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Financial decision-making behaviors of Ethnic Tibetan Households based on mental accounting

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Abstract

Ethnic Tibetans (ETs) typically reside in the remote plateaus of China and possess strong cultural and spiritual values. Their financial decision-making is influenced by economic and physical factors, unique culture, social norms, and psychological motivators. We conducted an in-person survey of 480 randomly selected ET households across four provinces in rural China. The survey data was analyzed using three different econometric models—probit, ordered probit, and ranked ordered logit—to examine the choice of borrowing from formal or informal credit sources, the number of sources borrowed from, and repayment priority. Our findings indicate that mental accounting plays a significant role in the financial decision-making process of ET households. Additionally, we find that the informal credit source is strongly associated with the financial decisions of ET households. The majority of loans from formal financial institutions are used to meet daily needs, as opposed to purchasing productive inputs. Our results also suggest that strong social relationships and religious beliefs prevent households from defaulting, and that loans from formal financial sources receive repayment priority. China would benefit from promoting inclusive finance and encouraging the adoption of improved agricultural practices to support the prosperity of ET and other minority communities.

Keywords: Mental accounting, Rural financing behaviors, Ethnic Tibetan households, Religious belief

JEL Classification: R51, Q14, G4

Introduction

A well-functioning rural financial sector is closely linked to agricultural growth and rural poverty reduction in developing countries. The rural financial sector in developing countries is generally underdeveloped, and the financial repression or restraint problem is exacerbated by the adverse selection and moral hazard caused by information asymmetry (Stiglitz and Weiss 1981; Benami and Carter 2021). Capital requirements are high and diverse in Chinese rural areas, owing to the country's long period of strong economic growth. However, rural areas in the country have not received the same attention as urban areas, highlighting the need to strengthen financial services in rural areas.

Financial services, such as credit, savings, payment, and insurance, play an important role in raising incomes and improving family well-being, and alleviating poverty (Pitt and Khandker 1998; Agbola et al. 2017; Banerjee and Jackson 2017; Yan and Niu 2017; Huang et al. 2022).

A strong rural financial sector is needed to alleviate poverty in developing countries (Ma and Xu 2012; Chen et al. 2021). However, because of dispersed locations, a lack of collateral, small-sized loans, and high transaction costs, many formal financial institutions are unwilling to venture into rural areas. Therefore, there is a substantial unmet demand for credit in rural areas in many developing countries, including China (Jia et al. 2010). Access to the needed capital has become a bottleneck for economic development in rural China, particularly in remote ethnic Tibetan (ET) inhabited areas in Tibet and four other Chinese provinces (Sichuan, Qinghai, Yunnan, and Gansu). Tibetans are an impoverished ethnic group with distinct religious and cultural characteristics. Despite the fact that the Chinese government has provided funds to support rural enterprise development in ET-inhabited regions through direct fund transfer and subsidy payments, poverty is still rampant among ET households. According to the Analysis Report on the Indicators of Chinese Reports on Inclusive Finance (2017), the development of inclusive finance, that is, financial services and products to assist low-income populations, is still lagging in ET-inhabited regions.

Previous research has found that socioeconomic and cultural factors influence loan availability, loan amount received, and loan repayment behavior (Jiang et al. 2020; Sun and Luo 2020). ET households have unique cultural and economic circumstances because of geographical fragility, economic marginality, and the complexity of the social environment. Tibetan people generally believe in religion, and Tibetan Buddhism has an impact on their psychological emotions and core values (Cohen et al. 2008; Pan and Zhong 2016). Emotional decision-making factors, such as value trade-offs and psychological preferences, could influence the ET household decision-making process. ET households practice mental accounting (Thaler 1985) for a variety of purposes (e.g., food, clothing, and entertainment).

We study how mental accounting affects ET households' ability to participate in building resilient financial behaviors. Most previous research studies in China examining the financial behavior of ET households did not pay much attention to mental accounting, which is easily influenced by Tibetan cultural practices.

Mental accounting is an economic concept proposed by Nobel laureate Richard H. Thaler (1999). Small to individual or households have explicit or potential psychological accounting systems, as do large to enterprise groups. When making economic decisions, the mental accounting system often follows a type of potential mental operation rule that contradicts economic and mathematical operational rules. It frequently has an unexpected impact on decision-making, resulting in individual decisions that appear to be diametrically opposed to rational economic decisions (Thaler 1985, 2015).

Thaler (1999) states three parts of mental accounting. The first is the perception of decision results, and the formulation and evaluation of decision results. The psychological account system analyzes loss and benefit before and after decision-making. The second part deals with the categorization of activities for specific accounts, with funds divided into different categories according to source and expenditure, and consumption

sometimes subject to explicit or ambiguous budgets for specific accounts; The third part deals with the frequency and selection framework of account evaluation, where accounts can be weighed daily, weekly, or annually, with a broader or narrower time limit. Therefore, a "mental account" is the process of encoding, classifying, and valuing results (particularly economic results) in people's minds, revealing the psychological and cognitive processes of people when making (financial) wealth decisions. Cheema and Soman (2006) show that mental accounting biases are more prevalent when a particular purchase can be unambiguously categorized into a specific account.

Using data from in-person surveys of ET households in four Chinese provinces, we show that emotional variables affect ET households' financing behavior. Different approaches are used to investigate the factors that influence ET households' financing behaviors. Our results show that certain village, family, and individual characteristics significantly impact the type and number of borrowing sources, and repayment order of ET households. For example, the frequency of temple visits will reduce the availability of formal credit. Thus, we propose some strategies for developing inclusive finance, such as reconstructing an incentive and restraining mechanism for formal financial services and products (e.g., loans) and improving capital allocation efficiency in Tibetan areas. These findings will serve as a scientific foundation to guide the future formulation and enforcement of China's targeted poverty reduction strategy.

The remainder of this paper is organized as follows. "Literature review" section discusses the literature review on mental accounts and lending behavior. "Conceptual framework" section introduces a conceptual framework of mental accounting in ET household financing behaviors. "Study area, data source, and econometric models" section provides a brief description of the data source and the econometric model used in the model. "Descriptive results" section presents the descriptive statistics. "Results from regression models" section mainly analyzes the influencing factors (economic, physical, and emotional) of farmers' formal and informal borrowing activities in Tibetan areas, using the mental accounting model to conduct an empirical study. Finally, "Conclusions and policy implications" section draws conclusions and policy implications.

Literature review

Researchers studying the financing behavior of farmers have primarily focused on financing decisions and repayment behavior (Jiang et al. 2020). Most researchers discuss financial capacity and channel preference when it comes to financing decisions (Ding et al. 2014). Financial capacity and channel preference are affected by a variety of factors, including social capital, household economic characteristics, and credit supply (Liu et al. 2019). The financial capacity of farmers is primarily analyzed in terms of loan availability. Farmers' ability to obtain financial services or products is influenced not only by their wealth (Paulson et al. 2006) but also by the level of regional financial development (Conning and Udry 2007; Wang and Fu 2022). Formal financial institutions frequently have more stringent requirements for the quality and value of collateral, constraining farmers from obtaining loans (Zhang et al. 2015). Farmers obtain funds from both formal and informal sources. Several studies have found that high transaction costs and difficulty obtaining loans from formal financial institutions drive farmers to borrow through an informal (private lending) channel (Aghion and Bolton 1997). Ding et al. (2014) state

that the farmers' preference for private financing is a result of financial repression rather than a personal choice. Because the loan process and procedures of formal finance are too complicated to apply, farmers are frequently forced to choose private financing. Despite the low transaction costs and default supervision of private financing, interest rates are generally high (Jiang et al. 2020). It is possible to facilitate interest rate agreement between borrowers and lenders, resulting in improved matching of funding supply and demand and increased efficiency in informal borrowing (Chao et al. 2021). Several researchers have suggested that group decision theory may be useful for achieving consensus among borrowers ((Chao et al. 2021; Kou et al. 2022; Zhang et al. 2019).

Researchers have indicated that various factors such as mechanism, willingness, operation characteristics, credit status, credit history, and loan amount affect repayment behavior and financial inclusion (Chirwa 1997; Sharma and Zeller 1997; Godquin 2004; Jiang et al. 2020; Chao et al. 2021). Farmers with more stable production and a higher credit rating (Sharma and Zeller 1997) are more likely to repay their loans on time (Chirwa 1997; Sharma and Zeller 1997; Bauchet et al. 2011). Moreover, the loan amount is inversely proportional to repayment behavior (Jiang et al. 2020). The longer the loan term, the more likely farmers are to repay the loans on time (Godquin 2004; Jiang et al. 2022). Borrowers' social capital also influences loan repayment. Zeller (1998) found that the joint liability mechanism and social network supervision can significantly influence the repayment behavior of Madagascan farmers. Social capital affects the loan repayment ability of farmers mainly through three channels: increasing income, improving credit access, and risk control (Li et al. 2018).

