Understanding Farmers' Decision Making in Agricultural Water Fee Payment in China: The Role of Mental Accounting

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Abstract: To better understand farmers' refusal, as well as their corresponding negative emotions, to pay agricultural water fee under current policy in rural China, this paper applies mental accounting, a behavioral economics framework, to explore how the reform of rural taxes and fees, direct agricultural subsidy programs and agricultural water fee influence farmers' decisions in paying agricultural water fee. Using fieldwork data from 577 farmers and 20 water managers in Sichuan, we explore farmers' information processing regarding the payment decisions of agricultural water fee via three sequential mental accounting processes, with the associated underlying principles and measures behind each process. We find that the information processing in three mental accounting scenarios related to the agricultural water fee elucidates farmers' observed behaviors in rural China. Generally, in the three mental accounting scenarios, two conditional intuitive expectations and nine other conditional intuitive preferences are formed; however, these conditions cannot be matched with the facts due to the reform of rural taxes and fees, the direct agricultural subsidy programs and the internal attributes of agricultural water fee. Additionally, this paper offers a view into how previous policies create negative psychological externalities (such as farmers' psychological dependence on the government) through mental accounting that negatively influences agents' subsequent decision making; it highlights the significance of underlying mental factors and information processing of negative behaviors in policymaking for managing or conserving common pool resources.

Keywords: mental accounting; agricultural water fee; behavioral economics; decision making; information processing; representativeness; negative psychological externalities

1. Introduction

Most countries are considering pricing and charging for agricultural water resources as an economic instrument for managing and saving water. However, a notable issue facing many developing countries is the poor execution of such agricultural water fees (AWF), particularly in China [1].

In rural China, AWF have long been charged by local governments, *e.g.*, for over 2000 years in the world-renowned Dujiangyan Irrigation District [2]. However, in 2006, a majority of farmers suddenly refused to pay or showed negative emotions (such as conflicts, complaints and angry expressions) related to paying the AWF [3], which resulted in a dramatic decrease in collection

rates. After 2006, collections were reduced by 23 percent, 25 percent and 40 percent in Zhejiang, Jilin and Guangdong, respectively [3]. A survey disclosed that the average collection rate for approximately 551 irrigation districts in 26 provinces was 57.37 percent in 2005 [4], but it dropped to 34 percent for 100 typical irrigation districts in 2007 [1]. Notably, expressions of negative emotions and refusal to pay the AWF are still observed [5].

Rural China had been recently experiencing major changes through some special supporting policies. For example, China initiated a reform of rural taxes and fees (RTF) in 2001 mainly aimed at cancelling the items charged by the government (that is, subject to "political charges"). Rural taxes mainly refer to agriculture-related taxes (such as agricultural, animal husbandry, cultivated land use, and special agricultural products taxes). Rural fees mainly refer to five "unified planned" fees (such as social assistance, family planning, education supplement, collective transportation and militia exercise fees) and three "retained" fees (such as public accumulation fund, public welfare fund and administrative fees). RTF have a long history, and the rural taxes date back to the Shang Dynasty (1600 to 1066 B.C.) [6]. However, in 2006, the government abolished nearly all of these taxes and fees through RTF reform [7]. Meanwhile, the Chinese government has conducted various direct agricultural subsidies (DAS) programs since 2003 (such as the so-called Four Direct Subsidy Programs for grain producers, for integrated agricultural materials, for agricultural machinery purchases, and for superior grain cultivators). These subsidies have provided increasing support for agricultural production over this period [8].

Nevertheless, the AWF institutions have not recently changed. Most importantly, the AWF is a typical political charge but was emphatically excluded in the RTF reform and DAS programs, making it the solitary political charge in rural China today. It appears that the observed negative behaviors around paying the AWF can be partially attributed to the RTF reform and DAS programs.

China is engaging in large-scale reforms related to agricultural water usage, which is clearly a concern for further institutional reforms. Thus, elucidating how RTF reform and DAS programs influence farmers' AWF payment decision-making is important for developing successful policies.

This paper seeks to address this issue from a psychological decision-making perspective using mental accounting (MA), a theoretical framework from behavioral economics, to answer the following four questions about rural China:

Question 1: Why did farmers suddenly refuse to pay the AWF in 2006?

Question 2: Why did farmers suddenly show negative emotions (such as angry displays, complaints or dissatisfaction) toward paying the AWF in 2006?

Question 3: Why do farmers continue to exhibit such refusal behaviors?

Question 4: Why do farmers continue to display such negative emotions?

This paper proceeds as follows. Section 2 presents a literature review related to the above questions and to the applicability of MA to this study. Section 3 provides the methodology; it describes the fieldwork, data, and theoretical MA framework used to interpret the observed behaviors, including MA's rationales, MA's three sequential decision-making processes, and MA's underlying principles and measures behind each process. Section 4 employs MA to probe farmers' information processing in the decision to pay the AWF to elucidate observed questions. Section 5 concludes the paper, and Section 6 provides the implications and limitations of this study.

