


Article

Consumer Segmentation of Green Financial Products Based on Sociodemographic Characteristics

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Abstract: Many green financial products currently have a low financial return level; even so, these products are spreading dynamically. In our study, we explored Hungarian green financial investment preferences and separated consumers of green financial products into homogeneous groups, which were characterized on the basis of sociodemographic characteristics. In the case of investments with a similar risk, using the sample we examined we proved that there is a homogenous group (C2) in Hungary which prefers green aspects to higher financial returns in the course of its investment decisions. We separated a group (C3) which can be considered influenceable, and we concluded that, with the application of appropriate marketing activities, this group could be a potential target consumers for national banks and traders of green financial products in the future. Young females are the main target consumers for green financial products in Hungary, and they are the largest majority of the C2 group, for whom financial rationality takes a backseat to green aspects. Based on the results of our study, national banks and traders of financial products can create a more accurate and effective marketing strategy for their products on the Hungarian market.



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1. Introduction

Analysis of the relationship and attitude between investment assets and the consumers of investment instruments have become of prime importance. The reason for this is the dynamic change in the financial markets, the interest rate environment, and the expectations of investors. Nowadays, many innovations and new products are appearing on the market of investment assets, which try to adapt to the macro conditions and market needs. These innovations and new products are fundamentally changing the investment markets and the demand for different financial assets. In addition to cryptocurrencies and crypto funds as investment assets, green financial products may be one of the most decisive investment assets in the future (Goodella et al. 2022). Green financial products are the emergence of sustainability as a global trend in the field of investment assets. When examining the popularity and spread of green financial products, several other contexts should be taken into account in addition to financial returns. The main such context is a lower return compared to financial assets with the same risk. Economic and investor rationality means the optimization of risk and financial return, so that the risk is minimal, and the financial return is maximal. Such economically rational investor behavior can prioritize sustainability criteria only if it lowers the expectation of the maximum financial return level and incorporates green aspects into its decision criteria. It should be added that there are and may be cases when green financial assets have the highest return among assets with the same risk, but this is very rare.

In recent years, several studies have highlighted that the green image and the green brand are a very important and determining factor in purchasing decisions. In many

industries, consideration of sustainability criteria is no longer a competitive advantage, but a competitive criterion. Recognizing this, most organizations introduce new green and sustainable products to the market that meet consumer expectations. On the other hand, consumers' sustainability expectations are directed not only at products, but also at company operations. It is clear that green products that are linked to sustainability or come from sustainable sources have value for consumers. As an increasingly popular field, greenwashing is becoming more and more popular not only in business practice, but also in academic research (de Freitas Netto et al. 2020). A considerable amount of research has proven that there are social groups for whom sustainability is the main criterion for their purchases.

Investment assets as consumer products are also popular and promise to be even more popular in the future. Green financial products facilitate the flow of capital to areas where sustainability aspects are guaranteed. However, in order for these financial products to find their target market and to be among the most widespread assets, national banks and traders can decide on two different strategies. Either the financial return level is raised to the level of securities and financial products with the same risk, or the other option is to find or build up the target customers that is most sensitive to these areas and provides added value for the consumers of the target customers by fulfilling the sustainability aspects.

In Central and Eastern Europe, many financial institutions have created green investment products. The primary target consumer of these investment products are retail investors of the given country. The goal of financial institutions is to allocate capital in the direction of sustainable investments by establishing green financial products. Hungary serves as an excellent example of the capital allocation process for sustainable investments. In 2019, the Hungarian National Bank (Jókuthy 2020) created its first green government bond, for which there was a high demand. Consumers of these green financial products have not yet been analyzed, so the factors influencing the selection of products have not been explored. At the same time, the definition of potential consumer segments and the exploration of consumer preferences constitute a bottleneck in relation to the properties of green financial products to be issued in the future. Due to ongoing sales and data protection considerations (GDPR—General Data Protection Regulation), even today a full analysis of actual consumers has not been carried out. Therefore, our research goal was to explore the attitudes of Hungarian consumers in the case of green financial products, and to find an answer to the question of whether there is a consumer group in Hungary that prefers green financial products, even with a lower level of financial return and the same risk. Our goal was to identify and characterize homogeneous groups along which national banks and traders of green financial products can more effectively segment their target customers and apply more effective marketing strategies during sales.

We formulated the following three hypotheses for our research:

Hypothesis 1 (H1). *A separated group of consumers can be defined in Hungary, for whom sustainability and green aspects are of higher value in their investment decisions than financial rationality.*

Hypothesis 2 (H2). *Among Hungarian retail investors, the group of consumers who can be influenced in financial investment decisions appears as a separate group, which can be considered as financially not conscious consumers.*

Hypothesis 3 (H3). *Hungarian females belonging to the younger age group prefer sustainable—green financial products to a greater extent than men for their financial investments.*

In our research, we used a questionnaire-based quantitative survey, during which the subjects of the sample were consumers living in Hungary. In our research, we analyzed questionnaires filled out by 519 consumers. The methods used were factor analysis, cluster analysis and crosstabs analysis.

2. Literature Review

The ecological crisis of recent years and the resource dilemma, global warming, resource depletion and environmental degradation are challenges that need to be addressed (Chiu and Lee 2020; Hao et al. 2018; Wang et al. 2022; Wen et al. 2022). Ecological and environmental negative effects have a significant influence on economic growth and can be considered bottleneck factors in economic development (Luo and Wu 2016; Raberto et al. 2019). In order to achieve sustainable development goals, many countries have started to develop their own green economy, which means the simultaneous coordination of the development of the economy, resources and ecological environment (Lee and Lee 2022).