Recent research on factors influencing farmer financing has progressed from socioeconomic characteristics to social relationships and religious beliefs. For instance, Yu (2017) found that the social network formed by human interaction had a significant impact on rural financing behaviors. In a social relationship, whether or not people associate with each other is determined by their shared sense of worth and emotional proclivity. Religious belief is a typical combination of values and emotions in Tibetan areas. As a result of rural China's underdeveloped formal financial market, the informal financing channel is more important in Tibetan areas than in the majority Han Chinese who live in rural areas. For instance, Jiang (2014) indicates that private financing accounts for the majority of the financing market in ET-inhabiting areas. Tibetan financing behaviors are constrained not only by the legal system but also by local customs and etiquettes, as well as Buddhist beliefs, which has increased the prevalence of temple loans.

Mental accounting is a cognitive operating system for individuals, families, or organizations to pay attention, code, and evaluate economic activities. Mental accounting refutes the rational person hypothesis and is a further development of the bounded rationality model. Mental accounting research can help us better improve mental accounting and advance the science of individual decision-making. Mental accounts offer a more plausible explanation for farmers' financing decisions. Zhu and Li (2018), based on bounded rationality and the endowment effect, indicate that all consumers have a mental accounting, and financial consumers instinctively create various psychological frames, causing the cost and benefit in traditional economics to no longer be simply equal. The root cause of psychological accounts is the endowment effect. Wang (2019) advances that bounded rationality is the root of the psychological

account phenomenon. During the early stages of psychological account development, researchers primarily focused economic behavior with varying incomes and expenditures. Subsequently, psychological account theory has been widely applied to research on investment and consumption decisions (Antonides et al. 2011), human resource management, and wealth management (Li et al. 2018).

Most researchers use mental accounting to study consumption decisions (Wang 2019). For instance, an individual uses mental accounting to carry out a mental budget for products, focusing on several key elements to simplify their consumption pattern selection and make multi-product consumption decisions. Thus, to control consumption, consumers rely on established mental accounts to create budgets (Heath and O'curry 1994; Heath 1995; Botond and Filip 2020). Banerjee et al. (2019) collect data from Indian and American students representing Eastern and Western cultures to analyze differences in the influence of mental accounting on consumption behavior. Their research reveals that the different ways of thinking lead to different types of accounting treatments—a piecemeal accounting process for Westerners and a comprehensive accounting process for Easterners. They also find that Easterners' mental accounting biases are not as strong as Westerners'.

When poor people are given the option of participating in financial credit and insurance services, they feel psychologically worse and less motivated than when those two financial products are combined. Financial institutions take advantage of this psychological account effect on customers by bundling financial products. Credit is a loss for people because it requires interest or fee payments, and the riskier the credit products, the less incentive the poor have to participate. Subsidies in low-income areas, such as government insurance subsidies, rural microfinance, and weather insurance, are bundled together. This model of bundling multiple financial products on mental accounts is a gain, and it can inspire more poor people to participate in agricultural insurance and rural microfinance. However, horizontal interconnection and interaction between financial institutions, as well as government policy guidance, are required (Huang and Hu 2017). In the insurance industry, mental accounting has been used to explore whether people's motivation to obtain insurance is related to their understanding of guarantees and deductibles, which has been found to be strongly correlated (Fels 2020).

Applying mental accounting to various areas opens up new research avenues (Henderson and Peterson 1992). However, mental accounting has primarily been used in consumption decisions, with few exceptions in financial decisions, let alone ET households' financing behavior. We assume that regional characteristics are intertwined with religious culture, which is a critical factor affecting the psychological features of ET households' financial decisions. Furthermore, religious beliefs have a substantial impact on their repayment behavior. Because ET households revere the three treasures of Buddha, Dharma, and Sangha, they rarely default or postpone temple repayment, and religious beliefs bind borrowers (Wang et al. 2017). In their opinion, if the loan is not returned to the temple, the family's fortunes will be ruined for good. As a result, people with strong religious beliefs are more likely to repay temple loans first. Similarly, we argue that understanding the unique characteristics of ET households is critical, as this can influence their financing behaviors. This paper studies the mechanism of using mental accounting in financial decision-making by analyzing three consecutive

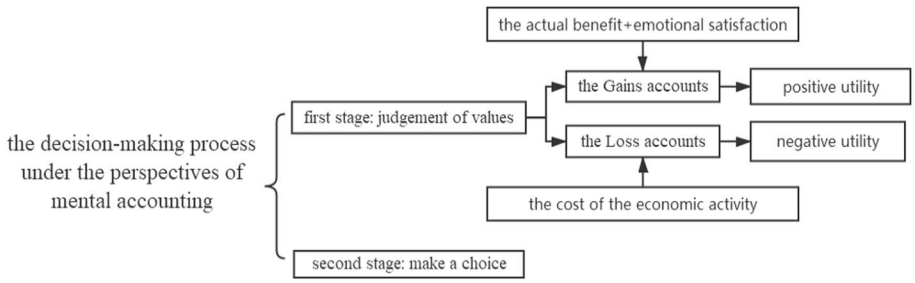

Fig. 1 Conceptual framework of the decision-making process under the mental accounting method

lending behaviors of ET households: borrowing decision, loan use, and loan repayment. Furthermore, these findings can be used to provide a case study of Tibetan areas, more empirical support for mental accounting theory, and policy implications for the long-term development of Chinese ethnic areas.

Conceptual framework

Figure 1 depicts the conceptual framework of the current study. The theory of mental accounting holds that there should be two stages in the decision-making process (Heath and Soll 1996). First, individuals evaluate the potential transactions, a process known as the *judgment of values*. In this stage, individuals will divide every economic activity into two separate accounts by assessing the gain and loss and establishing the gain and loss accounts. We assume that the gain account includes not only the actual benefits of an individual's behavior, but also the emotional satisfaction of that behavior, which may result in positive utility for the decision maker. In contrast, the loss account includes all costs associated with this economic activity, including time, money, and emotional investment, providing decision-makers with negative utility. After weighing the benefits and drawbacks of these two accounts, the decision maker will form an opinion about the activity. The second stage is to *make a choice* based on optimal account utility (see Fig. 1).

According to the funds theory of interest, when a rural household borrows money from a financial institution, they must pay a certain amount of interest for this loan, and the lenders will profit from the related interest (see Fig. 1). If an interest rate is set, it is only implemented when the utility of obtaining and using the loan exceeds or equals the utility of paying the interest. In general, ET households should select financing channels with the highest psychological utility. In reality, some ET households would seek financing from bank and temple loans, despite the high interest rates and transaction costs, because the psychological benefit is greater. According to our survey, 42.25% of ET households who have obtained loans borrow from two or more sources (see Fig. 2). Approximately 55.17%, 6.90%, and 4.31% of ET households apply for loans from banks only, temples only, and from both sources, respectively. Traditionally, besides the differences in quantity, financing from various borrowing channels should be fungible. However, we find a significant difference in financing from various sources. With this in mind, as well as the fact that mental accounting is not fungible, financing sources have been classified into different accounting and utilities.

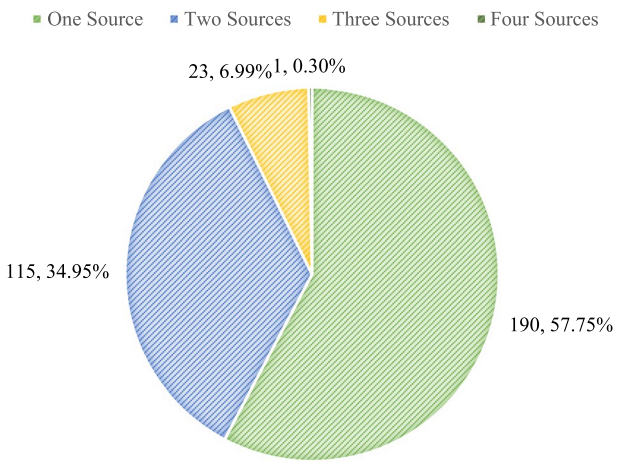

Fig. 2 Diversity of borrowing sources used by ET households. *Notes*: The borrowing sources mainly include the government's anti-poor loans, bank loans, friends and relatives, and temple loans. In this paper, the formal loans include the government's anti-poor loans and other bank loans, while the informal loans include temple loans and loans from friends and relatives

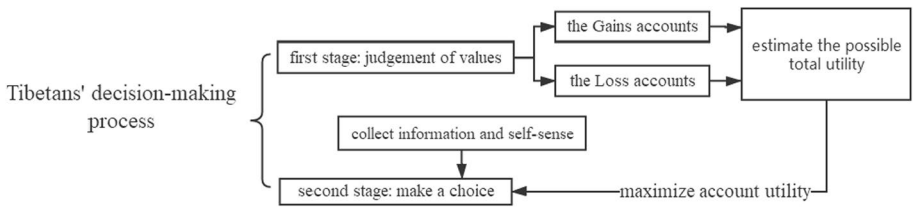

Fig. 3 The decision-making process of ET households using the mental accounting method

Our framework is based on the theory of mental accounting and has been adapted to analyze the selection of financing sources, usage of money, and repayment behaviors of ET households. Concerning the theory of mental accounting, we assume that ET households also experience two-stage choices and make decisions based on pertinent information and self-perception. Consequently, they create the gain and loss accounts for each activity and estimate the total utility. Ultimately, they make a self-satisfying choice based on maximizing utility (see Fig. 3).

