DE	229	15	12	9	11	6	8	4

Source: Elaborated by the authors

Classes A and B1 presented a more diversified distribution of investments - most female investors had more than one asset in their portfolio. Classes B2, C1 and C2/D/E were more dependent on investing in savings accounts. This finding suggested that lower-income classes tend to seek financial security and stability by adopting investments in savings accounts as capital preservation means, with little proclivity to explore higher-risk assets. These findings were in compliance with the literature, according to which, income is one of the main factors determining investors' decision to diversify portfolios, as well as their risk aversion (Fajardo & Blanco, 2010; Nosita et al., 2020; Quang et al., 2023; Doan & Yeasmin, 2024).

Family background can influence women's investment decisions, mainly their ability to accumulate resources, as well as their preference for some asset types and their financial priorities. Women with a large number of children tend to face higher family expenses, and it can reduce the amount of resources available for investment purposes. Furthermore, they overall choose to make low-risk investments to help preserving their assets and to perform long-term financial planning, with emphasis on issues like their children's education. Married women or women with partners often present greater financial security resulting from the division of responsibilities and from likely shared income, and it allows them to allocate more resources for investment purposes. Results in the current study have confirmed Hypothesis 4 (H4) and showed that family context, which includes both marital status and number of children, is a factor capable of influencing investment decisions.

Women with fewer children show higher participation in financial investments, and this participation decreases as the number of children increases. Women with large number of children tend to invest less in higher-risk assets like stocks; they mostly prefer conservative and liquid investments. Married women make higher volume of investments than other groups and they show higher proclivity to take risks. On the other hand, divorced or widowed women invest less in risky assets, and it can lead to higher financial instability. Findings by Nosita et al. (2020) corroborate the current results. According to the aforementioned authors, women with large number of children, who live under unstable conditions with regards to marital status, tend to adopt the most conservative strategies, as well as to prioritize capital preservation and low-risk assets.

Doan and Yeasmin (2024), in their turn, did not identify marital status coefficient as significant factor for financial risk tolerance; they considered this association inconclusive. Although studies have suggested that couples can be abler to create savings and to take risks (Blau & Kahn, 2017; Nosita et al., 2020), single people can present higher financial risk-tolerance level because they take fewer responsibilities.

In addition to demographic factors, geographical differences can influence investment choices. Regions presenting higher GDP tend to concentrate the largest

number of women investing in financial assets, since they offer better social and economic opportunities, such as greater access to financial education, banking institutions and sophisticated investment products. Hypothesis 5 (H5) was herein confirmed - approximately 50% of the investigated female investors lived in the Southeastern region.

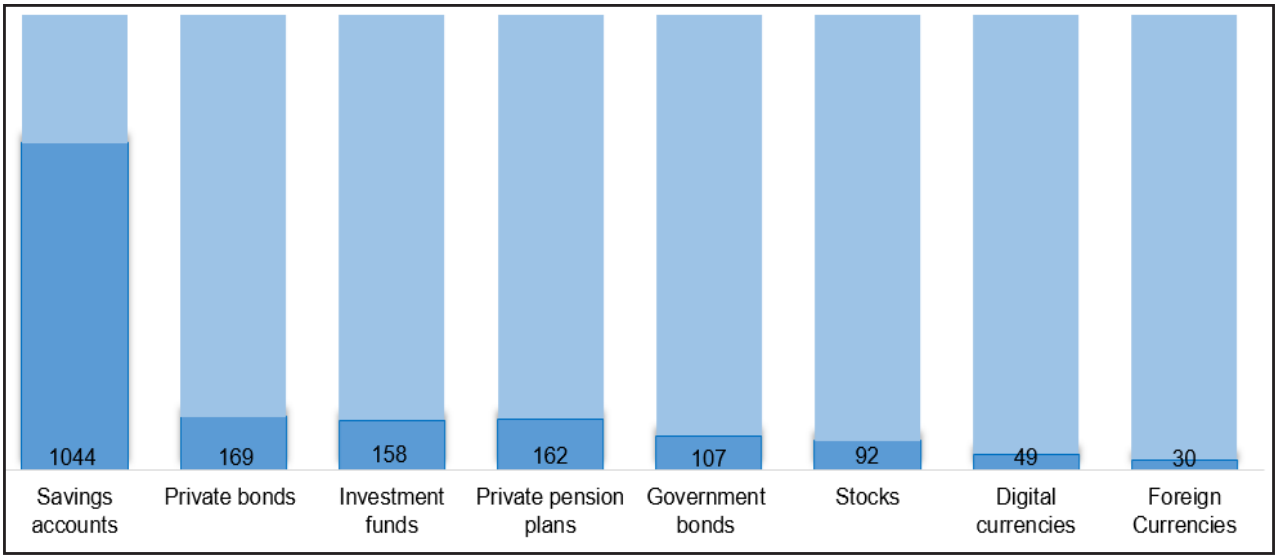
Southeastern Brazil stands out as the region with the largest number of female investors in each financial asset category, a fact that corroborates its leading position in regional GDP. It is followed by the Southern and Northeastern regions, which concentrate the largest groups of female investors. The concentration of female investors in these locations may suggest that economic development makes capital accumulation and, consequently, investment in financial assets, easier. On the other hand, regions presenting low GDP can face higher barriers to investment due to lack of opportunities, as well as to low access to financial information or cultural issues.