The financial system plays a vital role in economic development through the efficient management and distribution of capital. The financial sector must integrate sustainable development aspects (Kopinina 2015), which means integrating three fundamental aspects: environmental, social and governance (ESG) (Hansmann et al. 2012). ESG aspects are considered the three pillars of sustainability (Przychodzen et al. 2016), and their role in investment decisions shows a continuous increase worldwide (Sultana et al. 2018). It is particularly important to recognize the connection between finance and sustainability due to its role in capital markets, the development of ecological systems, and the support of social aspects (Carolina Rezende de Carvalho Ferrei et al. 2016). In order to achieve sustainable economic development, greening the financial system is therefore the first and essential step. The idea of making the financial system more environmentally friendly globally was born at the 2016 G20 summit. A year later, in 2017, the Network for Greening the Financial System (NGFS) was established by central banks and supervisory bodies, with the aim of greening the financial system. In 2020, NGFS already had 66 members and 12 observers, which contributed to the implementation of the necessary steps to achieve sustainable economic goals. In order to make the financial system more environmentally friendly, the focus was on green financing assets and activities (Gilchrist et al. 2021).

In the international literature, there is no generally valid definition of the concept of green financing. Among the definitions, the definition formulated by the IFC should be highlighted, according to which green finance is an approach that seeks to combine the financial and business worlds with environmental protection goals. It aims to create a financing system that finances investments with environmental benefits (Berrou et al. 2019). According to another definition, green finance is a type of financial activity to promote the better development of the environment, improve the utilization rate of resources and deal with climate change (Ng 2018). The Paris Agreement distinguishes between green and sustainable financing when defining green financing. In the Paris Agreement, green financing includes financial activities and financial assets that support the achievement of sustainable development goals related to the environment. In contrast, sustainable financing includes all financial activities and financial assets mobilized to achieve sustainable development goals (Berrou et al. 2019).

According to Falcone and Sica (2019), in contrast to traditional financial activities, green finance values ecological and environmental aspects, attaches greater importance to environmental protection and sustainable development of the environment.

Among the many conceptual definitions, there is agreement that green finance can help to balance the ecological environment and economic development (Zhou and Li 2019).

Over the past few years, the consumer popularity of green finance has continuously increased, which has encouraged the actors of the financial sector to structured product innovation processes (Wang and Zhi 2016). With the help of innovative financial assets such as green bonds, green stocks, green equity, green derivatives, etc., consumers can make investments representing green aspects. Actors of the financial sector act as mediators by providing various financial services to companies prioritizing green aspects. The financial sector contributes to the implementation of projects with environmental protection, clean energy and other environmental benefits, thereby creating a sustainable economy. In addition to consumers, financial institutions and companies, governments also influence the spread of the popularity of green financing. Governments need to create a public

environment that can adequately support green aspects for sustainable economic growth. Governmental support must appear in the education of consumers, in the financial support of enterprises representing environmental aspects and in the promotion of the consumption of green financial assets. Sustainable development can only be realized if the actors' interests are reconciled and win-win situations are created. Therefore, green finance should support sustainable economic growth and the improvement of the ecological environment while taking into account the different goals of the actors (Cui et al. 2020).

2.1. Green Consumption

The environmental aspect of sustainability is widespread in consumption patterns, and the consumption of green products has become a defining aspect at the international level. Green consumption includes, among other things, energy conservation, renewable energy, recycling and proper waste management of products (Ghvanidze et al. 2016). It is a complex consumption behavior where consumers incorporate their environmental considerations into their consumption behavior in order to take responsibility for the ecosystem. New purchase patterns are emerging in which customers evaluate the sustainability aspects of companies and brands in addition to traditional purchase criteria (Lozano et al. 2006). In the case of the financial sector, consumer behavior is primarily expressed in investment decisions.

The investment decision includes the selection of financial assets from a wide range of available options. According to traditional economic theory, consumers behave rationally, which means that they make objective decisions based on their knowledge, experience and expectations, and relates to the behavioral paradigm of financial decision-making (behavioral finance) (Bikas et al. 2013). According to Statman (2014), in addition to traditional financial needs, other aspects and needs of investors can also play a role in making decisions. For some investors, not only risk and return optimization is important, but also individual—social values and non-material benefit play a role in making decisions. Consumers' investment decisions were previously characterized by three factors: risk, liquidity and return. However, the factors influencing consumer investment decisions have changed, utilitarian (high return and low risk), expressive (values, taste and status) and emotional (feeling) factors have been added. It is necessary to make a compromise between the influencing factors, as there are investors who are willing to pay a higher price for financial assets with a lower return, but with a higher value in terms of more expressive and emotional factors (Statman 2014; Bellofatto et al. 2018). As a result of the changes, the phenomenal square approach has become increasingly popular in the examination of investment decisions, which, in addition to risk, liquidity, and return, due to the appreciation of the impact of expressive and emotional factors, also means the evaluation of sustainability aspects (Von Wallis and Klein 2014). As a result, investment decisions have become more complex and heterogeneous. Investors preferring different aspects use different strategies in choosing financial products. One group of investors takes into account the expected financial result of the investment and makes their investment decision based on this, while another group of investors takes sustainability aspects into account in their investment decision in addition to the financial results (Sultana et al. 2018). This new consumer behavior results in investor behavior that takes environmental, social and governance (ESG) aspects (Figure 1) into account in addition to the traditional criteria of profitability.