Financing sources

The gain and loss accounts of ET households determine the financing sources. There are three principal sources of financing: bank, private, and temple (Jiang 2014). ET households could use borrowed funds for consumption smoothing, agricultural and livestock production investments, and religious contributions. These activities provide direct economic utility to ET households, which is allocated to the gain account.

Financing from the bank channel

Aside from the economic benefit, a person who receives bank financing is respected by the villagers. This financing implies, to some extent, that a formal financial institution has recognized an individual's revenue-generating activities. Without considering other sources of financing (e.g., government subsidies), we believe that the gain only accounts

Table 1 The gain and loss accounting conditional on funding sources

Loan source	Gain accounting	Loss accounting
① Bank loans	Economic utility + social utility	Transaction cost utility
② Social loans	Economic utility	People's favor cost utility
③ Temple loans	Economic utility + religious satisfaction utility	Interest rate utility + people's favor cost utility

for financing from formal financial institutions and consists of economic and social utility.

In terms of the loss account, we believe it should include the time spent searching for financing as well as the cost of gathering information. It should be noted that ET households are typically isolated and far from the town center, where financial institutions are generally absent. Transportation and information collection are more expensive for ET households (Jiang 2011). Besides, because Tibetans have a low level of education, they struggle to understand the formal financing process and incur higher transaction costs. Although governments offer no-interest or low interest loans, other indirect costs in the financing process remain extremely high. As a result, the loss account under consideration here should have higher transaction costs (see Table 1).

Financing from social channels

Formal financial sources are nonexistent or relatively fewer in some Tibetan areas compared to other rural areas in China. Aa a result, the majority of ET households would prefer to finance through social relations. Nan (2010) indicates that social interaction is important in the financing behaviors of Tibetans in *Guide* county, *Qinghai* province. They would seek assistance from neighbors to overcome difficulties associated with daily living or production. Consequently, villagers form a stable and long-term social interaction network. ET households initially consider borrowing from friends and relatives when it comes to financing. To some extent, financing from these social interactions exemplifies the mutual assistance relationship, in which individuals can borrow for free or at a low interest rate. Borrowing from informal sources, therefore, helps to avoid high-cost borrowing from formal financial institutions (Li et al. 2019). However, one potential cost exists when borrowing from people, which is called the *people's favor.* It is an emotional cost that states that the beneficiary should always be grateful for the assistance provided by their social network (Turvey et al. 2010). Namely, the beneficiary should assist lenders in a similar situation. *People's favor* should be allocated to the loss account when borrowed from informal sources (such as friends and relatives). Similarly, the economic utility should be grouped into the gain account (see Table 1).

Financing from a temple channel

As previously stated, Tibetan Buddhism is almost universally practiced in ET households. For them, this belief has become a powerful source of spirituality. The ideology of Tibetan Buddhism has permeated every aspect of ET household production and living. ET households consciously donate a fixed proportion of their income to temples, including monetary deposits, yak, or others, due to tenets such as the equal existence

of living beings and reincarnation. As a result, the temple has funds available for lending. When ET households face financial difficulties, their desire to find *a living Buddha* motivates them to borrow from the temple (Wang et al. 2017). With this understanding, we believe that the temple loan not only provides financial assistance to ET households but also meets their religious needs. It should be noted that most Han ethnic Chinese people do not receive funding through the temple channel. It is primarily restricted to ET-inhabited areas.

Temple loans typically have higher interest rates than formal financial institutions. For example, if the loans are used for business, the annual interest rate can range between 20 and 30%, whereas if the funds are used for medical treatment, the interest rate is lower (Jiang 2014). Additionally, those who receive temple loans are required to be grateful to Buddha, which can be viewed as a kind of people's favor cost. In general, the gain account of temple loans includes both economic utility and religious satisfaction. Meanwhile, interest and people's favor costs are included in its loss account (Table 1). To summarize, we calculate the gain and loss accounting for ET households using different funding sources separately (Table 1).

According to the utility theory, total utility equals the sum of the gain and loss utilities. Here we review what we have described about total utility through three different financing channels:

1. $Total\ Perceived\ Utility\ of\ Bank\ Loans = Economic\ utility + Social\ utility - Transaction\ cost\ utility$
2. $Total\ Perceived\ Utility\ of\ Social\ Loans = Economic\ utility - People's\ favor\ cost\ utility$
3. $Total\ Perceived\ Utility\ of\ Temple\ Loans = Economic\ utility + Religious\ satisfaction\ utility - Interest\ rate\ utility - People's\ favor\ cost\ utility$

By comparing these total perceived utilities from different sources, ET households will adhere to their value judgment. Thus, the first stage is completed. Then, based on the value judgment, the financial channels are selected. However, the financing order is not fixed; it fluctuates based on the regional credit status, farmer characteristics, and demand characteristics. Those concerned about their social standing dislike social loans, whereas those unfamiliar with formal financial institutions prefer temple loans or social loans. Obviously, if the municipality has a high credit rating, local farmers prefer to obtain loans from formal financial institutions.

Use of loans

Most ET households are dispersed across the plateau and engage primarily in traditional agricultural and animal production. Due to the vulnerability of its geography, their production activities are frequently severely affected by the environment and the weather, resulting in a relatively low and unstable income. The financing demand of ET households has two components: borrowing for daily subsistence and borrowing for agricultural operations. Theoretically, they have three avenues for borrowing: private lending through social connections, temple lending, and formal financial institutions (Jiang 2014).

According to the mental accounting theory, rational people usually have a more rigorous calculation of loss and interest before making financial decisions. They focus more on losses than on gains (Kahneman and Tversky 1979). The priority for ET households is to borrow from family or friends to alleviate their financial constraints. Generally, this loan channel does not require them to pay minimum money costs, but it does require them to invest time in maintaining their relationship in daily life, although this may be the cheapest borrowing channel. When this method of borrowing is insufficient to meet the demand for funds, they will borrow from the second channel—temples. Receiving temple loans is not time-consuming. Temples charge different interest rates to varying borrowers according to the closeness and relatedness to the temple. When the first two channels are insufficient to alleviate rural households' financial distress, they choose to borrow from formal financial institutions. Borrowing from conventional financial institutions is typically accompanied by higher mortgage, guarantee, emotional, time, and fixed interest costs (Yin et al. 2015). Therefore, many ET households do not borrow from formal financial institutions.

An interesting phenomenon is that although ET households prefer not to borrow from formal financial institutions, these institutions also tend to exclude lending to ET rural residents. This phenomenon occurs because farmers and herders are the bank's long-tail customers. There is a significant information asymmetry between them. The bank's inability to fully and promptly comprehend the loan purpose of farmers and herders is likely to result in post-lending credit risk (Liu and Cheng 2009). Therefore, in the mental accounting of bank lending, ET farmers and herders are also positioned in the back.

Repayment of loan

According to the mental accounting theory, rational individuals also choose to repay the loan in order of priority. We assume a rural ET resident has three types of debt: loans from relatives, loans from temples, and bank loans. The first two are defined as informal financial loans, whereas the third is defined as formal financial loans. Our interest is to find the debt repayment priority of ET households.

Based on our field research, we observe interesting scenarios. ET farmers and herders have almost no active contract violations. Their religious convictions require them to honor their obligations. Therefore, they always endeavor to repay their debts prior to the due date.

Consider a scenario in which an ET household has three types of debt and is unable to repay them all on time. Traditionally, they prioritize repaying temple loans; doing otherwise would be disrespectful to Buddha. Then, they will prioritize the repayment of relationship loans because, if they are unable to repay the debt of relatives and friends on time, the ET household's reputation will suffer greatly. Others would include their family on a "dishonest list" within a small network of friends and relatives (Zhao and He 2007). When families require financing for a second time, few individuals are willing to provide so. However, as time passes, this could change. The official financial industry is contacting Lamas or living Buddhas and requesting that individuals pay the bank on time rather than the temple.

