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The Effect of Family Dynamics and Socio-Economic Factors on Savings Formation in Agriculture

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ABSTRACT
This study investigated the influence of gender on the savings behavior of farmers living in rural households and identified the factors that influence savings behavior by gender. For this purpose, a survey was conducted among 268 agricultural households in Konya province of Türkiye. A non-hierarchical cluster analysis was conducted to explain differences in the composition of savings between male and female households. Linear regression analysis was also used to identify gender differences in savings behavior. The results of the household survey showed the need for alternative sources of income that provide diverse income opportunities to mobilize more savings for economic growth. This is because a significant portion of investment funds is channeled into property or vehicle funds, irrespective of whether it is in urban or rural areas. Therefore, there is a need to promote and expand alternative investment instruments and develop policy recommendations for the use of savings. The integration of gender-sensitive financial inclusion programs should aim to effectively close the gender gap in access to financial resources in the agricultural sector and ultimately contribute to the sustainable development of the sector.

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Tarımda Tasarruf Oluşumu Üzerinde Aile İçi Dinamiklerin ve Sosyo-Ekonomik Faktörlerin Etkisi

ÖZET
Bu çalışmada, kırsal hanelerde yaşayan çiftçilerin tasarruf davranışlarındaki cinsiyet etkisini araştırılmış ve tasarruf davranışını cinsiyete göre etkileyen faktörler belirlenmiştir. Bu amaçla, Türkiye'nin Konya ilinde 268 tarım hanesi arasında bir anket yürütülmüştür. Çalışmada, erkek ve kadın hanelerin tasarruflarının bileşimindeki farklılıkları açıklamak için hiyerarşik olmayan bir kümeleme analizi yürütülmüştür. Çalışmada ayrıca tasarruf davranışındaki cinsiyet farklılıklarını belirlemek için doğrusal regresyon analizi kullanılmıştır. Hanehalkı anket sonuçları, ekonomik büyüme için daha fazla tasarruf seferber etmek amacıyla farklı gelir fırsatları sunan alternatif kaynaklara ihtiyaç duyulduğunu ortaya koymuştur. Bunun nedeni, yatırım fonlarının önemli bir kısmının kentsel veya kırsal alanlara bakılmaksızın gayrimenkul veya araç fonlarına kanalize edilmesidir. Bu nedenle alternatif yatırım araçlarının teşvik edilmesi ve yaygınlaştırılması ve tasarrufların kullanımı için politika önerilerinin geliştirilmesi gerekmektedir. Cinsiyete duyarlı finansal katılım programlarının entegrasyonu, tarım sektöründe finansal kaynaklara erişimdeki cinsiyet farkını etkili bir şekilde kapatmayı hedeflemeli ve nihai olarak sektörün bir bütün olarak sürdürülebilir kalkınmasına katkıda bulunmalıdır.

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INTRODUCTION

The agricultural sector contributes to world food supplies and livelihoods in the countryside. In developing countries, it continues to be inefficient due to various setbacks. Among them, gender inequalities in accessing productive resources as well as opportunities are prominent. Importantly, all populations are in a process of population transition that is two-dimensional. Reduced levels of fertility and lowered levels of mortality are transforming age structures in populations. In addition to that, falling levels of marriage and higher levels of divorce significantly redefine conventional nuclear families in households. These have created a differentiation in consumption and savings behavior, together with the distribution of earnings. In response to this problem, programs are being developed to reduce gender discrimination in line with the United Nations Millennium Development Goals. Research has shown that increasing gender equality has benefits to children as well as society at large (Doepke and Tertilt, 2019).

Although studies have shown that women's empowerment can increase welfare, it is uncertain how women's consumption and saving behavior may be affected. Therefore, it is important to explore gender differences in agricultural saving behavior by examining the roles of women in rural areas of developing countries and the constraints they face in accessing resources and opportunities (Fletschner and Kenney, 2014). Numerous studies have shown that women in agriculture have less access to agricultural assets, inputs, services, and rural employment opportunities than men (Conley and Ryvicker, 2004; Amha and Alemu, 2014; Remble et al., 2014; Fehr et al., 2016; Horioka and Terada-Hagiwara, 2017). To promote savings behavior in agriculture, it would be appropriate to adopt a gender perspective. That is because female empowerment can facilitate increased productivity and rural development sustainability. In comprehending farm women's saving behavior in a better way, it would be appropriate to discuss contract farming and new value chains of high-value agriculture. New market arrangements have the potential of empowering agriculture-related women as well as disempowering them, depending on their ownership of and their access to resources.

Prevailing gender norms and entrenched societal beliefs continue to limit women's access to essential resources, opportunities, and their involvement in agricultural decision-making processes (Badstue et al., 2020). These traditional assumptions, often rooted in outdated socio-cultural myths, obstruct the development of equitable financial behavior in rural economies. A meaningful intervention aimed at fostering savings habits in the agricultural sector must begin with a critical gender analysis that unpacks and challenges such assumptions. This requires not only interrogating the narratives that sustain these myths but also generating and utilizing nuanced data that reflect the evolving roles of women in agricultural settings over time and across geographies (Doss et al., 2018). At this point, the issue of gender control over resources assumes critical importance. The decisive factor is not the ownership of resources, but rather the control over them. The impact of gender control on family decision-making processes, the utilization of financial services, and savings behavior is a multifaceted and intricate matter. The argument is posited that the enhancement of women's access to resources is imperative, and that their capacity to make decisions regarding these resources must be augmented (Doss et al., 2018). Consequently, in order to effectively encourage savings behavior in the agricultural sector, it is necessary to analyze gender-based structural inequalities and control relationships. In the design of financial services, it is imperative to consider women's level of control over resources. Inclusive savings mechanisms should be created by developing financial products specifically for women. This approach is expected to support both individual empowerment and the sustainable development of the rural economy.

To advance our understanding of financial behaviors within rural labor structures, it is vital to examine how gender dynamics and intersecting social identities shape individual agency and economic participation (Doss, 2018). When women are empowered, there is demonstrable potential for gains in agricultural productivity, household food security, and broader rural development outcomes. Hence, a comprehensive grasp of how gendered relations influence labor roles and economic decision-making is critical to encourage savings-oriented behavior in farming communities. Future studies drawing upon the dataset collected through this research are encouraged to delve deeper into these dimensions. Such efforts would not only enrich the discourse on gender and rural development but also inform policy frameworks aiming to close the gender gap in access to financial services. Integrating a gender-sensitive perspective into agricultural finance could pave the way for transformative change. This would involve designing tailored financial products, expanding financial literacy initiatives targeted at women, and dismantling structural barriers that restrict women's control over financial resources and their participation in economic decision-making.