Studies focused on investigating the influence of geographic variables on investment decisions and on financial risk tolerance remain scarce, since the literature often emphasizes demographic factors (Bunyamin & Wahab, 2021). However, studies have pointed out that geographic areas can influence financial education promotion, as reported by Lusardi and Mitchell (2014).

Investors with conservative profile prioritize capital security and focus on minimizing associated risks, even if it results in lower returns (Cardoso et al., 2019). Financial education is still at its early years and lack of culture focused on investing in financial assets tends to favor the choice for the most conservative investments in Brazil (Zanotelli, 2021). The lack of a consolidated culture of investing in more sophisticated financial assets reinforces this conservative tendency, resulting in a preference for products such as savings accounts and fixed-income securities. The findings of this research corroborate hypothesis 6 (H6), by demonstrating that savings remained the most common investment among the investors analyzed. This result reinforces the risk aversion behavior prevalent in the country, especially among certain investor profiles, which can be attributed to factors such as low dissemination of knowledge about investments and the historical preference for

assets characterized as safe for investment. Hypothesis 6 (H6) was herein confirmed, since savings accounts were the most common investment among female investors. Figure 2 shows investments made in each financial asset.

Figure 2 – Financial assets chosen for investment purposes



Source: Elaborated by the authors

Figure 2 shows that most female investors prefer to allocate their resources to conservative options. The prevalence of savings accounts (1,044 investors) reinforces this conclusion. Savings accounts, which are one of the most traditional investments in Brazil, are acknowledged for their security and liquidity, despite offering low profitability in comparison to other investment alternatives (Cardoso et al., 2019).

Less than one third of female investors had more than one invested asset. This factor has evidenced their low diversification and preference for simple investments. Other conservative assets, such as private bonds (169 investors), investment funds (158 investors) and private pension plans (162 investors), although in smaller numbers than savings accounts, confirmed these female investors' conservatism and preference for lower-risk options. These findings are consistent with those found by Cardoso et al. (2019), Paiva et al. (2020) and Zanotelli (2021).

Assets requiring higher risk tolerance, such as stocks (92 investors), digital currencies (49 investors) and foreign currencies (30 investors), recorded low adhesion. This finding pointed out that few female investors were willing to take significant risks in pursuit of higher returns.

4.2 Profile analysis applied to Brazilian female investors

Indicators used to define the segmentation of female investors, such as Silhouette Score (0.337), Davies-Bouldin Index (1.543) and Calinski-Harabasz Index (451.75), were herein adopted to analyze clusters' formation. Based on this analysis, the formation of 3-5 clusters provided balance between internal homogeneity and distinction between groups. Thus, option was made to create three clusters in order to optimize their generalizations, based on the K-Means algorithm. Data were grouped based on the following features: economic class, region, average age, average number of children and education.

It was possible identifying the following sociodemographic patterns shaping female investors' profiles based on details recorded for the clusters. Cluster 1, with 528 observations, was called Experienced Female Investors. This group was formed by the most experienced investors (mean age 45 years), who presented family stability, with two children, on average. They mostly belonged to economic class A and lived in Southeastern Brazil. This profile suggests history of financial and family stability.

Cluster 2, with 522 observations, was identified as Young Female Investors. This group was formed by younger female investors (mean age 35 years) with at least one child (no more than two). They belonged to economic class B and lived in Southern Brazil. This profile suggests focus on building wealth and potential financial growth.

Cluster 3, with 403 observations, was classified as Beginner Female Investors. This group was formed by female investors with mean age 28 years and lower schooling. They belonged to economic class C and lived in Northeastern Brazil. The lower mean number of children and the age profile of this group suggested that these investors were at the early stage of their financial journeys and that they were seeking investment opportunities. This

factor contrasts the regional reality, according to which, families living in this region have larger number of children than those living in other regions, on average.

The investigated female investors shared common features, such as desire to invest, whether to maintain or improve their financial situation. All these women sought to achieve financial stability or growth, regardless of the life stage they were at.