We can find the reason for this situation from the mental account theory. The repayment decision of an ET family takes the cost into full account. If they do not repay the bank loan, they will incur the penalty. The cost of the penalty includes time, economic, and reputation costs. If they do not repay the temple loan, they will be responsible for the material cost; if they do not repay the relationship loan, they will be responsible for the reputation cost. Therefore, "penalty cost > reputation cost > material cost" applies to ET households.

Study area, data source, and econometric models

Based on the conceptual framework presented in the previous section, we outline empirical models to analyze whether the ET family psychological account has a practical impact on borrowing and repayment behavior.

Study area and data source

To investigate whether ET households' mental accountings have any effect in the real-world situation, we collected in-person interview data in 2018 from ET households located infour provinces, namely Qinghai, Sichuan, Yunnan, and Gansu. The four Tibetan provinces have similar environmental, social, and economic development. The stratified random sampling method was used to collect the data. First, ten Tibetan autonomous prefectures were chosen from the provinces of Sichuan, Qinghai, Yunnan, and Gansu. We randomly selected 1–3 autonomous counties in each Tibetan autonomous prefecture and 2–6 representative towns in each county. Again, 2–3 sample villages were randomly selected in each sample village, and 15–20 Tibetan households were chosen at random within each sample village for household investigation. To be more specific, we considered whether the households were poor or not during the sampling, and stratified sampling and in-person interviews were conducted in poor and non-poor villages in a 6:4 ratio to ensure the survey data's reliability and comparability.

Simultaneously, we took several steps to control sampling bias. First, we considered the economic conditions, traffic, and poverty levels in each region when selecting towns and villages. Second, with the help of the village head and local farmers, we conducted an in-person interview survey of households, considering the language barrier in Tibetan areas and other factors. In the questionnaire, we also considered actual village conditions in Tibetan areas, such as yak breeding and the number of temples. The collected information covers bank loans, private financing, temple financing, repayment behaviors, government subsidies, and financial-related issues. Only 420 of the 480 ET households interviewed responded to the majority of the questions required for economic analyses. Among 420 observations used in this study, 412 respondents were Tibetan, 7 were Han, and 1 was Naxi. The Tibetan to Han respondent ratio was 98.10:1.67.

Model

We use four econometric models to understand the influence of variables on borrowing and repayment. First, using probit models, the factors influencing borrowing from formal

and informal sources are identified. The number of sources from which ET households borrowed is then chosen as a dependent variable in the ordered probit model. Finally, in the rank-ordered logit model, different loan repayment orders are chosen as dependent variables. Variables described in the conceptual framework and other variables identified as important in previous studies were used to select explanatory variables. Social capital, household economic characteristics, and credit supply, for example, influence loan availability (Ding et al. 2014), whereas operation characteristics, credit status, and loan amount may influence repayment behavior (Sharma and Zeller 1997; Godquin 2004).

Probit model

Our dependent variable is binary, indicating whether ET households borrowed from formal or informal sources. The observed outcome z_i is determined by a latent regression (Chen 2014),

$$z_i^* = \gamma^{'} W_i + \xi_i \tag{1}$$

The random variable z_i takes two values, one and zero, with probabilities

$$\begin{aligned} Prob(z_i = 1|W_i) &= Prob(z_i = 0|W_i) \\ &= Prob(\gamma' W_i + \xi_i > 0) \\ &= Prob(\xi_i > -\gamma' W_i) \end{aligned} \tag{2}$$

The model is completed by specifying a particular probability distribution for ξ_i. In terms of building an internally consistent model, we require that the probabilities be between zero and one and increase when $\gamma^{'} W_i$ increases.

Ordered probit model

We want to know what factors influence ET households' borrowing behavior from one or multiple sources. An ordered probit model is an underlying random utility model or latent regression model (Johnston et al. 2020),

$$y_i^* = \beta^{'} X_i + \varepsilon_i, i = 1, \ldots .., n \tag{3}$$

in which the continuous latent utility or "measure," y_i^* is observed in discrete form through a censoring mechanism (Navandar et al. 2020). The dependent variable in this case is the number of borrowing sources, which can range from 0 to 4. ET household loan sources include anti-poverty loans from the government, bank loans, loans from friends and relatives, and temple loans.

Rank-ordered logit model

We ask ET households to rank repayment orders for various loans, such as the government's anti-poverty loan, a bank loan, a loan from friends and relatives, and a temple loan. The repayment priority order is expressed as first, second, third, and fourth, corresponding to the numbers from 1 to 4.

We select a rank-ordered logit model to conduct the analyses. Respondents are asked to rank items rather than choose their preferred repayment option in this model. Given

that we are considering loan repayment for four different sources, the full ranking looks like the following (Fok et al. 2012)[1]:

$$U_{ir_{i1}} > U_{ir_{i2}} > \cdots > U_{ir_{ik}}, \quad \text{where } k = 4 \tag{4}$$

With a set of assumptions, the final model can be obtained (Ghimire et al. 2017), where the probability of observing a particular ranking r_i is equal to

$$\begin{aligned} Prob[r_1; \beta] &= Prob\left[U_{ir_{i1}} > U_{ir_{i2}} > \cdots > U_{ir_{ik}}\right] \\ &= \prod_{k=1}^{K-1} \frac{exp\left(V_{ir_{ik}}\right)}{\sum_{l=k}^{K} \exp\left(V_{ir_{il}}\right)}. \end{aligned} \tag{5}$$

Here, $U_{ij} = V_{ij} + \zeta_{ij} = \theta_j X_{ij} + \zeta_{ij}$. ET household i with sociodemographic characteristics X_{ij} gives borrowing source repayment a rank k which is denoted by r_{ik}.

Descriptive results

In this section, we focus on the detailed analysis of the ET households' borrowing channels, total number of borrowing channels used, use of borrowed funds, and repayment behavior using descriptive statistical analysis (Table 2).

Borrowing channels

Table 3 shows the primary sources of funding for ET households. Of the ET households, 55.75% borrowed from the bank, 55.50% from social relations, and 6.75% from the temple.[2] This suggests that informal financial transactions are prevalent in the areas inhabited by ET households. With the advent of inclusive finance, however, more ET households borrow from formal financial institutions, such as bank loans and government anti-poverty loans distributed by rural credit unions. The preference of ET households for financing channels is closely related to the loan interest rate. Bank loan refers to small loans for poverty alleviation, which adopts the 530 policy; that is, the government provides a three-year loan of 50,000 yuan with zero interest discount. The interest rate on a loan obtained through social relationships is typically zero or very low, whereas the rate on a temple loan is typically high. It may also provide evidence that the utility of bank financing and social relations are converging in the mental accounting of ET households.

Table 4 provides information regarding satisfaction with financing, particularly from formal financial sources. Of the ET households, 57.25% responded that loans from formal financial sources helped them improve their standard of living. Furthermore, we find that 76.47% of these borrowers are village officers. This number is significantly greater than those who do not demonstrate leadership (non-village officers who got a loan account for 52.63%). This indicates a correspondence between a social reputation and obtaining loans, reflecting the social utility of bank loans.

[1] Rather than providing a complete ordinal ranking of all available options, it is possible to adopt a pairwise comparison method. For recent advancements in this methodological approach, please refer to the work of Xiao et al. (2023).

[2] Very small percentages of farmers use other financial sources to borrow such as private lending, rural mutual fund, farmers' cooperative organization, and small loan companies.