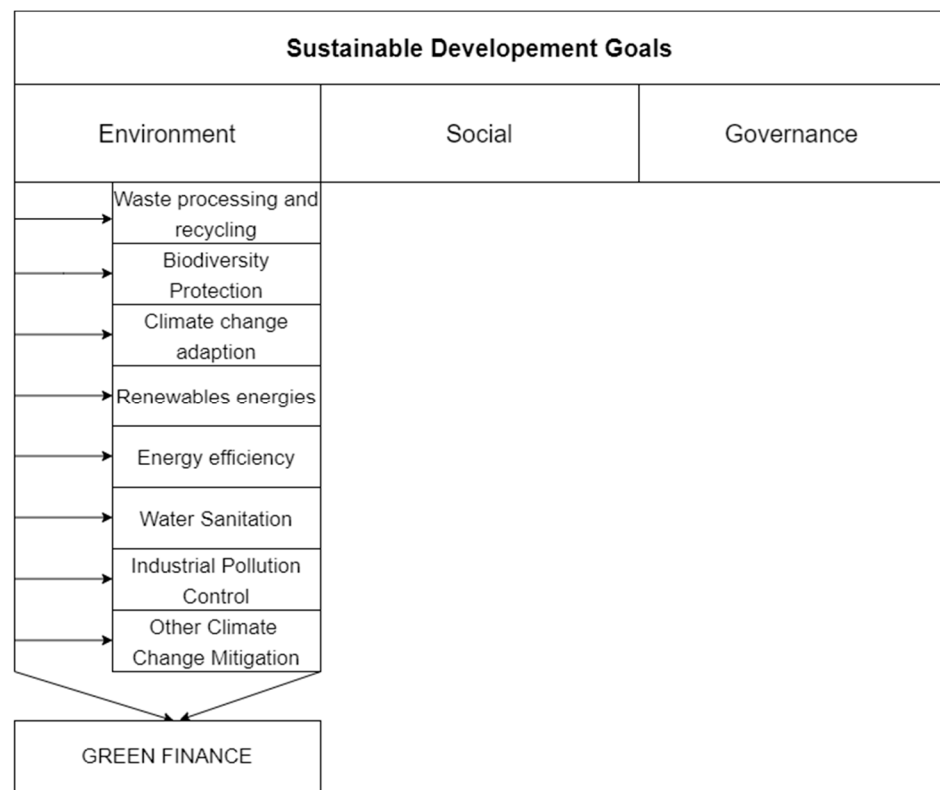


Figure 1. Green finance with regard to sustainable development goals. Source: based on [Saleem and Khan \(2021\)](#).

The three aspects of ESG:

- Environment: climate change, greenhouse gas emissions, air pollution, resource efficiency, biodiversity, toxic emissions and waste and clean technology;
- Social: human rights, labor management, health and safety, human diversity, human capital development, relationship with the local community and product responsibility;
- Governance: corporate governance, compliance, corruption, board diversity, ownership, executive pay, tax transparency and risk management ([Nakajima 2021](#)).

ESG investments play a social role and can also be defined as socially responsible investments (SRI). In addition to the aspect of financial return, the goal of ESG investment is compliance with various social norms ([Nakajima 2021](#)). An important aspect in the analysis of the desire to comply with social norms and consumer decision-making is the analysis of personal and sociodemographic factors. The personal and sociodemographic variables influencing investment decisions are summarized in Table 1.

2.2. Sociodemographic Characteristics

Non-financial aspects in investment decisions, such as environmental, social and governance (ESG) aspects, have already been the subject of research ([Sreekumar and Ladha 2014](#); [Dorfleitner and Utz 2014](#)); however, limited research has been carried out to examine the relationship between retail investors and green financial investments ([Carolina Rezende de Carvalho Ferrei et al. 2016](#); [Zhu 2017](#)). However, the attitude of retail investors towards environmental sustainability is crucial from the point of view of the connectivity of financial and sustainability aspects, as well as the stability of a sustainable economy ([Sultana et al. 2018](#)).

Table 1. The personal and sociodemographic variables influencing investment decisions.

Variables	Sources
Gender	(Escrig-Olmedo et al. 2012; Pérez-Gladish et al. 2012; Rossi et al. 2019; Bauer and Smeets 2015; Bauer et al. 2021; Jonwall et al. 2022)
Year	(Bauer et al. 2021; Riedl and Smeets 2017; Jansson et al. 2014; Jonwall et al. 2022)
Education	(Junkus and Berry 2010; Jonwall et al. 2022)
Income	(Halbritter and Dorfleitner 2015; Jonwall et al. 2022)
Information	(Bourghelle et al. 2009; van Duuren et al. 2015; Amel-Zadeh and Serafeim 2018; Khemir et al. 2019; Chen and Yang 2020)
Risk	(Pérez-Gladish et al. 2012; Ashwin Kumar et al. 2016; Cornell 2020; Maiti 2020)

Sustainability aspects appear in investment decisions, in addition to traditional financial concepts, in which the expected return and consideration of risk are the most important. A substantial amount of the international literature points to the correlations between the sociodemographic characteristics of retail investors and sustainable investment decisions (Nilsson 2009; Cheah et al. 2011; Dorfleitner and Utz 2014). Sociodemographic factors such as gender, age, education level and income status are considered influencing factors for sustainable investment decisions. These factors are often used to understand and measure the behavior of traditional investors (Barber and Odean 2001; Graham and Kumar 2006). Studies on the characteristics of consumers committed to sustainability (Berkowitz and Lutterman 1968; Anderson and Cunningham 1972) drew attention to the fact that female, young, highly educated and medium-high income consumers are more likely to consider sustainability factors in their decisions. Furthermore, several studies compared the behavior of social investors and traditional investors using sociodemographic factors (McLachlan and Gardner 2004; Rosen et al. 1991). In their research, Tippet and Leung (2001) highlighted that, unlike traditional investors, ethical investors in Australia are typically younger, educated females who diversify their portfolios less than traditional investors.

As with Australian consumers, among the sustainable development aspects, environmental factors have an increasingly significant influence among Hungarian consumers. Consumers' willingness to consume green products shows a growing trend (Kuslits and Kocsis 2019), which is also reflected in the population's investment decisions. Based on these research results, we formulated our third hypothesis (H3).