Globally, women constitute a substantial segment of the agricultural labor force and hold the potential to make transformative contributions to the sector. However, they frequently encounter systemic disadvantages that hinder their full economic participation. These include restricted access to land, limited control over productive resources, and exclusion from formal financial systems. Such disparities significantly undermine women's capacity to engage

in sustained savings and investment activities within agriculture, thereby perpetuating cycles of financial vulnerability and underproductivity.

By mainstreaming gender considerations into policy-making and institutional practices, it becomes possible to create an enabling environment where women farmers are empowered to participate fully in financial decision-making. This includes acknowledging that women and men may exhibit different attitudes toward risk, saving, and long-term investment, all of which require differentiated approaches in the design of financial instruments. Recognizing and addressing these differences is key to developing tailored financial products that align with the distinct savings goals and priorities of both female and male farmers. Gender-responsive financial services—such as flexible savings accounts, microcredit targeted at women, or savings-linked insurance schemes—can enhance both access and outcomes. Over time, such approaches can contribute not only to improved household financial security but also to broader objectives of gender equality and rural economic resilience. A gender-focused strategy for promoting savings in agriculture thus serves a dual purpose: it advances women's empowerment while simultaneously strengthening the financial foundations of rural communities. In doing so, it encourages a more inclusive and sustainable model of agricultural development. By pushing for women's access to financial resources and their savings and investment efforts, women can become self-reliant and have more authority over their financial lives. The benefits of this empowerment realized are not only for the empowered woman but also have a deep penetration for her family members and society in general. It benefits agriculture as an industry to a great extent.

A gendered approach to savings in agriculture can contribute to sustainable development. Savings to sustainable agriculture can consist of investment in high-yielding agricultural methods, irrigation systems, and climate resilience. Savings to sustainable agriculture can be promoted for female and male farmers to enable them to cope with climate change challenges, resource deficiencies, and food insecurity.

Therefore, comprehension of savings behavior in agriculture with a gender approach can support sustainable and inclusive development. Savings in the agricultural sector refer to the income that is not consumed in the current year and reserved for future investment, consumption, or unforeseen circumstances (Ağızan et. al., 2024). Policymakers and other stakeholders can support building a robust and vibrant agriculture sector if they identify and address women farmers' gender-related issues for their specific needs, tailor financial products and services to their needs, encourage empowerment of women, and drive savings for sustainable agriculture. Ultimately, this can not only enrich farmers' livelihoods but can also support global food security and sustainable development goals. Adopting a gender-sensitive lens to examine savings behavior in agriculture reveals underlying structural and social dynamics that often remain obscured in generalized analyses. This study seeks to illuminate the often-unacknowledged gender-specific determinants that shape financial behaviors within agricultural contexts. The central premise is that understanding and addressing the gendered nature of savings practices is not only vital for equity but also for enhancing overall agricultural performance.

Theoretical Framework

To analyze people's and households' behavior in terms of savings, it would be relevant to inquire into those factors that cause them to save a portion of their incomes. Motives of households in non-agriculture sectors to engage in savings can be generalized into three major groups. Saving behavior caused by temporary budget imbalances caused by shocks in consumption in various phases of life of an individual person belongs to the first group of motives (Chang, 1983; Browning and Crossley, 2001). Households possess a variety of motives to make savings. Precautionary savings that imply making savings for keeping stability in a person's budget, despite unexpected money needs, come first. Households can also make savings in preparation for inheritance and intergenerational wealth transfers, in that tangible objects are to be left to children and other beneficiaries (Gale and Scholz, 1994; Kimhi, 1997; Wakita et al., 2000). It would be constructive to introduce gender-oriented decision-making methods in financial issues, in that gender has emerged in various studies as a decisive factor that affects people's behavior about savings. It would be constructive to understand that gender can become an issue in decision-making in finances and to inquire how to address this issue.

Previous studies (Schunk, 2009; Abdelkhalek et al., 2010; Minh et al., 2013; Gries and Dung, 2014) have shown that household saving behavior is influenced by the gender of the household head, even when controlling for other variables such as income. In these studies, all other variables, especially income, show that men save less than women. Gender differences in saving behavior can be attributed to a wide array of socio-economic, demographic, and behavioral factors. Notably, variations in life expectancy, permanent income levels, and accumulated wealth contribute to distinct saving motives and practices between men and women. Female-headed households, for example, often exhibit stronger saving motivations due to factors such as earlier retirement ages (Warren et al., 2001), income instability (Warren et al., 2001; Fisher, 2010), and greater childcare responsibilities (Abdelkhalek

et al., 2010), Furthermore, empirical findings reveal that women are more likely to allocate a greater proportion of their income to child-related expenditures compared to men (Horioka and Terada-Hagiwara, 2017). These gendered variations in saving behavior are further shaped by factors such as cultural norms, societal expectations, gender-based income disparities, differential access to education and employment opportunities, financial literacy, and attitudes toward financial planning and risk (Seguino and Floro, 2003; Paxton, 2009; Amha and Alemu, 2014; Remble et al., 2014; Finlay and Price, 2015; Fehr et al., 2016; Abebe, 2017; Horioka and Terada-Hagiwara, 2017; Steinert et al., 2018; Hua and Erreygers, 2020; Liu et al., 2021). In many cultural contexts, women are expected to prioritize the welfare of their families over personal savings, which may lead to the prioritization of short-term financial stability rather than long-term investments. Additionally, persistent gender wage gaps and occupational segregation result in lower average earnings for women, thereby constraining their saving potential. Educational attainment and access to employment also significantly impact on women's ability to save. Women with higher education levels and stable employment are more likely to enjoy financial autonomy and increased saving capacity (Bechly, 2018). Conversely, lower levels of financial literacy among women have been identified as a barrier to effective savings behavior (Sabri et al., 2020). Women with lower levels of financial literacy may have limited knowledge about different savings options and may be less inclined to engage in savings behavior (Fonseca et al., 2012). Additionally, individual attitudes towards risk and financial planning can also affect savings behavior (Bechly, 2018). Individual attitudes toward risk and financial planning also differ by gender. Research suggests that women are generally more risk-averse and may prefer safer, more liquid forms of saving—such as savings accounts or fixed-term deposits—over higher-risk investment vehicles (Conley and Ryvicker, 2004). However, there remains limited empirical evidence examining the interaction between risk tolerance and savings decisions specifically within male- and female-headed households. Theoretical frameworks such as precautionary savings models and life-cycle hypotheses suggest that individuals facing greater uncertainty or shorter planning horizons—particularly those who are younger or economically vulnerable—are more likely to accumulate liquid savings to buffer consumption shocks. This is particularly relevant in agricultural contexts, where income volatility is high, and liquidity is essential for meeting consumption needs, addressing emergencies, and supporting entrepreneurial efforts (Carroll, 1997).