Table 2 Summary statistics of variables used in the empirical model

	Variable	Variable definition	N	Mean	SD
Dependent variables	Formal credit	Have you borrowed money from formal sources? (Yes = 1; No = 0)	411	0.543	
	Informal credit	Have you borrowed money from informal sources? (Yes = 1; No = 0)	403	0.576	
	Waynum	Number of borrowing sources (ranging from 0 to 4)	415	1.188	0.833
	Repay	The rank order that shows repaying preference for the government's anti-poor loan, bank loan, loan from friends and relatives, and temple loan (1 = first; 2 = second; 3 = third; 4 = fourth)	420	2.500	1.118
Independent variables	Credit village	Whether it is a credit village (Yes = 1; No = 0)	417	0.113	
	Temple	Number of religious places in villages	417	1.206	0.941
	Telecom	Whether to connect to the telecom network (Yes = 1; No = 0)	417	0.957	
	Certificate	Whether there is a certificate of land title (Yes = 1; No = 0)	420	0.679	
	Poverty	Are they poor? (Yes = 1; No = 0)	419	0.621	
	Religion	Frequency of family visits to temples (1 = never; 2 = rarely; 3 = once a year; 4 = go to a special religious festival; 5 = once a month; 6 = once a week; 7 = more than once a week)	419	4.103	0.964
	Association	Whether they attend special technique association (Yes = 1; No = 0)	411	0.024	
	Str income	Income structure = agricultural income/total income	315	0.283	0.255
	Dowry	Social spending (unit: thousand yuan)	391	3.712	6.094
	Age	Age	418	46.667	10.797
	Gender	Gender (female = 1; male = 0)	420	0.212	
	Married	Marriage (single = 1; married = 2; divorce = 3; widowed = 4)	418	2.172	0.599
	Health	Health (very good = 1; good = 2; normal = 3; not good = 4; very bad = 5)	405	2.516	0.948
	Edu	Education (1 = uneducated; 2 = did not finish primary school, but can read and write; 3 = primary school graduation; 4 = junior high school graduation; 5 = high school/vocational high school/technical secondary school graduation; 6 = college graduate; 7 = undergraduate degree)	400	1.908	1.139
	Agrilost	The score for theloss in agriculture (the losses gradually increase in this order: 1 point, 3 points, 5 points, 7 points, 9 points)	400	2.906	1.083
	Labor	Number of laborers at home	412	2.265	0.954
	Land	Homestead squares (unit: square meters)	361	175.628	135.688
	Income	Total income (include income in the crop, business, rent, and off-farm income; unit: hundred yuan)	319	3.522	3.237
	Loan info	Have you ever heard about microfinance (Yes = 1; No = 0)	414	0.754	
	Loan need	Do you need a microfinance loan? (unknown = 1; no need = 2; need = 3; need very much = 4)	412	2.670	0.723
	Skill	Whether the family members have special skills (Yes = 1; No = 0)	411	0.299	

When using the rank-ordered logit model, the data structure is changed, so all the variables chosen have more than 420 observations. In that case, the variables were grouped individually into 1680 observations

Table 3 Main lending sources of ET households

Lending sources	Number of households	Percent
Bank loans	223	55.75
Social relations	222	55.50
Temple	27	6.75
Others	17	4.25

Other lending sources include private lending, rural mutual funds, farmers' cooperative organization, and small loan companies. The data is from a survey of Tibetan people in four provinces in 2018. We asked, "Do you have loans from a bank or other sources?" It is worth noting that in this paper, the formal loans include the government's anti-poor loan and bank loans, while the informal loans include temple loans and loans from friends and relatives

Table 4 Satisfaction with the funding

Satisfaction with the living improvement	Number of households	Percent
Very little improvement	0	0.00
Relatively small improvement	14	6.11
Normal improvement	32	13.97
Very large improvement	136	59.39
Huge improvement	47	20.52

This table shows the response to the question," Does the small loan you apply for have a significant impact on your life and production activities?"

Table 5 Reasons for dissatisfaction with lending from banks

Reasons	Number of households	Percent
Complicated procedures	7	50.00
Too many conditions attached to the loan	3	21.43
The service attitude of the bank staff is not good	8	57.14
The approval time is too long	2	14.29
The quota is too small to meet the demand	3	21.43

Of the survey respondents, 17 ET households express dissatisfaction with loans from formal sources (Table 5). Among them, 21.43% indicate there is an excessive amount of paperwork required to obtain loans, 14.29% criticize the lengthy approval process, and 50.00% think the procedures are too complicated.

Table 6 provides reasons why ET households do not seek bank loans. There are 28.13% of ET households who stated they stopped applying for a bank loan because they did not have a social connection to get the loan, 28.13% who did not apply because they did not know the loan disbursement method used by banks, and 3.65% who did not apply because there is no easily accessible transportation facility available from their village to where financial institutions are located. Many respondents also stated that the transaction cost of a bank loan is substantially higher than that of other sources.

Figure 4 shows the expenses incurred in maintaining social relationships among ET households who borrowed from relatives and friends. Despite low household income, families spend a substantial amount of money on maintaining positive social relationships. In 2017, the average cost of maintaining social relations was 3712 yuan per household (13.58% of household income). As illustrated in Fig. 4, 19.29% of households

Table 6 Reasons for not applying for bank loans

Reasons	Number of households	Percent
No social relationships	54	28.13
Too far distance	7	3.65
No idea about loans	54	28.13
Not rated	8	4.17
Easier to borrow money from other sources	15	7.81

We asked, "If you have not applied for a loan from formal sources, why?"

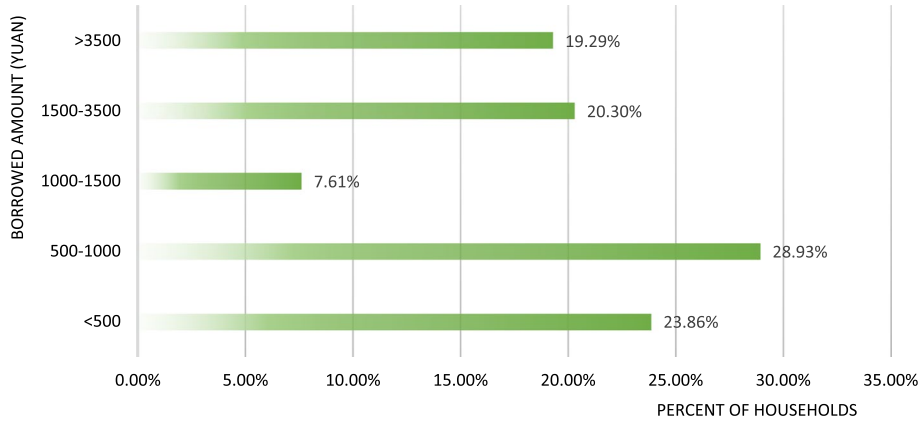

Fig. 4. 2017-Expense in maintaining social relationships among Tibetan households who borrow from relatives and friends. *Note*: US$1 = 6.78 yuan (as of 1/22/2023)

spend more than 3,500 yuan on social relations. In particular, 5.13% of families spent 10,000 to 50,000 yuan on maintaining social relationships. Furthermore, we find that these families' income levels are relatively high, owing to the strong influence of Tibetan human culture. To maintain social relations, they invest more in marriage, funerals, birthdays, holidays, and other human contacts. ET households that borrow from relatives and friends typically spend a substantial portion of the borrowed funds on maintaining the social relationship.

Temples can be found in almost every village. A village can have a maximum of seven temples. Similarly, 92.59% of villagers have a religious belief on average. A strong religious atmosphere obligates Tibetan households to fund temples. They also benefit from borrowing from temples, despite the fact that the interest rate is higher than in other formal or informal sources. Among those who borrowed from temples, 24.24% received temple financing with an interest rate less than 10%, 36.36% received a 10%–15% interest rate, and 39.40% received an interest rate greater than 15%.

Temples charge interest based on the loan's use and the borrower's credit history. The interest rate on loans for business investment is much higher than the interest rate on loans for health care. The interest rate on temple loans is arbitrary and varies greatly by region. In places where formal financial institutions do not exist or where credit from formal financial institutions is difficult to obtain, temples charge interest rates up to four times the average bank loan rate in that county.

Table 7 Overview of bank loan use by Ethnic Tibetan households based on production and consumption categories

Category	Items	Number of households	Percentage (%)
Production	Farming and animal production	76	32.34
	House Construction	64	27.23
	Starting and running business	29	12.34
Consumption	Basic Consumption	95	40.43
	Social relationship Expenditure	60	25.53
	Medical Treatment	60	25.53
	Debt Repayment	30	12.77

Here, we asked, "what is the primary purpose of the formal loan application?"

Use of loans

Referring to the classification method of social institutions and microfinance organizations, we divide loan use into loan for production and loan for consumption. The production includes farming and animal production, house construction, and business starting and running. The consumption part includes basic consumption, social relationship expenditure, medical treatment, and debt repayment Table 7 shows that 40.43% of ET households seek bank loans to meet capital needs for agriculture and livestock production, house construction, social relations, medical treatment, and debt repayment.

We asked all ET households to respond, "*How many yaks (do you think) are needed for dowry or so-called 'bride price*'?" Results show that 1.23% choose "no need to prepare yaks." Other responses like "1–2," "3–5," and "More than 5" account for 60.49%, 20.99%, and 17.29%, respectively. Yaks are regarded as a valuable asset item by ET households. As a result, the number of yaks in the dowry or "bride price" may reflect the importance of social relationships. When ET households do not have enough yaks, they apply for bank loans to purchase yaks in order to maintain social relationships.