2.3. The Role of Information

The importance of information in retail investment choices is being recognized, with a particular emphasis on its crucial role in fostering responsible investment decisions. In the case of green financial investments, from the Barreda-Tarrazona et al. (2011) study, it can be stated that, in addition to profitability criteria and portfolio diversification, the awareness of individual investors is also a clearly influencing factor. Financial advisors, social preferences and individual values play a decisive role in the gathering of information (Diouf et al. 2014). The majority of retail consumers are interested in green financial products, but this alone is not enough to make an investment decision. In addition to the provision of information, various incentives (financial support, marketing activities, communication, a certificate indicating the sustainability evaluation of a company project, brand, etc.) influence consumers' decisions (Young et al. 2010). Based on these research results, we formulated our second hypothesis (H2).

2.4. Risk Taking

In retail financial decisions, consumer goal orientation is decisive. Goal orientation during the choice of financial products is influenced by the hope of future returns, mar-

keting activity and self-realization factors (Higgins 1997). These consumers are called promotion-focused consumers, who typically choose the investment opportunities with higher risks when considering the options due to influencing factors (Pham and Avnet 2004). Promotion-focused consumers prefer high-risk and high-return investment opportunities, so they can be characterized as risk takers investors who are guided by financial returns in their investment decisions. At the same time, the feeling of financial security and the desire for protection lead consumers to protect themselves from financial situations considered risky. This group of consumers is called prevention-focused consumers. The feeling of security and the desire for protection result in greater risk avoidance (Pham and Avnet 2004). Prevention-focused consumers prefer low-risk and low-return investment opportunities, so they can be characterized as risk-averse investors who do not consider financial return as a primary consideration in their investment decision (Zhou and Pham 2004). These investors are influenced, among other things, by the self-realization factor; they prefer financial products that have some added value. Green financial products can also be defined as such financial assets. Based on these research results, we formulated our first hypothesis (H1).

3. Materials and Methods

In Central and Eastern Europe, the appearance of green financial products appeared in recent years and started to become popular. Hungary, the Czech Republic and Poland are the countries that can serve as a suitable example of the high demand for green financial products and thus for sustainability in this region as well. In the last ten years, Hungary has been one of the top-three largest issuers of green financial products in the region. In the region, the ratio of the value of issued green government bonds to GDP reached the second highest value in Hungary (IFC 2020). The significant increase in demand for green financial products in recent years has resulted from changes in the needs of the retail investors. In our study, we examine the factors influencing the consumption of financial products by Hungarian retail investors. The target group of our study is Hungarian retail investors who intend to purchase Hungarian financial products for investment purposes. In Hungary, the primary consumers of green financial products are retail investors, and the largest issuer is the Hungarian National Bank. As a result, examining the socio-demographic characteristics of Hungarian retail investors greatly facilitates the understanding of current consumer attitudes and the development of future products.

Our primary goal is to assess to what extent the appearance of green aspects is an influencing factor in the investment decisions of Hungarian retail consumers. Our goal, the survey of the opinions of Hungarian retail investors, was justified, among other things, by the fact that neither the Hungarian nor the international literature paid enough attention to the appearance of green aspects in the financial decisions of Hungarian retail investors. For the empirical research, we used an online survey aimed at the investment decision of Hungarian consumers. Before finalizing the questionnaire, we tested it on a sample of 25 people. Based on the results of the testing, the questionnaire was fine tuned. It was possible to fill out the finalized questionnaire between July and September 2022. We collected data from 519 consumers using a questionnaire sampling method. The sample is not representative, but it is suitable for drawing conclusions, and it clearly defines future research directions and consumer trends. The questionnaire contained a total of 1 (conditional question that must be positively met in order to participate in the research) + 29 questions, which were seven-point Likert scale questions. The structure of the questionnaire can be divided into three parts. In the first part of the questionnaire, we asked the respondents questions about their main sociodemographic characteristics, then in the second part of the questionnaire, we asked questions about conscious consumption and sustainability, and in the third part of the questionnaire, we asked about the factors influencing the selection of financial products. After collecting the data, recording the data and coding the data, the statistical analysis was performed using the IBM SPSS software. In the case of attitude and sociodemographic research, among the multivariate statistical

methods, factor and cluster analysis are the two most frequently used methods. The reason for this is that the subjects of the study can be clearly segmented using these methods.

3.1. Factor Analysis

The data was segmented using factor analysis. Principal component factor analysis and varimax rotation were used to determine the factors. In quantitative research, factor analysis and principal component analysis are the two most frequently used methods (Hotelling 1933). There are few, non-significant mathematical differences in these methods, which are not detailed in this research. The choice between the two procedures is not very significant from a methodological and practical point of view. Velicer and Jackson (1990), after reviewing several different types of applied component and factor analysis studies, concluded that differences between the two procedures are rare when the number of latent constructs is approximately equal.

The purpose of factor analysis is dimensionality reduction. The primary goal of these methods is to examine the correlations between (p) observed variables and to summarize these correlations in a smaller number (m) of new variables. This new variable is a latent construct where ($m < p$) (Velicer and Jackson 1990). The values of (m) as a new variable can be used to replace the original (p) observed scores.

A factor cannot be observed; instead, it can be characterized as a kind of latent variable that can explain the correlations of the observed data or only a certain part of the data. Common factors turn out to be latent variables that are responsible for the variability of the variable in at least two of the variables. The individual factors illustrate the measurement error and variability of the different observed variables, which have no common point with the other variables. The main purpose of factor analysis is therefore to estimate the pattern of synergistic relationships between common factors and different observed variables. The item reliability of each factor was examined using Cronbach's α . This is necessary to confirm the internal consistency of the metrics. A scale is considered highly reliable if its Cronbach's α is greater than 0.70 and should be removed if it is lower than 0.35 (Cronbach 1951). In our study, Cronbach's α tests (Table 2) showed that the reliability of the measurement scales was acceptable.