A range of interrelated factors contribute to gender-based differences in saving behavior, including the distribution of financial responsibilities within households, prevailing cultural and social norms, disparities in financial literacy and access to financial resources, and income inequality between men and women. These factors can significantly influence an individual's financial awareness, their confidence in managing money, and their capacity to prioritize long-term savings objectives over immediate financial needs. Gender-specific cultural expectations often shape perceptions and behaviors around financial decision-making, with women more likely to focus on short-term financial stability due to caregiving responsibilities and household welfare considerations. Moreover, societal norms may restrict women's access to formal financial instruments, limiting their ability to accumulate and manage wealth independently (Fernandez & Tranfaglia, 2020). These constraints not only impact women's financial inclusion but also shape their broader saving patterns and investment preferences. In sum, a growing body of research affirms that gender remains a critical dimension in understanding variations in saving behavior, shaped by both structural and behavioral influences (Fernandez and Tranfaglia, 2020).

While numerous studies have identified the factors influencing household saving behavior, these analyses often overlook sector-specific dynamics. In the context of agriculture, evaluating household financial decisions without accounting for the existence and performance of the farm enterprise presents an incomplete picture of economic behavior. As such, this study seeks to extend the savings literature by examining differences in the composition of savings between male- and female-headed households within the agricultural sector. The econometric analysis employed further emphasizes the importance of socio-economic variables—including demographic characteristics, financial conditions, household structure, and exposure to risk—in shaping saving outcomes at the household level.

MATERIAL and METHOD

The province of Konya was chosen as the research region due to its high representativeness for both crop and animal production, as well as its status as the province with the highest capital movements, particularly in land, livestock, and tool-machine capital.

Sample Method:

The sample enterprises were selected based on the assumption that not all producers could be surveyed. A stratified random sampling method was used to determine the sample size. The number of samples to be studied was calculated using the formula below, with 5% error and 99% confidence limits considered when determining the number of samples drawn from the main mass (Yamane, 1967).

$$n = \frac{(\Sigma\, Nh.\, Sh)^2}{N^2.D^2 + \Sigma\,(Nh.Sh^2)} \qquad D^2 = d^2/z^2$$

After determining the number of samples, the Neyman method was used to determine a single sample volume for all strata by considering the weight of the mean and variance of each stratum. The aim of this method was to increase the efficiency of sampling (Oğuz and Karakayacı, 2017). The equation by which the sample volume is determined according to the Neyman method is shown below.

$$n = \frac{N_h\, S_h * n}{\Sigma\, N_h\, S_h} \quad [1]$$

Table 1. Number of Sample Enterprises according to Enterprise Size Groups (number)
Tablo 1. İşletme Büyüklüğü Gruplarına Göre Örnek İşletme Sayısı (adet)

Size (ha)	Nh	Sh	Mean	CV	Nh*Sh	Nh*(Sh)2	n
0-5	18.888,00	9.94	32	31.05	187.654,98	1.864.379	18
5.1-15	28.873,00	28.47	91.56	31.09	821.892,08	23.395.788	78
15.1-50	18.900,00	81.42	247.08	32.95	1.538.797,84	125.285.651	145
50.1-+	1.477,00	195.27	605.56	32.25	288.409,85	56.317.021	27
Total	68.138,00				2.836.754,75	206.862.839,00	268

Statistical Analysis

In this study conducted to determine gender-based differences in household saving behavior, 16.79% of 268 household heads are female managers, while 83.21% are male managers. Non-hierarchical clustering analysis is employed to identify the formation of savings resulting from gender-based differentiation and the factors influencing them. The analysis involves determining the cluster (1: Male, 2: Female) and clustering observations into two distinct sections. ANOVA tests are then conducted, and the averages of the observations are interpreted based on the variables. The k-means clustering analysis divides the sum of squares within the clusters into k clusters with the smallest sum of squares. This means that observation vectors x1, x2, ..., xn, each with p variables, are considered as points in the multidimensional space x at the same time, a1n, ... akn are selected.

$$W_n = \frac{1}{n}\sum_{i=1}^{n} 1 \le j \le k\ ^{||x_i - a_{jn}||^2}$$

as cluster centers for each group of individuals, and individuals are classified into the nearest cluster according to the rule. The k-means technique was used to reveal gender-based differences in saving behaviors.

Logistic regression analysis was used to estimate the factors affecting saving behaviors by gender. Two separate models were created for male and female managers. Binary logistic regression analysis was performed since the dependent variable, savings behavior, has two options. The study classified the dependent variable as saving behavior, with 1 representing saving and 0 representing non-saving. The use of discrete variables was convenient as it eliminated the need to meet the normality assumption. Both models used the same independent variables, and gender-based comparisons were conducted. The study considers several independent variables, including age, education, experience, social security, family population, health status, capital, agricultural income, consumption expenditure, financial literacy, and risk perception. The age variable was measured based on the age declared by the head of the household. The educational level was determined categorically by asking individuals about the highest level of education they had completed (e.g., elementary school, middle school, high school, university). Experience was obtained by asking about the number of years spent on agricultural activities, particularly. Social security is based on a yes/no response regarding whether the individual is covered by any social security (SSI, SSI-SEP, etc.). Family size is measured numerically as the total number of individuals residing in the same household. Health status is assessed using a 5-point Likert scale (from very poor to very good) based on the individual's subjective perception of their health. Capital was calculated as active capital based on the total value of physical production tools and savings used in agriculture. Agricultural income was measured numerically through self-reported data as the total agricultural income earned in the past year. Consumption expenditures were asked

[1] n=Sample number
Nh=h. Number of units in the layer
Sh=h. Standard deviation in the stratum
N= Total number of observations
D=d/z
d= Deviation from the mean at a certain rate
Z=If the number of units is over 30, z value is used in t distribution.

monthly to cover the total expenditures made by the individual at the household level, but were included in the model on an annual basis. Financial literacy was assessed using a 5-point Likert scale ranging from "I definitely do not know" (1) to "I definitely know" (5) to measure individuals' knowledge of interest rates, inflation, types of investment, and financial planning. Similarly, risk perception was also measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to assess individuals' propensity to take financial risks and their attitudes toward uncertain situations. In this way, all variables included in the study were appropriately structured for analysis, based on both objective statements and subjective evaluations.