Table 7 shows that only 12.34% of ET households are likely to use bank loans for "starting and doing business." This ratio is significantly lower than the percentage of loans for "Use on Farming and livestock production." Furthermore, a question like "*Do you want to buy a lottery?*" is intended to assess Tibetan households' risk attitudes. Economists are well aware that those who want to buy a lottery are risk takers, whereas those who do not are more likely to be risk averse (Thaler 2015). The results show that 86.21% of ET households who choose to use the loan for "*Starting or Doing Business*" leave a "No" response to the question. In comparison, the percentage of respondents who said "No" to the same question in the group "*Use on Farming and Stock-raising*" is 93.42%. The result demonstrates the critical point that ET households are risk averse. In other words, it explains why these ET households prefer to use loans for agricultural and livestock production rather than nonagricultural businesses. Although the rate of return on subsistence agriculture is frequently low, it also carries a low risk.

Repayment of loans

In response to the question, "*If you do not have enough money, which financing sources would you like to pay back first, second, third, and fourth*?" we gave households four options to choose from and rank: (i) anti-poverty loans from the government, (ii) bank

Table 8 Percentage of respondents ranking the repayment order of different loans

Loans to repay	Rank			
	1	2	3	4
Government's anti-poor loans	33.99	33.60	18.58	13.83
Bank loans	36.60	38.49	19.25	5.66
Loans from friends and relatives	13.64	20.83	41.67	23.86
Temple loans	15.02	10.30	18.45	56.22

For the rank, 1,2,3,4 refers to repaying this kind of loan as first, second, third, and fourth priority, respectively. For example, for the government's anti-poor loan, there are 33.99% of ET households prioritize paying it as the first repayment priority, and 33.60% of ET households stated it as the second repayment. Here, the question asked was, "*If you do not have enough money, which financing sources would you like to pay back first, second, third, and fourth*?" We provided the four choices given in the first column. Details on the variables influencing the repayment order are later analyzed using the rank-ordered logit model

Table 9 Ability to differentiate the bank loan and government subsidies

Items	Number of households	Percentage (%)
They are the same ①	29	12.50
They are not the same ②	203	87.50
Among ①: treat bank as the first repayment object	12	41.38
Among ②: treat bank as the first repayment object	68	36.96

Here, we asked the question, "Do you think the government's anti-poor loan is the same as a bank loan?"

loans, (iii) loans from friends and relatives, and (iv) temple loans. The results are shown in Table 8. For the government's anti-poor loan, 33.99% and 36.60% of ET households choose them as their first and second repayment priority, respectively. The interest rate on temple loans is relatively high, which may encourage ET households to prioritize repayment. However, approximately 56.22% of ET households regard it as the final repayment; this could be due to two reasons. For starters, ET households are closer to the temple than they are to the bank. Most people who borrow from temples go there to pray or have family members who work there, making them less eager to repay temple loans. Second, the default rate on temple loans is low, and borrowers can frequently apply for renewal. Nonetheless, up to 50% of ET households repay temple loans on time or ahead of schedule. Among those repaying, 76.81% of Tibetans prefer to repay temple loans on time. Religious belief continues to have a binding force, which encourages ET households to work hard and not default on temple loans.

We also test the basic financial knowledge of ET households by asking, "*Do you think the bank loan is the same as government subsidies?*" As many as 12.5% of Tibetans interviewed chose "they are the same" (see Table 9). Few respondents, as expected, have difficulty distinguishing between bank loans and government subsidies. In the cohort of bank loans, 36.96% of respondents prioritize repayment to the bank.

Table 10 Regression results from a probit model identifying the factors that influence borrowing from formal sources

Variable	Coeff.	Marginal effects
Credit village	0.056	0.018
	(0.312)	(0.100)
Temple	−0.005	−0.002
	(0.120)	(0.038)
Telecom	0.857	0.275
	(0.590)	(0.185)
Certificate	0.804***	0.258***
	(0.287)	(0.082)
Poverty	0.584***	0.187***
	(0.212)	(0.064)
Religion	−0.397***	−0.127***
	(0.110)	(0.032)
Association	1.188*	0.381*
	(0.613)	(0.195)
Str income	−0.200	−0.064
	(0.357)	(0.115)
Dowry	0.054**	0.017**
	(0.022)	(0.007)
Age	−0.009	−0.003
	(0.009)	(0.003)
Gender	−0.471**	−0.151**
	(0.233)	(0.075)
Married	0.147	0.047
	(0.161)	(0.051)
Health	0.103	0.033
	(0.104)	(0.033)
Edu	−0.011	−0.004
	(0.079)	(0.025)

Probit estimates (log-likelihood = −152.00, Wald chi2 = 49.93, and prob. > chi2 = 0.00). The dependent variable is the availability of bank loans (1—acquired, 0—not acquired). It's worth noting that among the independent variables, str income means the proportion of agricultural income in total household income. Standard errors in parentheses are obtained by village clustering

*, ** and *** represent significant at 10%, 5% and 1% level, respectively

Results from regression models

This section describes the influencing factors of Tibetan borrowing channels and repayment behaviors, as well as the impact of psychological accounts on Tibetan borrowing behavior.

Variables influencing ET households' choice of formal borrowing sources

Several sets of explanatory variables related to village, family, and individual characteristics are included to explore the determinants of ET households' borrowing from formal sources. Standard errors are clustered at the village level. Table 10 displays the coefficients and marginal effects. We find that having a land title certificate increases the likelihood of applying for formal credit by 25.8%; the poor have an 18.7% chance of receiving loans, and attending a special technical association increases the likelihood

Table 11 Regression results from a probit model identifying the factors that influence borrowing from informal sources

Variable	Coeff.	Marginal effects
Credit village	−0.353	−0.116
	(0.320)	(0.102)
Temple	0.333**	0.110**
	(0.163)	(0.052)
Telecom	1.937**	0.639**
	(0.984)	(0.308)
Certificate	−0.721**	−0.238***
	(0.299)	(0.092)
Poverty	−0.253	−0.083
	(0.243)	(0.078)
Religion	−0.013	−0.004
	(0.113)	(0.038)
Association	−0.242	−0.080
	(0.541)	(0.178)
Str income	−0.130	−0.043
	(0.421)	(0.138)
Dowry	−0.032	−0.011*
	(0.020)	(0.006)
Age	−0.024***	−0.008***
	(0.007)	(0.002)
Gender	0.451*	0.149**
	(0.237)	(0.075)
Married	0.023	0.008
	(0.165)	(0.054)
Health	0.066	0.022
	(0.111)	(0.037)
Edu	−0.180*	−0.059*
	(0.095)	(0.031)

Probit estimates (log-likelihood = −152.75, Wald $\chi^2 = 59.03$, and prob. > $\chi^2 = 0.00$). The dependent variable is whether a household borrowed from informal sources (1 = borrowed, 0 = did not borrow). It's worth noting that among the independent variables, str income means the proportion of agricultural income in total household income. Standard errors in parentheses are obtained by village clustering. The two columns to the right stand for probit regressions coefficients and marginal effects, respectively

*, ** and *** represent significant at 10%, 5% and 1% level, respectively

of borrowing from formal sources by 38.1%. Poor people have more access to formal financial sources based on the recently implemented poverty alleviation policies. For instance, in Gansu and Qinghai provinces, double-base linkage loans and small-amount credit loans for poverty alleviation have been introduced in the Postal Savings Bank of China. These are unsecured credit products primarily aimed at rural, low-income households and agriculture-related microenterprises. Only poor households are eligible for interest exemptions on such loans. Borrowing from formal sources increases by 1.7% for every unit increase in social spending, whereas borrowing from formal sources decreases by 12.7% for every unit increase in temple attendance.

Table 12 Regression results from an ordered probit model identifying the factors that influence the number of borrowing sources

Variable	Coeff	Marginal effects				
		0	1	2	3	4
Agrilost	0.145*	−0.044*	−0.003	0.031	0.014*	0.001
	(0.086)	(0.027)	(0.005)	(0.020)	(0.008)	(0.001)
Labor	−0.253***	0.077***	0.004	−0.055***	−0.025*	−0.002
	(0.082)	(0.026)	(0.009)	(0.017)	(0.014)	(0.002)
Dowry	0.027**	0.008**	0.000	−0.006**	−0.003*	−0.000
	(0.012)	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
loan info	−0.354**	0.108**	0.006	−0.077**	−0.034*	−0.003
	(0.148)	(0.049)	(0.012)	(0.033)	(0.020)	(0.003)
Telecom	0.970***	−0.296***	−0.017	0.210***	0.094**	0.008
	(0.340)	(0.104)	(0.037)	(0.081)	(0.048)	(0.008)
Health	−0.183**	0.056**	0.003	−0.040**	−0.018**	−0.001
	(0.076)	(0.024)	(0.007)	(0.019)	(0.008)	(0.002)

Coefficient not statistically significant and removed from the model. Ordered probit estimates (log-likelihood = -284.05, Wald $\chi^2 = 64.92$, and prob. > $\chi^2 = 0.00$). The dependent variable is the number of sources Tibetan households borrowed from (ranging from 0 to 4). It's worth noting that among the independent variables, loan info refers to whether the respondent has ever heard about microfinance (yes = 1, no = 0). Standard errors in parentheses are obtained by village clustering

*, **, and *** represent significant at 10%, 5%, and 1% level, respectively

Variables influencing ET households' choice of informal borrowing sources

A probit model is used to identify the influencing factors affecting household borrowing from informal sources. Explanatory variables included in the model represent the village, family, and individual characteristics. In addition, we calculate the marginal effects (Table 11). Each additional temple in the village increases informal borrowing by 11%, and the construction of the telecom network increases informal credit by 63.9%. The network not only promotes information dissemination, but it also improves interpersonal communication, which contributes to the availability of informal credit. Land title certificates and social spending significantly reduce borrowing from informal sources at the household level. Females are 14.9% more likely to borrow from informal sources, and access to informal credit decreases by 0.8% with each year of age. Meanwhile, having more educated family members reduces the likelihood of borrowing from unofficial sources.