In factor analysis, the factors represent the weighted sum of the observed variables, where the weights obtained during the calculation depend on the analysis. After creating the different factors, it is possible to calculate the correlations between these factors and the different observed variables. Variables that show a high correlation with a given factor are highly linearly related to that factor and can be interpreted as part of the same underlying common source. The amount of variance explained by the factors obtained during the analysis depends on the extent to which the determined factors properly characterize the originally observed data. The result of the factor analysis can be several numerical variables, each of which carries a different and calculated factor score. These scores can be used for further analysis, which can be, for example, the identification of variables related to the factors (Velicer and Jackson 1990).

Table 2. Factor analysis of retail consumption of green financial products.

Factors and Items	Factor Loading	Eigenvalue	Cumulative Percent of Variance	Cronbach's α
Greens, the financial return matters less		2.97	14.356	0.739
How important is sustainability to you?	0.768			
In the case of investments with the same risk, my decision is influenced by the sustainability criteria, not the return.	0.760			
My goal is to increase the proportion of my investments in green financial products.	0.738			
Green financial products finance socially higher added value investments.	0.722			
Sustainable		2.288	28.654	0.701
How much more are you willing to pay for sustainably sourced products?	0.704			
To what extent do you consider yourself a responsible consumer?	0.699			
Social expectations and long-term sustainable thinking can influence me to invest in green financial products.	0.651			
My goal is to invest as much as possible in long-term, predictable, low-risk stocks and financial assets (blue-chip shares, developed country government bonds etc.).	0.651			
Diversifying my portfolio.	0.650			
Risk takers for return		2.210	42.464	0.708
For a financial product with the same risk but a higher return, I prefer the higher return.	0.795			
In the case of a green financial product with the same risk but with a higher return, I would rather choose the green financial product than another financial product.	0.743			
In my investment portfolio, stocks and financial assets with higher risk represent a significant percentage (government bonds of risky developing countries, start-up investments, cryptocurrencies, etc.).	0.740			
Cryptocurrencies are the investment option with the highest return in the future, which is why I prefer to invest in cryptocurrencies.	0.636			
Influenceable		1.700	53.088	0.596
My family and environment can influence me to invest in green financial product.	0.786			
How influenceable do you consider yourself to be in making financial investment decisions?	0.749			
I prefer to keep my money in a sight deposit for future opportunities.	0.650			

3.2. Cluster Analysis

The consumers were then grouped into clusters based on their character factor scores obtained in the K-means cluster analysis. In studies dealing with attitude and consumer preference studies, in addition to factor analysis, the other most common method is cluster analysis. The underlying logic of cluster analysis is also dimensionality reduction (condensing the information of several variables into a few variables), but it does so in a completely different way than factor analysis. Cluster analysis techniques reduce the number of observed data into a smaller number of profiles (clusters) by examining the

interactions between the data. Cluster analysis is, therefore, an exploratory technique, which is used to categorize data into a small number of clusters based on their scores along the observed variables.

Basically, five separate steps can be identified during cluster analysis (Hofstetter et al. 2014):

1. Selection of the sample of variables to be included in the given cluster;
2. Defining the set of variables used to measure the individuals in the selected sample;
3. Calculation of identities between variables;
4. Using the cluster analysis method to create clusters of identical or similar data;
5. Interpretation and characterization of the obtained results.

The result of steps one and two of the cluster analysis is a data matrix consisting of (n) variables (illustrated in rows), which can be measured on variable (p) (columns of the matrix). The dimensions of the space required for cluster analysis are determined by the number of variables used to describe the data. (For example, in the case of eight variables, the data is displayed as an eight-dimensional space.) In the third step of the cluster analysis, the spatial coordinates must be examined. This measure of dissimilarity, like a distance measure, expresses relationships between data, interpreted in terms of a set of predefined variables (Hofstetter et al. 2014). In step four, a clustering method is used to create clusters of similar variables along this $n \times n$ matrix. Several different families of methods can be used, each of which in many cases represents a completely different view of the mathematical methods of creating clusters. The choice between clustering methods is significantly influenced by the choice of classification, the different measurement levels of the variables and the size of the sample and the preference of disciplines. In the field of social science, the most popular clustering methods are the hierarchical methodology and the K-means procedure (Hofstetter et al. 2014). As the last step of the cluster analysis, the interpretation of the results is one of the most important steps. The result of cluster analysis is not just a set of clusters. Understanding and interpreting the obtained results and putting them into context is also critical. Several different criteria are available in the literature for evaluating the fit of cluster models. The most commonly used are the likelihood ratio chi-square statistic L2, the Akaike information criterion (Akaike 1998) and the Bayesian information criterion (Schwarz 1978).

In each case, the result of the cluster analysis is a small group of variables that are highly similar to each other and that differ in a certain respect from variables of other clusters (Hofstetter et al. 2014).

3.3. Crosstabs Analysis

In our research, we used crosstabs analysis, which is one of the most frequently used multivariate methods. This allows the examination of two or more variables and their distribution. The crosstabs analysis was used to characterize the distinct clusters. During the analysis, we performed a correlation analysis based on the sociodemographic characteristics of the clusters and consumers. During the correlation test, the significance level is 0.05, as this is a generally accepted value in social science research. If the chi-square test shows a correlation between the examined variables, then the strength of this correlation must also be examined.

4. Results

4.1. Sample

The data was collected from 519 people. Among those who completed the questionnaire, 488 people answered all questions, which means a response rate of 94.0%. In the sample, 55.5% were female respondents and 44.5% were male respondents. The share of respondents under the age of 38 was 63.5%, and the share of respondents over 38 was 36.5%. Regarding their income status, the majority of respondents (68.9%) have a net income between HUF 180,000 and HUF 480,000. Most of them have financial goals (84.6%). Although only 42.2% regularly set long- and short-term financial goals. A total of 77.5% of the respondents usually seek information about financial topics, but it should be noted

that 29.5% of the respondents gather information about financial topics before making any investment decision. The respondents are potential consumers of various financial products, and their behavioral intentions were valuable for the study.