Logistic regression analysis is used, which is based on the odds ratio. The odds ratio focuses on the probability of an event occurring or not occurring. The logistic regression model parameters are commonly estimated using the maximum likelihood method, which involves taking the natural logarithm of the odds ratio. Thus, the bivariate logistic regression model is written as

$$\ln\left(\frac{P(Y)}{Q(Y)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n$$

$$\frac{P(Y)}{Q(Y)} = e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n} = e^{\beta_0} e^{\beta_1 X_1} e^{\beta_2 X_2} e^{\beta_n X_n}$$

The odds ratio (OR) is calculated as P(Y) / Q(Y), where Q(Y) = 1 - P(Y). It is important to use clear and precise language when discussing technical concepts. The odds ratio (OR) is calculated as P(Y) / Q(Y), where Q(Y) = 1 - P(Y). The OR value for each parameter represents the probability of the dependent variable being observed with the effect of the independent variable, expressed as a ratio or percentage (Özçomak et al., 2005).

Thus, the estimation model we use is as follows:

$$Sav_i = \beta_0 + \beta_1 AGE_i + \beta_2 EDU_i + \beta_3 EXP_i + \beta_4 SOC_i + \beta_5 POP_i + \beta_6 HEA_i + \beta_7 CAP_i + \beta_8 INC_i + \beta_9 CONS_i + \beta_{10} FİN_i + \beta_{11} RISK_i + \mu_i + \varepsilon_i$$

Before proceeding to logistic regression analysis, the Variance Inflation Factor (VIF) values were calculated to assess whether there was a problem of multicollinearity among the independent variables. According to the results obtained, the VIF values of all variables remained between 1 and 2.5, and none of the variables exceeded the critical threshold of 5; this indicates that there is no significant multicollinearity problem in the model. The overall fit of the logistic regression models was evaluated using the Hosmer-Lemeshow goodness-of-fit test; p=0.628 was found for the model created for women, and p=0.442 for the model created for men. Since p>0.05 in both cases, it was concluded that the model fits the data well. Additionally, the Nagelkerke R^2 statistics used to evaluate the explanatory power of the model were found to be 0.755 for the women's model and 0.749 for the men's model, indicating that the independent variables explain savings behavior to a moderate extent. The overall significance of the model was tested using the likelihood ratio test, and the χ^2 statistics were found to be statistically significant in both models (p<0.001). The contribution of individual variables was tested using the Wald test, and the results are presented in tables. Finally, while autocorrelation is particularly important in time series analysis, there is no risk of autocorrelation in this study due to the cross-sectional data structure used. All these findings indicate that the model is both theoretically sound and statistically reliable.

RESULTS and DISCUSSION

Gender plays a significant role in shaping saving behavior among farmers, as women may prioritize different financial goals compared to their male counterparts. For instance, female farmers often emphasize saving for household food security over agricultural income generation, reflecting their central role in maintaining family well-being. Analyzing saving behavior through a gendered lens is thus essential for uncovering the distinct financial preferences and constraints faced by female farmers.

Such an analysis enables a deeper understanding of the specific challenges women encounter in accessing financial services, and it informs the design of targeted interventions to enhance their financial inclusion and economic resilience. Furthermore, exploring gender differences in saving practices can illuminate disparities in savings rates, motivations, and instruments, thereby guiding policy frameworks that aim to foster gender equity and empowerment within the agricultural sector.

In this regard, a gender-disaggregated assessment of savings instruments (Figure 1) revealed that while men predominantly utilize gold and cash-based savings, women more frequently rely on gold and formal bank accounts. The underlying motivations for saving also vary by gender: men tend to save with objectives such as purchasing a home or vehicle, investing in entrepreneurial activities, and acquiring household assets, whereas women's saving

strategies are more closely linked to family-centered needs and risk mitigation. Women, on the other hand, save for investing in businesses, securing a higher standard of living in the future, and providing for their children (Figure 2). Female often have more family responsibilities, such as childcare and housework, which can impact their ability to save. Female, particularly those with children, may tend to save with future financial needs in mind. The analyses also indicate that female tend to prioritize longer-term financial goals. As a result, female may have a more long-term perspective when it comes to saving.

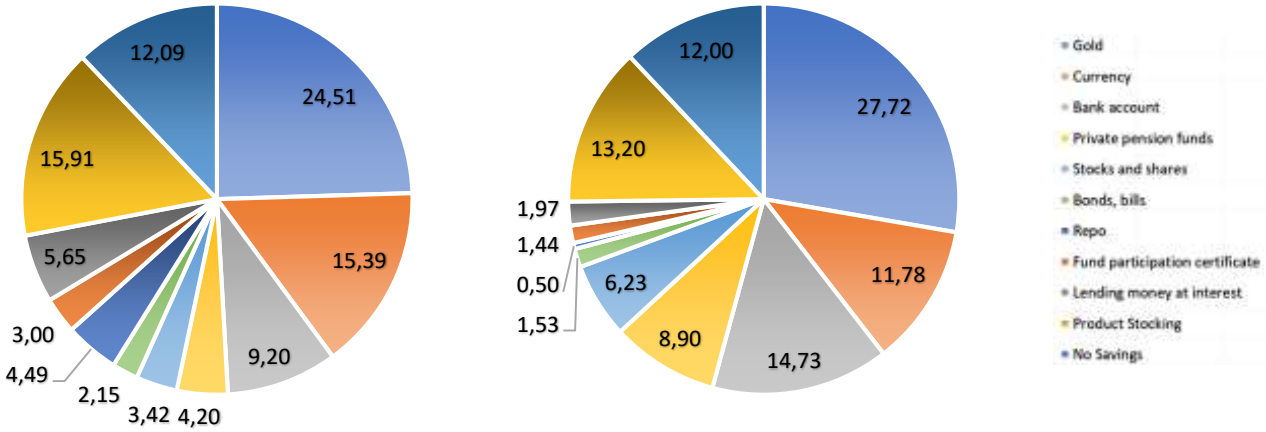

Figure 1. Utilization of Savings by Gender of Farmers
Şekil 1. Çiftçilerin Cinsiyetine Göre Tasarrufların Kullanımı