Variables influencing ET households' choice of multiple loan sources

There are numerous lending sources, including government anti-poverty loans, loans from formal financial institutions (e.g., banks), loans from friends and family, and loans from temples. Using an ordered probit model, we estimate the parameter and marginal effects of variables affecting the number of borrowing sources.

As shown in Table 12, if the agricultural loss is increased by one unit, ET households' ordered log odds of getting loans from more sources would increase by 0.145, holding other variables constant. Those who suffer from agricultural disasters may receive government assistance and access to additional borrowing sources. The greater the number of workers in the household, the fewer resources are borrowed. In addition, spending a great deal on social relationships contributes to the diversification of sources

Table 13 Regression results from a ranked ordered logit model identifying the factors that influence the repayment order of different loans

Alternative (base: temple loan)	Loan from friends and relatives		Bank Loan		Government's anti-poor loan	
Variables	**Coeff.**	**Std.Err.**	**Coeff.**	**Std.Err.**	**Coeff.**	**Std.Err.**
Credit village	0.372	0.505	0.150	0.603	0.321	0.595
Temple	0.013	0.348	−0.008	0.338	0.291	0.371
Skill	−0.405	0.536	−0.454	0.422	−0.462	0.437
Religion	−0.004	0.166	0.387	0.321	0.589*	0.331
Income	0.025	0.043	−0.050	0.050	0.085	0.066
Str income	−0.811	0.649	−0.812	0.777	−1.512	0.972
Dowry	−0.009	0.037	−0.167**	0.070	−0.198**	0.088
Age	0.020	0.015	0.018	0.018	0.005	0.017
Gender	−0.120	0.440	−0.201	0.460	0.302	0.322
Married	0.789**	0.393	0.874*	0.468	1.164***	0.401
Health	−0.228	0.231	−0.565*	0.333	−0.397	0.316
Edu	0.143	0.145	−0.034	0.193	0.150	0.196

Dependent variable is the repayment order rank of four kinds of loans (1 = temple loan, 2 = loan from friends and relatives, 3 = bank loan, 4 = government's anti-poor loan). It's worth noting that among the independent variables, str income means the proportion of agricultural income in total household income. Standard errors are estimated by village clustering

*, **, and *** represent significant at 10%, 5%, and 1% level, respectively

of credit, including temple loans, loans from friends, and private lending. In the end, social spending increases the cost of loss accounting, so there is a degree of utility. Moreover, if one's knowledge of loans increases by one unit, the ordered log odds of obtaining loans from more sources decrease by 0.354%, assuming all other model variables remain unchanged. This is due to the fact that the individual was aware of the gain accounting and loss accounting for each source of borrowing and weighed them to determine the best option. Moreover, telecom will increase Tibetans' access to a wide variety of borrowing sources and thus acquire more. Simultaneously, the healthier a person is, the less demand there is for loans, resulting in a less use of multiple loan sources.

Variables influencing ET households' repayment order

A rank-ordered logit model is estimated to analyze the repayment behavior of ET households in greater detail. Explanatory variables include individuals, families, and regional characteristics. We choose temple loans as the base category.

As shown in Table 13, a married head of household is more likely to repay their loans in the following order: government anti-poverty loans > bank loans > loans from friends and relatives > temple loans. Perhaps, marriage makes people more responsible. Therefore, they place greater emphasis on formal credit. For accounting, they wish to increase the social and economic utility. People with greater social consumption are, however, less likely to prioritize the repayment of government anti-poverty loans or bank loans, as the favor cost for social loans and temple loans increases in loss accounting. This repayment order is different from in other regions of China, which demonstrates, to some extent, the success of recent modernization efforts in Tibetan regions.

Moreover, regular temple goers pay back the government's anti-poverty loan first. Informal loans incur a disproportionate amount of favor cost under loss accounting, so

they focus more on the utility of gain accounting. In other words, the economic value of the government's anti-poverty loans is deemed to be greater. Besides, healthier people are less inclined to repay a bank loan first because they are less likely to default.

Conclusions and policy implications

This study shed new light on the financing behavior of ET households through the lens of mental accounting. Our findings have several key implications. First, informal financial organizations are extremely important to ET households. However, with the gains utility associated with bank loans, ET households are becoming more willing to borrow from formal financial institutions. Previously, temple loans were the preferred source of financing, but as Tibet has modernized, bank loans have taken precedence due to their convenience and greater gains utility. Second, rather than investing in productive and profitable ventures, ET households borrow from banks to meet their daily needs. They primarily use these loans for familiar subsistence agriculture practices. Finally, strong social ties and religious beliefs play an important role in ET households' life. Gain accountings effectively prevent them from defaulting on informal and temple loans by overwhelming their repayment behaviors. The mental accounting approach influences repayment behavior, but the default can still occur when bank loans and government subsidies are mixed up.

This study examined the borrowing habits of ET households and revealed new insights that depart from previous research. The recent modernization of Tibetan regions is largely responsible for the shift in borrowing preferences, loan utilization, and repayment sequence. Our study has some limitations. For example, we are unable to conduct an econometric analysis of the use of borrowed funds due to a lack of data, and we have not addressed the endogeneity issue. Our findings should be regarded as correlations rather than causations. Despite using stratified random sampling to improve the study's representativeness, increasing the sample size can yield even better results. These limitations open up possibilities for future research, such as exploring the use of mental accounting in family financial management.

The study's findings have policy implications. It could increase in the promotion of inclusive finance in the four provinces where ET households reside. The government could provide clear and comprehensive information on loan procedures, subsidies, and required documentation to facilitate better access to financing (Liu et al. 2020). This would aid in the simplification of the financing process and the reduction of transaction costs for these households. The government may also consider paying more attention to distinguishing between bank loans and government subsidies. It is also critical to design financial products specifically tailored to the needs of ET households (Zohaib et al. 2021). By taking into account cultural and religious considerations, financial institutions can provide services that align with these households' beliefs and meet their unique financial needs. Combining agricultural insurance with microfinance products may also help promote inclusive finance (Mishra et al. 2021). This would help reduce risks associated with agriculture and lower loan defaults, resulting in higher agricultural income for ET households. Finally, these recommendations have the potential to create a positive cycle of increased income, financial development, and improved living standards for ET households.

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Availability of data and materials
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Declarations

Competing interests
The authors declare no competing interests.