4.2. Segmentation

In our study, we examine the factors influencing the consumption of financial products by retail investors, segmenting their sociodemographic characteristics and investment decisions in order to define different character groups.

The respondents' sociodemographic characteristics and the factors influencing investment decisions were submitted to factor analysis with a varimax rotation. Using an eigenvalue greater than 1 as one of the main selection criteria, four factors emerged. These factors accounted for 53.1% of the variance and the factor loading for all items was greater than 0.6. Cronbach α coefficients were calculated to check the reliability of the four factors. The results showed that the Cronbach α value of three factors is greater than 0.7, which means that the reliability level of internal consistency between the items of the factors is acceptable. In the case of one factor, the value of Cronbach α is 0.6, which suggests the reliability of the consistency between the factor items. During the further analysis, we did not exclude this factor, we considered that the data support the research (Table 2).

After determining the factors, we created groups based on the factor scores. The purpose of this analysis is to form consumer segments with similar sociodemographic characteristics and making investment decisions based on the same factors. Non-hierarchical K-means cluster analysis was used to segment consumers. The use of this method is more acceptable than the hierarchical approach. After performing the K-means cluster analysis, three separated consumer segments emerged. ANOVA was used to evaluate the cluster groups. The ANOVA results showed that the three segments differed significantly in the factor score of those who preferred greens, the financial return matters less factor score ($F = 24.8$; $p < 0.01$), the three clusters differed significantly in the factor score of sustainable consumers ($F = 52.4$; $p < 0.01$). $p < 0.01$), the three clusters differed significantly in the risk takers for return factor score ($F = 158.1$; $p < 0.01$) and the three clusters differed significantly in the influenceable factor score ($F = 245.5$; $p < 0.01$). These factor scores were therefore significantly different between the three clusters (Table 3).

Table 3. Clusters points.

Factors	Cluster (Mean of Factor Scores)			F	p (sig.)
	C1 (n = 170)	C2 (n = 128)	C3 (n = 190)		
Greens, the financial return matters less	−0.29803	0.47966	−0.05648	24,783	<0.001
Sustainable	−0.49623	0.58767	0.04809	52,379	<0.001
Risk takers for return	0.85744	−0.41524	−0.48744	158,101	<0.001
Influenceable	−0.26520	−0.88680	0.83471	245,499	<0.001

Based on the analysis of the factor scores of the clusters (Figure 2) and the identification of the sociodemographic characteristics of the consumers who can be classified in each cluster, which was carried out using a crosstabs analysis (Table 4), the clusters can be characterized. The data shown in Table 4 contain the most important characteristics of each cluster.

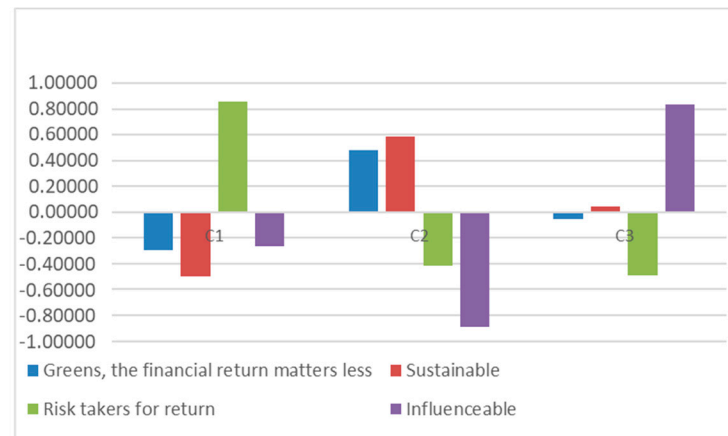


Figure 2. Clusters centroid.

Table 4. Characterization of clusters based on sociodemographic characteristics.

Items	<i>p</i> (sig.)	C1—Interested in Financial Return	C2—Sustainable Financial Investor	C3—Influenceable
Gender	<0.001	female (37.6%), male (62.4%)	female (62.5%), male (37.5%)	female (66.8%), male (33.2%)
Age	<0.05	32–38 (23.5%), 39–45 (24.1%), over 45 (21.8%)	18–24 (18.0%), 25–31 (26.6%), 32–38 (27.3%)	18–24 (12.6%), 25–31 (26.8%), 32–38 (26.8%)
Education	<0.001	Primary school (8 primary) (11.2%), Vocational school (26.5%), Higher vocational school (28.2%)	Currently studying in higher school (29.7%), Diploma (BSC/ MSC) (28.9%), Postgraduate qualification (6.3%)	Primary school (8 primary) (11.6%), Vocational school (25.8%), Higher vocational school (20.0%)
Position at work	<0.001	Manager (35.9%), Entrepreneur (20.0%)	Student (37.5%)	Student (34.2%), Employees (39.5%)
Expense per month (thousand HUF)	<0.001	381–480 (27.1%), over 481 (30.6%)	180 below (14.8%), 181–280 (26.6%), 281–380 (25.8%)	181–280 (27.4%), 281–380 (21.1%), 381–480 (27.9%)
Financial goals	<0.001	Long- and short-term financial goals (50.0%)	Long- and short-term financial goals (56.3%)	In some cases, it states financial goals (47.9%)
Gathering information on financial topics	<0.001	Daily information gathering (58.2%)	Daily information gathering (58.6%)	Information gathering is not typical (35.8%)