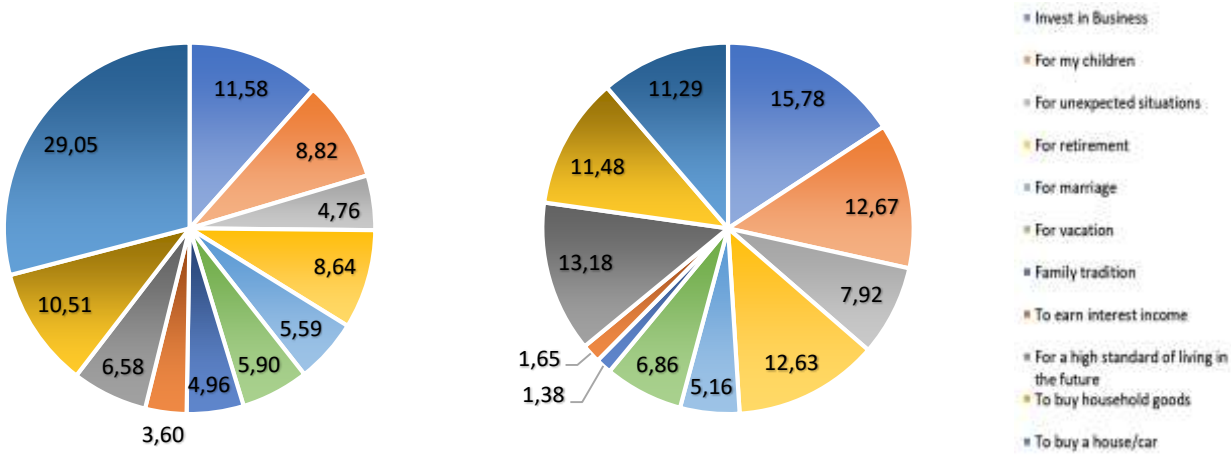

Figure 2. Farmers' Reasons for Saving by Gender
Şekil 2. Çiftçilerin Cinsiyete Göre Tasarruf Etme Nedenleri

Factors enabling savings are analyzed in Figure 3. Males (% 33.50%) can save due to having multiple sources of income, while females (% 34.90%) are able to save due to generating income for multiple people. When saving, both males and females consider socio-economic status, with females also taking income level into account (Figure 4). Additionally, it has been determined that 36.11% and 47.70% of males are unable to save due to insufficient income (Figure 5).

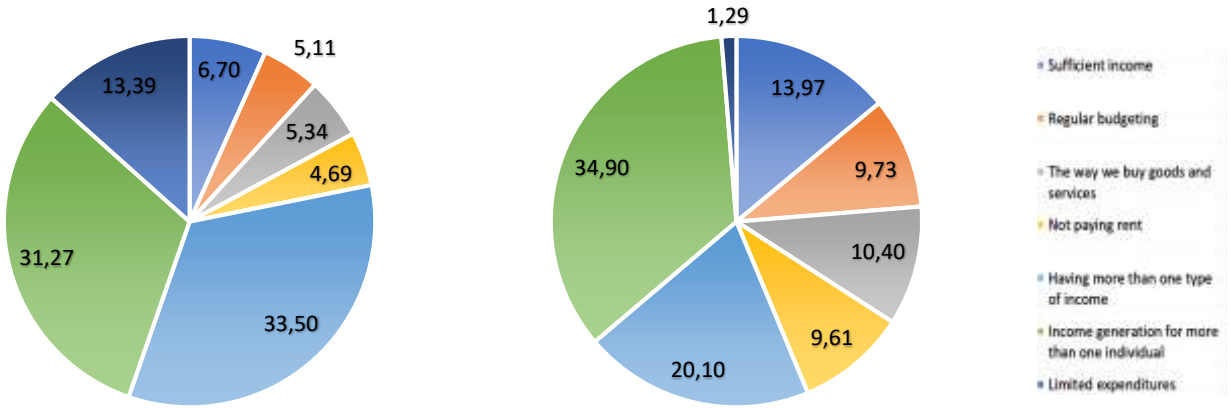

Figure 3. Factors Enabling Farmers to Save According to Gender
Şekil 3. Çiftçilerin Cinsiyete Göre Tasarruf Etmelerini Sağlayan Faktörler

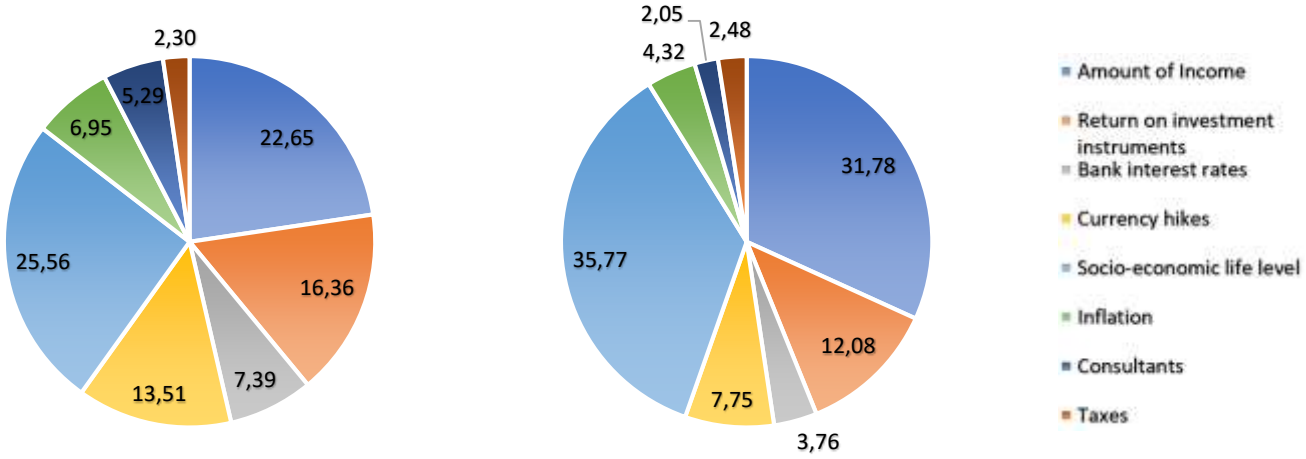

Figure 4. Factors Considered by Farmers While Saving According to Gender
Şekil 4. Çiftçilerin Tasarruf Yaparken Cinsiyete Göre Dikkate Aldığı Faktörler