5 FINAIL REMARKS

The current study aimed at identifying factors determining Brazilian women's investment in financial assets, as well as at featuring their profiles as female investors. The analysis of factors enabled classifying the sample into three different investment profiles, as well as contributed to better understand female investors' features, which constitutes the main difference of this research.

The herein used data derive from the survey called "Raio X do Investidor", which was conducted by ANBIMA, from 2018 to 2023. The research sample comprised 1,453 women who made some investment in financial products during the aforementioned period. The research hypotheses, which were based on the literature on investments and personal finances, were tested through artificial intelligence tool Sider®, which made statistical calculations and data visualizations easier. The clustering technique, based on the K-Means algorithm, was applied to gather female investors into profiles with similar features.

Results observed for factors determining investments pointed out that female investors' schooling is a determining element to increase and diversify investments (H1). However, it was not possible establishing correlation between investors' age group, and their risk and return profile (H2). This finding suggests that other factors may be more decisive in this regard. Investment in financial assets is also associated with female investors' economic condition, which leads to differences in their capacity to diversify and take risks (H3). Family context (marital status and number of children) played relevant

role in investment decision-making (H4), and it suggested that higher family responsibility can limit individuals' investment capacity. Furthermore, most female investors were concentrated in Brazilian regions recording the highest GDP; approximately 50% of them lived in Southeastern Brazil (H5). Finally, the current research confirmed conservatism prevalence among female investors, a fact that can be attributed to their incipient financial education and to lack of culture focused on investing in financial assets (H6).

With respect to investment profiles, three (3) Clusters were identified. Cluster 1 was formed by the most experienced female investors, who presented greater financial and family stability. Cluster 2 comprised younger investors who focused on building wealth and on potential financial growth. Finally, Cluster 3 encompassed younger investors who were at the beginning of their financial journey and who sought investment opportunities.

The current research presented some academic contributions and managerial implications. First, it contributed to the academic debate about sociodemographic aspects in investment intentions, in compliance with previous studies (Quang et al., 2023; Nosita, et al., 2020; Doan & Yeasmin, 2024). In managerial terms, the current findings can help formulating public policies focused on financial education to help developing a more inclusive capital market and increasing female participation in it. In addition, they can generate insights about the features (profiles) of their target audience for managers in financial institutions operating in the financial market. However, it is important to mention that the use of secondary data obtained through a survey may not fully reflect the diversity of profiles and motivations of Brazilian female investors, which can be considered a limitation of the research.

Future studies should deepen the use of data from Raio X do Investidor survey, which was conducted by ANBIMA, in order to help developing a structural model capable of measuring the impact of variables, such as schooling, age, economic class and family context, on Brazilian women's investment intention, since these variables may play different roles in the investment decision and profile formation of these female investors.

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Authors

1 – Flávia Mônaco Vieira

Institution: Hospital de Clínicas de Porto Alegre – Porto Alegre, Rio Grande do Sul, Brazil

Master's Degree in Environmental Impact Assessment from La Salle

Orcid: https://orcid.org/0000-0003-0851-6506

E-mail: flaviamonaco@yahoo.com.br

2 – Vanessa Martins Pires

Institution: Universidade Federal do Rio Grande – Rio Grande, Rio Grande do Sul, Brazil

Doctor in Administration from UNISINOS, Master's Degree in Accounting from UNISINOS, Graduated in Administration from PUCRS and in Accounting from UNISINOS

Orcid: https://orcid.org/0000-0002-1220-2254

E-mail: vanessapires2502@gmail.com

3 – Luis Carlos Schneider

Institution: Universidade Federal do Rio Grande – Rio Grande, Rio Grande do Sul, Brazil

PhD in in Administration (UNISINOS)

Orcid: https://orcid.org/0000-0003-4099-7311

E-mail: luisschneider@furg.br

4 – Guilherme Costa Wiedenhöft

Institution: Universidade Federal do Rio Grande – Rio Grande, Rio Grande do Sul, Brazil

Doctor, Master's and Bachelor degree in Administration (PUCRS)

Orcid: https://orcid.org/0000-0003-2426-4396

E-mail: wiedenhoft@gmail.com

Contribution of authors

Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]
1. Definition of research problem	√	√	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√	√	
3. Development of theoretical propositions (theoretical work)	√	√	√	
4. Theoretical foundation / Literature review	√	√	√	
5. Definition of methodological procedures	√	√		√
6. Data collection	√			
7. Statistical analysis	√	√		√
8. Analysis and interpretation of data	√	√	√	√
9. Critical revision of the manuscript	√	√	√	√
10. Manuscript writing	√	√	√	√
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The authors have stated that there is no conflict of interest.

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