Cluster 1: C1—Interested in financial return

In the case of the first cluster (C1), the Risk Takers for return factor stands out. This means that the consumers belonging to this cluster had a significantly more positive evaluation of risk taking in order to obtain a financial return than the average. In the case of the other three factors, it can be seen that the factor scores are below the average. Therefore, the consumers who can be classified into the cluster rated the questions related to the factor of preferring green financial products as less important, consider conscious consumption less important, and do not consider themselves to be influenced in making their investment decisions. In this cluster (C1), the proportion of men (62.4%) is higher than the proportion of females (37.6%), and more men belonged to this cluster than to the other two clusters (48.8%). Compared to the other two clusters, the share of females in this cluster (C1) is the lowest (23.6%). This clearly illustrates that men's willingness to take risks is higher than females. The age distribution of the cluster can be considered evenly distributed. In the case of educational qualifications, it can be stated that the share of those with lower qualifications is decisive in the cluster; 65.9% of the consumers have at most primary school, vocational qualification (OKJ) or higher vocational qualification. The share of managers and entrepreneurs is 55.9%, and the share of managerial employees (50.0%) and entrepreneurs (59.6%) in this cluster is higher than in the case of the other two clusters. C1 cluster is characterized by a higher income status; 57.7% of respondents have income of

at least HUF 381,000. It is characteristic of the respondents to be included in the C1 cluster that they have long-term and short-term financial goals (50.0%). The cluster's consumers are characterized by the regular gathering of information on financial topics (58.2%), and compared to the other two clusters, this cluster is characterized by the highest level of information on financial topics on a daily basis (42.2%).

Cluster 2: C2—Sustainable financial investors

The factor scores of greens, the financial return matters less and sustainable consumers in the C2 cluster are higher than the average. The respondents rated the importance of the questions belonging to these two factors as more important than the average. Scores for risk takers for return and influenceable factors are below average. The respondents judged the questions of these two factors more negatively than average and considered it less important in making investment decisions. The majority of C2 cluster participants were female respondents (62.5%). The cluster's respondents are characterized by belonging to the younger generation; 71.9% of the consumers are between 18–38 years old. According to the level of education, the share of those with a higher education is decisive in the cluster; 64.9% of the respondents are currently studying in higher education or already have a BSC/MSc degree or a postgraduate qualification. The proportion of students (37.5%) is outstanding within the cluster. The C2 cluster is characterized by a lower income status; 67.2% of the respondents have income of no more than HUF 380,000. In the cluster, the share of those with long- and short-term financial goals (56.3%), as well as the share of daily financial information from several sources (58.6%), should be highlighted.

Cluster 3: C3—Influenceable

Consumers belonging to the C3 cluster evaluated the questions belonging to the influenceable factor with higher-than-average points. In this cluster, the respondents agreed less with the questions belonging to the risk takers for return factor, obtaining a financial return is a less important factor than the average in making investment decisions. The respondents rated the questions belonging to the factors greens, the financial return matters less factor and sustainable factor average. These two factors therefore do not have strong impact when making investment decisions. The proportion of female respondents in the cluster (66.8%) should be highlighted, and more females belonged to this cluster than to the other two clusters (46.9%). When segmenting by age, it can be stated that the younger age group is typical of the respondents of the cluster; 66.3% of the respondents are between 18–38 years old. In the case of education, the proportion of those with a lower education is decisive in the cluster; 57.4% of the respondents have at most primary school, vocational school (OKJ) or higher vocational school. Furthermore, the proportion of consumers with primary school (42.3%) and vocational schools (OKJ) (43.0%) is the highest in this cluster compared to the other two clusters. Students and employees have a proportion of 73.7%. The proportion of students (42.5%) and employees (52.4%) in the C3 cluster is the highest compared to the other two clusters. The segmentation of the cluster according to income can be considered evenly distributed. It is characteristic of the respondents of the C3 cluster that they formulate financial goals only in some cases (47.9%). Furthermore, it should be emphasized that in this cluster the largest proportion of respondents who do not typically set financial goals (66.7%). It is not typical of the consumers of the cluster that they are regularly informed about financial topics (35.8%). In this cluster, the proportion of consumers who are not typically informed about financial topics is the highest (61.8%).

5. Discussion

During our examination of the decisions made by Hungarian retail investors, a cluster of C3—Sustainable financial investors emerged as distinguishable. Regarding their sociodemographic characteristics, the results of our analysis partially align with the findings of Faradynawati and Söderberg's (2022) research. Based on our research results, it can be stated that green financial products are more likely to be preferred by female consumers who are young, female and highly educated. This is justified by the fact that females have different cognitive abilities, risk-taking attitudes and decision-making styles than

males (Faradynawati and Söderberg 2022). Female investors, who are highly educated, consider sustainability aspects as an important factor that determines long-term sustainable development; thus, they are more inclined to take them into account in their investment decisions (Hill et al. 2006). A recent survey revealed that sustainability is an increasingly important topic among students between the ages of 18 and 30 in Hungary, and this age group is willing to do much more to protect the environment (Herman 2022).

Our research reached the same result, within the C3—Sustainable financial investor cluster there is a high proportion of young students between the ages of 18 and 30. This result agrees with Hood et al. (2013), who pointed out that younger investors place more emphasis on environmentally friendly stocks. One possible explanation for the positive correlation between young generations and green financial products is that the consideration of environmental aspects is relatively new in investment decisions. As a result, the younger generations better understand the importance of sustainability and especially green aspects and are more willing to take these aspects into account in investment decisions (Wood 2022). Previous studies have shown the significant influencing role of consumers' income in consumption behavior (Halbritter and Dorfleitner 2015; Jonwall et al. 2022). In our study, in consideration the income statues, we came to the conclusion that consumers with a lower-to-middle income statues prefer green financial products. Bauer and Smeets (2015) reached a similar result in their study, according to which low-income investors show more interest in sustainability and this leads them to pay more attention to green aspects in their investment decisions. In the case of investors with higher incomes, this correlation is less noticeable, as they are less willing to sacrifice financial returns in order to meet sustainability criteria (Risi et al. 2021). According to Garg et al. (2022), the investor group with a higher income primarily chooses green financial assets in cases when green investments offer at least similar returns as traditional investments. Our results are the same as the study by Garg et al. (2022) wherein consumers with lower-to-middle income statues value sustainability aspects more and do not consider the return of the financial asset to be a strongly influencing factor. In our research, consumers belonging to the cluster of C3—Sustainable financial investors are guided by sustainability and green aspects in their investment decisions. This group chooses green financial products under long-term investment conditions. Benson and Humphrey (2008) reach a similar conclusion in their study, according to which investors who consider sustainability aspects are less sensitive to the financial performance of funds and typically invest for a longer period of time than investors who consider traditional factors (return, liquidity and risk). Consumers with higher incomes, on the other hand, consider the expected financial return as a primary influencing factor. A higher financial return goes hand in hand with taking on a higher risk, which consumers who can be classified in the C1—Interested in financial return cluster are willing to take on to a greater extent. In agreement with our results, Bassen et al. (2019) found in their study that in the case of higher risk taking, the expected financial return is the determining factor, not the environmental aspects.