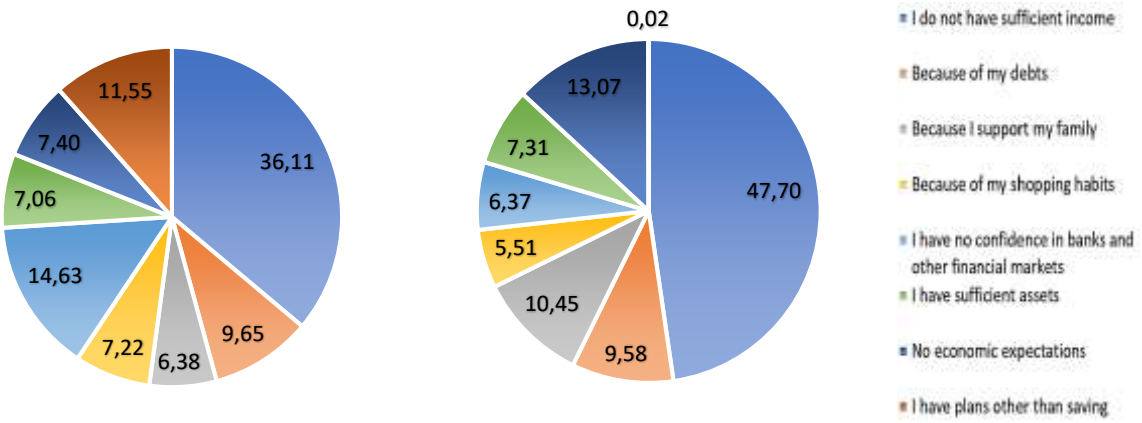

Figure 5. Reasons for Not Saving by Gender of Farmers
Şekil 5. Çiftçilerin Cinsiyetine Göre Tasarruf Yapmama Nedenleri

Investigating farmers' saving behavior by gender is important to ensure that financial services and interventions effectively meet the needs of both male and female farmers. This can lead to more inclusive and targeted interventions that address the specific challenges and barriers faced by female farmers. By understanding the saving behavior of female farmers, we can design gender-sensitive financial programs and initiatives that cater to their specific needs and priorities. Furthermore, gender-specific analysis of farmers' saving behavior can help identify any gender disparities in access to financial resources and opportunities. This information is crucial for developing policies and programs that promote gender equality in agriculture and support the economic empowerment of female farmers. Therefore, in this study, gender-based cluster analysis was conducted to demonstrate the averages of variables in clusters. Accordingly, it was determined that female have higher incomes, are more inclined towards agricultural investments and savings, while their consumption expenditures are lower than male (Table 2). The purpose of the ANOVA table was to examine whether the variables differ by clusters. According to this, variables show a significant difference by groups, and it can be concluded that female have a higher tendency to save (Table 3).

Table 2. Final Cluster Centers by Gender
Tablo 2. Cinsiyete Göre Nihai Küme Merkezleri

	Male	Female
Age	52.78	43.67
Education	3.03	4.20
Income (TRY)	428342.72	529600.97
Agricultural İnvestment (TRY)	64259.94	201600.48
Saving (TRY)	294085.39	339000.34
Consumption Expenditure (TRY)	63531.58	41023.12

Table 3. Differences of Variables According to Gender Cluster
Tablo 3. Cinsiyet Gruplarına Göre Değişkenlerin Farklılıkları

ANOVA

	Cluster Mean Square	df	Error Mean Square	df	F	Sig.
Age	19.800	1	11.852	39	145.446	.000
Education	44.179	1	3.892	39	11.352	.002
Income (TRY)	27.660	1	6.698	39	107.936	.000
Agricultural İnvestment (TRY)	8.160	1	1.766	39	43.106	.000
Saving (TRY)	42.690	1	49.809	39	102.201	.000
Consumption Expenditure (TRY)	53.445	1	29.455	39	24.643	.000

The factors that affect farm savings rates were estimated using a linear regression model in this study. The analysis focuses on personal factors related to the farm, especially the characteristics of the farm head. In rural areas, the farm head has a significant impact on the decision-making process within the family and affects a range of family behaviors, such as savings. The farm head's age, gender, education, expectations, socio-cultural background, health status, and psychological state can result in distinct approaches. Empirical studies reveal that savings of farmers differ depending on these factors (Mishkin, 2007; Özcan and Günay, 2012; Temel Nalın, 2013; Şengür and Taban, 2016). The characteristics, desires, and aspirations of farm households are of great importance for expenditure and savings. However, in addition to these, some factors (economic and environmental) have an impact on savings. In this case, determining which other factors besides demographic factors affect savings behavior and formulating policies in this direction are among the first things to be done.

Table 4 presents the descriptive statistics of factors that affect gender-based savings in the agricultural sector. Women have a crucial role in the agricultural sector, but their contribution is often undervalued and overlooked. They face several challenges and constraints that affect their saving behavior in this field. These factors include limited access to financial resources, lack of control over income and assets, unequal access to inputs and markets, gender biases and norms, and socio-cultural constraints (Beuchelt, 2016). These factors can significantly impact women's ability to save in agriculture.

When examining Table 5, the probability of women saving varies depending on their age, education, experience, social security, and family size. Younger women may face different challenges and opportunities compared to older women, which may affect their ability to save. The analysis shows that the likelihood of saving decreases as the age of the household head increases for both men and women ($p<.029$ and $p<.051$). These results align with previous empirical research suggesting that when household heads fall within the 18–50 age range, uncertainty regarding future income tends to prompt a stronger inclination toward precautionary saving behaviors (Paxton,

2009). These results provide important insights into how individuals shape their saving behavior throughout their life cycle. According to the life cycle hypothesis, people start earning income at a young age and save for future expenses; as they age, they tend to spend their savings. The declining savings observed in this study can be explained by the fact that older individuals begin to consume their savings. On the other hand, when considered within the framework of the permanent income hypothesis, it is understood that individuals make savings decisions by considering not only their current income but also their expected future income level. The higher savings tendency of women in the younger age group can also be interpreted as an effort to secure their future in this uncertain environment.