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References

Agbola FW, Acupan A, Mahmood A (2017) Does microfinance reduce poverty? New evidence from Northeastern Mindanao, the Philippines. J Rural Stud 50:159–171
Aghion P, Bolton P (1997) A trickle down theory of growth and development. Rev Econ Stud 64:151–162
Antonides G, De Groot IM, Van Raaij WF (2011) Mental budgeting and the management of household finance. J Econ Psychol 32(4):546–555
Banerjee SB, Jackson L (2017) Microfinance and the business of poverty reduction: critical perspectives from rural Bangladesh. Hum Relat 70(1):63–91
Banerjee P, Chatterjee P, Mishra S, Mishra AA (2019) Loss is a loss, why categorize it? Mental accounting across cultures. J Consum Behav 18(2):77–88
Bauchet J, Marshall C, Starita L, Thomas J, Yalouris A (2011) Latest findings from randomized evaluations of microfinance. World Bank, Washington, DC. Accessed on 12/20/2022. Website: https://openknowledge.worldbank.org/handle/10986/26892
Benami E, Carter MR (2021) Can digital technologies reshape rural microfinance? Implications for savings, credit, & insurance. Appl Econ Perspect Policy 43(4):1196–1220
Botond K, Filip M (2020) Choice simplification: a theory of mental budgeting and naive diversification. Q J Econ 135(2):1153–1207
Chao X, Kou G, Peng Y, Viedma EH (2021) Large-scale group decision-making with non-cooperative behaviors and heterogeneous preferences: an application in financial inclusion. Eur J Oper Res 288(1):271–293
Cheema A, Soman D (2006) Malleable mental accounting: the effect of flexibility on the justification of attractive spending and consumption decisions. J Consum Psychol 16(1):33–44
Chen Q (2014) Advanced econometrics and Stata application. Higher Education Press, Beijing
Chen Y, Kumara EK, Sivakumar V (2021) Investigation of finance industry on risk awareness model and digital economic growth. Ann Oper Res 1:22. https://doi.org/10.1007/s10479-021-04287-7
Chirwa EW (1997) An econometric analysis of the determinants of agricultural credit repayment in Malawi. Afr Rev Money Finance Bank 2:107–122
Cohen AB, Shariff AF, Hill PC (2008) The accessibility of religious beliefs. J Res Pers 42(6):1408–1417
Conning J, Udry C (2007) Rural financial markets in developing countries. Handb Agric Econ 3:2857–2908
Ding Z, Xu D, Qin Z (2014) Passive choice or subjective preference: why farmers prefer private channels for financing. Agric Tech Econ 11:52–64
Fels M (2020) Mental accounting, access motives, and overinsurance. Scand J Econ 122(2):675–701
Fok D, Paap R, Van Dijk B (2012) A rank-ordered logit model with unobserved heterogeneity in ranking capabilities. J Appl Econom 27(5):831–846
Ghimire R, Green GT, Paudel KP, Poudyal NC, Cordell HK (2017) Visitors' preferences for freshwater amenity characteristics: implications from the US household survey. J Agric Resour Econ 42:90–113
Godquin M (2004) Microfinance repayment performance in Bangladesh: how to improve the allocation of loans by MFIs. World Dev 32(11):1909–1926
Heath C (1995) Escalation and de-escalation of commitment in response to sunk costs: the role of budgeting in mental accounting. Organ Behav Hum Decis Process 62(1):38–54
Heath C, O'curry S (1994) Mental accounting and consumer spending. ACR North American Advances
Heath C, Soll JB (1996) Mental budgeting and consumer decisions. J Consum Res 23(1):40–52

Henderson PW, Peterson RA (1992) Mental accounting and categorization. Organ Behav Hum Decis Process 51(1):92–117
Huang YJ, Hu GS (2017) Financial poverty alleviation, behavioral psychology and regional poverty traps—poverty alleviation mechanism setup from the perspective of accurate identification. J Southwest Minzu Univ Humanit Soc Sci 38(2):1–10
Huang J, Sherraden M, Sherraden MS, Johnson L (2022) Effective finance to increase financial well-being for low-income families: empirical examination and policy implications. J Consum Affairs. https://doi.org/10.1111/joca.12484
Jia X, Heidhues F, Zeller M (2010) Credit rationing of rural households in China. Agric Financ Rev 70(1):37–54
Jiang X (2011) Research status of financial services for farmers and Herdsmen in Tibetan areas: literature review. Southwest Finance 5:18–20
Jiang X (2014) Discussion on the development of financial system in Tibetan areas of China. J Natl 5(6): 26–33+98–102
Jiang M, Paudel KP, Zou F (2020) Do microcredit loans do what they are intended to do? A case study of the credit village microcredit programme in China. J Int Dev 32(5):763–792
Jiang M, Paudel KP, Sene SO (2022) Does counter-guarantee affect microcredit mechanism's performance on repayment? Evidence from Guangzhou, China. Int J Financ Econ 27(2):1807–1817
Johnston C, McDonald J, Quist K (2020) A generalized ordered Probit model. Commun Stat Theory Methods 49(7):1712–1729
Kou G, Yüksel S, Dinçer H (2022) Inventive problem-solving map of innovative carbon emission strategies for solar energy-based transportation investment projects. Appl Energy 311:118680
Li Q, Lu X, Li C, He J (2018) Mechanism analysis of the impact of social capital on farmers' credit default. Agric Tech Econ 2:104–118
Li C, Sun T, Li Q (2019) Research on household welfare level under the interaction of demand and supply credit rationing: based on generalized propensity score matching method. Agric Tech Econ 1:111–120
Liu X, Cheng E (2009) Farmers' formal credit constraints in poor areas: an empirical study based on rationing mechanism. Chin Rural Econ 6:37–50
Liu L, Paudel KP, Li G, Lei M (2019) Income inequality among minority farmers in China: does social capital have a role? Rev Dev Econ 23(1):528–551
Liu J, Zhang G, Zhang J, Li C (2020) Human capital, social capital, and farmers' credit availability in China: based on the analysis of the ordered probit and PSM models. Sustainability 12(4):1583
Ma N, Xu M (2012) Experience and enlightenment of rural finance supporting agricultural economy in developing countries. World Agric 5:16–18
Mishra K, Gallenstein RA, Miranda MJ, Sam AG, Toledo P, Mulangu F (2021) Insured loans and credit access: evidence from a randomized field experiment in northern Ghana. Am J Agric Econ 103(3):923–943
Nan (2010) Study on Tibetan life etiquette and gift etiquette. Tibet University
Navandar YV, Singh M, Dhamaniya A, Patel DA (2020) Empirical analysis of level of service at toll plaza by using ordered probit model. Transp Lett 12(10):692–700
Pan L, Zhong C (2016) Praying in churches or borrowing from banks. Micro evidences for correlated religion and financial behaviors. China Econ Q 15:125–148
Paulson AL, Townsend RM, Karaivanov A (2006) Distinguishing limited liability from moral hazard in a model of entrepreneurship. J Polit Econ 114(1):100–144
Pitt MM, Khandker SR (1998) The impact of group-based credit programs on poor households in Bangladesh: does the gender of participants matter? J Polit Econ 106(5):958–996
Sharma M, Zeller M (1997) Repayment performance in group-based credit programs in Bangladesh: an empirical analysis. World Dev 25(10):1731–1742
Stiglitz JE, Weiss A (1981) Credit rationing in markets with imperfect information. Am Econ Rev 71(3):393–410
Sun J, Luo T (2020) Influence of social network and economic characteristics on formal financial credit of farmers. Jiangsu Agric Sci 48(1):7–14
Thaler R (1985) Mental accounting and consumer choice. Mark Sci 4(3):199–214
Thaler RH (1999) Mental accounting matters. J Behav Decis Mak 12(3):183–206
Thaler RH (2015) Misbehaving: the making of behavioral economics. J Real Estate Lit 25(6):570–587
Turvey CG, Kong R, Huo X (2010) Borrowing amongst friends: the economics of informal credit in rural China. China Agric Econ Rev 2(2):133–147
Tversky A, Kahneman D (1979) Prospect theory: an analysis of decision under risk. Econometrica 47(2):263–291
Wang X (2019) Mechanism of tourism consumption decision based on psychological account—a study of tourism audience in mega cities. Econ Manag 41(3):141–155
Wang X, Fu Y (2022) Digital financial inclusion and vulnerability to poverty: evidence from Chinese rural households. China Agric Econ Rev 14(1):64–83
Wang RY, Zhou JB, Li LF (2017) Financial channels through which social capital influences social welfare: a perspective of temple finance. Econ Sci 5:31–47
Xiao H, Zhang Y, Kou G, Zhang S, Branke J (2023) Ranking and selection for pairwise comparison. Naval Res Logist (NRL). https://doi.org/10.1002/nav.22093
Yan X, Niu R (2017) The influence of farmers' borrowing or lending money on income growing: sample of 1771 farmers. Reform 10:105–113
Yin Z, Wu Y, Gan L (2015) Financial availability, financial market participation, and household asset choice. J Econ Res 3:87–99
Yu H (2017) Study on the financing behavior of Chinese farm from the perspective of social network. Working Paper. Xiangtan University
Zeller M (1998) Determinants of repayment performance in credit groups: the role of program design, intragroup risk pooling, and social cohesion. Econ Dev Cult Change 46(3):599–620
Zhang Y, Gao J, Zhang J (2015) Research on formal financial credit constraint of entrepreneurial farmers: an empirical analysis based on 939 surveys of entrepreneurial farmers. Agric Tech Econ 1:64–74
Zhang H, Kou G, Peng Y (2019) Soft consensus cost models for group decision making and economic interpretations. Eur J Oper Res 277(3):964–980
Zhao Y, He G (2007) Research on the effectiveness of co-guarantee loans for farmers. Financ Res 7:61–77

Zhu H, Li J (2018) Financial institution education from the perspective of financial consumer psychological account. Shanghai Finance 8:65–68
Zohaib M, Islam KA, Tahir MY, Hussain R, Zaineb A, Ismail M (2021) The innovative financial product development with its functional performance. Am Int J Econ Finance Res 3(1):1–15

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