However, in terms of investment performance, studies focusing on the risk-return characteristics of green investments have reached different results. According to some studies, clean technology indices finance higher returns than traditional investments, although the better performance of returns was also associated with higher risk (Ortas and Moneva 2013). Bioy (2020) points out that, in the long term, sustainable funds resulted in higher returns than traditional financial funds. According to Climent and Soriano (2011) and Reboredo et al. (2017), green investment funds produce similar returns to traditional funds, but with lower risk. Other studies have concluded that green bonds generally have low returns and high volatility, thus achieving returns with lower risk (Hachenberg and Schiereck 2018; Bachelet et al. 2019; Yousaf et al. 2022). Regarding the willingness to take risks, according to our results, consumers grouped in the C3—Sustainable financial investor cluster reject high risk taking, and green financial investments are judged as less risky investments. In making their investment decision, the financial return of the investment is not the determining factor, but the fulfillment of the sustainability aspects. As a result, it

can be stated that investors with a lower willingness to take risks are more likely to hold green financial products in their portfolio.

To increase the proportion of green financial products in the portfolio of retail investors, it is necessary to take into account consumer values, which influence consumer decisions. According to the literature, the consumer's decision is greatly influenced by compliance with social norms (Han 2018; Han and Kim 2019). In Hungary, compliance with social norms is a significantly influencing factor in consumer decisions. In order for the share of green financial products in retail portfolios to increase, it is necessary to increase the social acceptance of sustainability and environmental aspects (Machová et al. 2022). However, this alone is not enough, our results highlight that consumers show an interest in sustainable—green financial products, but this aspect is not always included in investment decisions. These consumers can be classified in the C3—Influenceable cluster, who do not have an independent preference in their investment decisions. In this cluster, compliance with social norms and the influence of environmental factors can significantly influence the making of investment decisions. Pham and Avnet (2004) stated in their study that promotion-focused (influenceable) consumers are a consumer group that prefers high-risk and high-return investment opportunities. In contrast, our results show that Hungarian retail investors, who are considered to be influenced, reject financial products with high risk and high financial returns. Consequently, for consumers belonging to the C3—Influenceable cluster, it is advisable to promote financial products that have lower risk and, in addition to the financial return, some additional added value. Recognizing this creates an opportunity for organizations issuing various financial products with added value, such as sustainable—green financial products, to implement a more effective marketing activity and communication strategy in order to increase capitalization.

6. Conclusions

In our study, we examined the investment decisions of the Hungarian consumers from the point of view of sustainability—consumption preference for green financial products. Our research results have highlighted the existence of separated consumer groups in Hungary, whose analysis results support the understanding of Hungarian green investment preferences. The distinct consumer groups were analyzed based on their sociodemographic characteristics. We set up three hypotheses.

We accepted the H1 hypothesis, as the results of the cluster analysis clearly revealed that there is a distinct group of consumers (C2—Sustainable financial investors) who prefer green financial products in their investment decisions. Economic and financial rationality and related theories assume that among investments with the same risk, the rational choice is the option with a higher financial return. Based on our analysis, a homogenous consumer group (C2—Sustainable financial investor) has been identified, for whom the financial return is not influential at the same risk, but green aspects as added value guide the making of investment decisions. We partially accept the result of our H2 hypothesis, since a cluster (C3—Influenceable) was created during the cluster analysis, which can be influenced to a large extent by consumers in making their investment decisions. This influence means that they do not have an independent preference in financial investment decisions. Consumers belonging to this cluster typically make their investment decisions by influencing environmental factors, and their independent interest in financial matters is low. For those issuing green financial products, this group can be a potential target consumers in the future, as they can be encouraged to consume with an appropriate marketing communication strategy. It should be emphasized that the consumers belonging to this group are only partially financially conscious. In some cases, financial goals are defined, which are aimed at investment decisions such as: spot deposit, purchase of short-term government bonds, etc. One of the possible reasons for this is that they do not have, or only in some cases define, long-term financial goals and investment strategies. The H3 hypothesis was confirmed by the results of the analysis. The C2—Sustainable financial investor cluster is a consumer group in which the proportion of young females is decisive.

This group considers sustainability—green aspects as a primary aspect in their investment decisions. On the other hand, the C1—Interested in financial return cluster illustrates a consumer group in which financial rationality is the determining factor. The proportion of males in this cluster is outstanding. From this, we conclude that young Hungarian females prefer buying green financial products to a greater extent than males. In Hungarian families, investment decisions are most often made by males. Consequently, in order to increase the share of green financial products in the portfolio of residential consumers, it may be advisable for issuers to launch marketing campaigns optimized for males.

An extensive attitude study can be formulated as a further research opportunity, which, in addition to sociodemographic factors, reveals latent factors that influence the decisions of Hungarian retail investors. In addition to these, it is worth researching the cause-and-effect relationships between Hungarian culture and the consumption of green financial products. After the expansion of the present research, the level of green financial conscious of Hungarian retail consumers can be evaluated and put into context through an international comparative analysis.

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