Table 4. Descriptive Statistics on Factors Affecting Savings
Tablo 4. Tasarrufları Etkileyen Faktörlere İlişkin Tanımlayıcı İstatistikler

	N	Minimum	Maximum	Mean	Std. Deviation
Age	268	21.00	69.00	46.71	11.13
Education	268	1.00	6.00	3.10	0.35
Experience	268	2.00	55.00	25.14	11.99
Social Security	268	0.00	1.00	0.85	0.36
Family Population	268	2.00	8.00	3.81	1.26
Health Status	268	0.00	1.00	0.78	0.42
Capital	268	2980000.00	31434300.00	5708242.86	5235958.46
Agricultural Income	268	80000.00	6000000.00	1107840.95	1017059.16
Consumption Expenditure	268	45380.00	131762.00	81008.71	19568.77
Financial Literacy	268	1.00	5.00	3.51	1.47
Risk Perception	268	1.00	5.00	2.00	1.65
Valid N (listwise)	268				

Educational attainment has consistently emerged as a key factor influencing household saving decisions, particularly in less developed economies—a trend similarly observed in studies conducted in advanced economies (Paxton, 2009). Nevertheless, the relationship between education and saving behavior is multifaceted (Akhtar, 1987; Morisset and Revoredo, 1995). Heads of households with higher levels of education generally have greater capacity to make strategic financial decisions regarding current expenditures, future investments, and effective saving mechanisms (Morisset and Revoredo, 1995; Horioka and Watanabe, 1997; Bersales and Mapa, 2006; Schunk, 2009). On the other hand, advanced education levels may also result in increased expenditures, particularly for children's schooling (Akhtar, 1987; Bebczuk, 2015). Despite this, there remains a lack of comprehensive evidence examining how educational attainment distinctly shapes saving behaviors across genders. The current study reveals that as education levels rise, the likelihood of saving increases by 1.7 times for women ($p < .090$) and by 1.32 times for men ($p < .004$). The findings are consistent with the life cycle hypothesis, which suggests that heads of households in the active population tend to earn higher incomes and save more, and that education is a factor that supports this increase in income. Moreover, when evaluated in the context of the permanent income hypothesis, higher levels of education have been found to positively influence individuals' future income expectations, thereby motivating savings behavior. Consequently, the adoption of saving as a rational choice is facilitated by education, which provides access to knowledge and income potential. This effect is more pronounced among women.

Experience in agriculture also plays a role in shaping saving behavior, particularly among women. Those with greater familiarity with farming systems and markets are likely to have stronger financial awareness and resilience. Other influencing factors include access to social protection mechanisms and household composition. For women, especially those heading households, larger family sizes often drive more robust saving behaviors. According to the study, male-headed households are significantly less likely to save as family size grows ($p < .000$), whereas female-headed households exhibit a positive association between family size and saving propensity ($p < .040$). This pattern reflects the prioritization of family needs and risk mitigation strategies by women. Female-headed households often demonstrate stronger precautionary saving behavior, particularly in anticipation of potential health-related or economic shocks.

Men's saving behavior is similarly shaped by variables such as age, education, agricultural experience, social protection, and household structure. Younger men may exhibit different financial priorities and risk preferences compared to older men. Those with higher education levels are typically more financially literate and better equipped to allocate resources efficiently. Additionally, agricultural experience enhances financial acumen and market navigation, potentially leading to more consistent saving and investment habits. Access to social support systems and the size of the household also significantly influence the capacity and willingness of male household

heads to save and invest. The behavior of men in relation to savings is influenced by a multitude of socioeconomic factors, including age, educational attainment, agricultural experience, social protection, and household structure. The higher risk tolerance exhibited by young men in comparison to their older counterparts, as well as their propensity to prioritize short-term financial objectives, can be elucidated within the framework of the life cycle hypothesis. This theoretical framework posits that individuals' financial decision-making, including their propensity to spend and save, undergoes fluctuations across various stages of their lives. As the level of education increases, men's financial literacy and ability to allocate resources effectively increase, which is consistent with the predictions of both the life cycle and the permanent income hypotheses. This is because individuals make rational savings decisions based not only on their current income but also on their expectations regarding future income flows. Individuals with extensive experience in the agricultural sector have been shown to exhibit heightened sensitivity and meticulous planning in their response to market dynamics. This heightened sensitivity and planning may, in turn, serve to reinforce precautionary savings behavior. The greater exposure of agricultural activities to income uncertainty has been demonstrated to result in a prioritization of future-oriented savings decisions. Conversely, enhanced access to social protection systems may result in individuals reducing their propensity for precautionary saving, due to the state's guarantee against unforeseen risks. Furthermore, household size exerts a significant influence on both saving capacity and spending pressures, thereby influencing individual financial behavior. These multi-layered interactions demonstrate that men's savings decisions are not only sensitive to individual preferences but also to structural and environmental conditions.

Understanding these gender-differentiated determinants of saving behavior is essential for designing effective financial interventions. Tailored policies and support programs that address specific constraints faced by rural women—based on their age, education, agricultural experience, and family dynamics—are crucial. The study underscores the importance of adopting targeted measures aimed at enhancing rural women's productivity and income generation within the agricultural sector.

Table 5. Factors Affecting Gender-Based Saving Behavior in the Agricultural Sector
Tablo 5. Tarım Sektöründe Cinsiyete Dayalı Tasarruf Davranışını Etkileyen Faktörler

Variables in the Equation	Male B	S.E.	Sig.	Odds Ratio (OR)	Female B	S.E.	Sig.	Odds Ratio (OR)
Age	-.041	.042	.029	1.042	-.023	.000	.051	1.200
Education	21.022	.043	.090	1.748	.000	.000	.004	1.320
Experience	.135	.093	.048	1.144	.462	.384	.028	1.588
Social Security	.064	.110	.059	1.066	.466	.428	.076	.627
Family Population	-2.726	.763	.000	1.273	.018	.088	.040	1.018
Health Status	-.063	.107	.055	.939	.116	.167	.087	1.123
Capital	1.337	.844	.013	.263	.145	.212	.093	.865
Agricultural Income	.208	.226	.057	.812	.015	3.299	.096	3.015
Consumption Expenditure	-1.573	.000	.043	.940	-.032	.000	.047	1.424
Financial Literacy	.261	.430	.044	1.298	.015	3.299	.096	.986
Risk Perception	-.128	.420	.061	.880	.158	1.049	.081	.854
Constant	-4.137	2.333	.076	.016	3.355	2.827	.035	28.643
a. Negelkerke RSquare (.755)					b. Negelkerke RSquare (.749)			

In addition to the factors mentioned above, other variables that significantly influence the savings behavior of both women and men in the agricultural sector have been identified. It is evident that capital, encompassing access to credit and investment opportunities, plays a pivotal role in determining the capacity of both genders to accumulate savings and engage in investment activities within the agricultural sector. Furthermore, the level of agricultural income and consumption expenditures directly affects the savings behavior of women and men, as it influences their capacity to allocate funds for savings. Consequently, it is estimated that capital increases women's savings rates by 3.8 times ($p<.013$) and men's savings rates by 1.15 times ($p<.093$). A similar situation pertains to agricultural income. An increase in agricultural income has been demonstrated to increase the likelihood of saving in both female- and male-headed households. It can thus be concluded that an augmentation in household agricultural income will result in an increase in household savings rates. This finding aligns with the absolute income hypothesis and is consistent with observations in certain countries, notably Australia, China, and Poland (Qian, 1988; Harris et al., 2002; Pan, 2016; Szopinski, 2017; Hua and Erreygers, 2020). In accordance with the prevailing hypothesis, the projected increase in consumption expenditures is predicted to exert a deleterious effect

on the formation of savings. Consequently, a 1-fold increase in consumption expenditures is estimated to reduce savings formation by 1.06-fold (p<.043) for men and by 1.43-fold (p<.047) for women.

Additionally, risk perception is a significant factor in shaping the savings behavior of both men and women in the agricultural sector. Different risk perceptions may lead to varied saving patterns. It is important to note that subjective evaluations have been excluded, and technical term abbreviations have been explained when first used. The text adheres to conventional structure and format, with consistent citation and footnote style. This study found that high-risk perception for men reveals lowered saving behavior (p<.076), while female-headed families with high-risk perception have improved saving behavior (p<.081). Besides that, financial literacy that entails knowledge of financial products and understanding of the financial system significantly determines savings behavior for both men and women. As financial literacy increases, savings formation increases an expected 1.29 times (p<.044) for male-headed families to 1.01 times (p<.096) for female-headed families.

Understanding these interactions is crucial in crafting targeted interventions to stimulate men's and women's savings behavior in agriculture. Certain issues in accessing capital, agricultural incomes, consumption expenditure, perceived risks, and financial literacy can be addressed to craft individualized strategies to stimulate savings and investment among men and women engaged in agriculture. The promise of comprehensive policy and program interventions that account for the heterogeneous nature of savings behavior in agriculture shines through in the findings. Policy analysts and agencies can help create an enabling environment for women and men to save, invest, and thereby improve their financial position in agriculture by addressing these identified factors.

CONCLUSION

This study presents empirical evidence on how intra-family dynamics and socio-economic variables distinctly influence saving behaviors within agricultural households in Türkiye, with particular attention to gender-based differences. The analysis of 268 rural households in Konya province highlights that gender plays a significant role in shaping financial decision-making, saving motives, and the deployment of capital.

The clustering and regression analyses reveal that female-headed households tend to exhibit a higher propensity to save, accompanied by greater average agricultural income (TRY 529,600.97 compared to TRY 428,342.72 in male-headed households) and lower consumption expenditure (TRY 41,023.12 vs. TRY 63,531.58). Women also allocate more resources toward agricultural investment (TRY 201,600.48 vs. TRY 64,259.94), underscoring a greater long-term financial orientation and commitment to productive use of income. These findings suggest that female farm managers, despite systemic constraints, often demonstrate a more conservative and goal-oriented approach to financial management.

Logistic regression outcomes further emphasize gender-specific determinants of saving behavior. For female household heads, experience (p<.048), agricultural income (p<.096), and household size (p<.040) emerged as statistically significant predictors of saving likelihood. Conversely, male-headed households are more influenced by educational attainment (p<.004), financial literacy (p<.044), and household composition, where increasing family size inversely correlates with savings (p<.000). Risk perception also displayed divergent effects; while elevated risk lowered male saving behavior (p<.076), it enhanced precautionary saving among women (p<.081). These insights support the premise that gendered financial priorities—driven by roles, responsibilities, and perceived vulnerabilities—translate into differing saving strategies.

Capital availability and agricultural income universally promoted savings, while consumption expenditures exerted a negative influence. Notably, a one-fold increase in consumption reduced savings by 1.06-fold in male-headed households (p<.043) and by 1.43-fold in female-headed households (p<.047). Additionally, financial literacy positively influenced the odds of saving for both genders, albeit more strongly for males (OR=1.298, p<.044) than for females (OR=1.01, p<.096).

While the findings offer valuable insights, the study has certain limitations. Firstly, the relatively small female sample size (n=45) presents a potential risk for insufficient statistical power in logistic regression. Nevertheless, the diagnostic and significance levels of the model indicate that the regression estimates are stable and interpretable despite this constraint. Secondly, the study is geographically constrained to Konya province, introducing regional limitations that may constrain the generalizability of findings to other agricultural contexts in Türkiye. These limitations include specific climatic conditions, crop patterns, and local economic structures. Furthermore, key regional variables such as climate factors, crop diversification patterns, and agricultural policy instruments were not explicitly incorporated into the regression model. The omitted variables may have a significant impact on the observed behaviors and could be indicative of important structural limitations of the current analysis. It is recommended that future research consider a more extensive geographic sampling and incorporate environmental and policy dimensions. This would serve to enrich the explanatory power and applicability of gender-sensitive rural financial models.

Overall, the findings underscore the necessity of incorporating a gender-sensitive lens in the formulation of financial inclusion policies and rural development strategies. Tailoring financial products and savings instruments to align with the socio-economic profiles and behavioral tendencies of both male and female agricultural managers can facilitate more inclusive economic growth. Supporting female farmers through targeted financial education, risk management tools, and diversified income opportunities is imperative to unlocking their savings potential and enhancing their role in sustainable agricultural development.

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Contribution Rate Statement Summary of Researchers

The authors declare that they have contributed equally to the article.

Conflict of Interest

The authors of the articles declare that they have no conflict of interest.

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