2. Literature Review

2.1. Previous Research and the Present Study

Previous research has identified three aspects to interpret above negative behaviors. First, the observed behaviors can be attributed to the economic affordability of the AWF because farmers' well being is influenced by paying the AWF [9]. However, this connection is difficult to support based on the following facts: a) Chinese farmers' net income per capita in 2005 increased 3.04 times to 9892 yuan in 2014; b) both RTF reform and DAS programs alleviated farmers' tax burden. For instance, through the RTF reform, farmers' expenses were reduced by more than 125 billion yuan, with an average reduction of over 140 yuan per farmer [10]. Moreover, the total funds distributed

by the Four Direct Subsidy Programs increased 10.49 times from 2004 (14.52 billion yuan) to 2012 (166.8 billion yuan) [8]; and c) the AWF has been set at a low and stable level. For example, the average fees in 2000, 2005 and 2013 were 0.028 yuan/m^3 [11], 0.065 yuan/m^3 (accounting for 38 percent of the supply cost) [4], and 0.091 yuan/m^3 (accounting for 35.59 percent of the supply cost), respectively [12]. The fee in 100 typical water sectors increased by approximately 10 percent from 2003 to 2011 [13], while other areas, such as Sichuan, have not seen increases since 2003 [2].

Second, existing studies suggest that the farmers' observed behaviors can be attributed to having a willingness to pay lower than the set fee [14]. Even if willingness to pay can be defined as a mental dependent variable connected to the above behaviors, the existing research has concentrated on the importance of willingness to pay rather than on the mental processes connecting it to behaviors.

Third, these behaviors can be attributed to three remaining issues: a) AWF management issues, such as opaque water prices and limited information about quantities used, poor user participation management, lack of supervision for collection and use of the AWF, and invalid propaganda [1,3,9]; b) a sense of inequity concerning the AWF charges, as the AWF has become the only channel through which local water managers can raise prices, add surcharges and intervene as they did before the RTF reform [1,3]. These practices have deteriorated farmers' perceptions about the fairness of AWF charges that causes misunderstanding and dissatisfaction [3]; and c) issues with water conservancy infrastructure, such as the lack of volumetric metering facilities, the maturation of some long-established irrigation facilities, the ineffective dredging of canals, and the damage to and disrepair of caudal canals [1,3], which may motivate farmers' negative emotions. These researches may enable us to take some policy actions from the perspective of policymakers; nevertheless, the implications from the perspective of policy recipients or participants (such as farmers) must also be considered. Thus, we need to understand how farmers make decisions about paying the AWF.

In summary, the previous research has not addressed the questions that we consider in this paper with the current agricultural policies in rural China. Our study contributes to the current literature by using a behavioral economics framework to identify farmers' mental determinants of AWF payment in the current policy context of rural China. More broadly, it contributes to understanding how previous policies created negative psychological externalities (such as farmers' psychological dependence on the government) through MA that influences agents' subsequent decision making, an effect that needs to be taken into account in policymaking for managing and conserving water resources and other common pool resources.

2.2. Applicability of Mental Accounting (MA)

First, MA is an appropriate theoretical framework for the aims of this paper. For one thing, MA was defined narrowly by Tversky and Kahneman [15] as a mental outcome frame that is used to jointly evaluate events and the manner in which they are combined. Richard Thaler, who proposed MA, defined it as the cognitive activities that individuals and households edit, categorize, budget and evaluate transactions and other financial events by the way of managerial accounting. MA provides agents with inputs to use for an *ex post* intuitive comparison with other relevant events [16]. For another, paying the AWF is an economic or consumption decision for farmers, and MA is such an appropriate behavioral framework we need. MA is the main driver of cognitive biases or anomalies based on agents' mental categorizations of economic and consumption decisions [16-17] and, thus, provides rules that can be used to psychologically dissect or understand these anomalies [18]. Considerable experimental or laboratory data have shown that MA influences consumption decision making [19].

Hence, examining the above questions through the MA framework can enhance our understanding of how other agricultural policies psychologically affect farmers' decisions to pay the AWF. This knowledge can guide further institutional reforms so that they can better match farmers' mental models and prevent similar influence in other agricultural policy areas. By doing

so, this knowledge can help improve farmer compliance and the effectiveness of this economic instrument for agricultural water management in the current context of rural China.

Moreover, MA exhibits adequate applicability to Chinese farmers. On the one hand, the poor are usually characterized by a high degree of bounded rationality, which is the root of MA. Kahneman [20] maintained that there are two human brain systems that process information: System 1 is characterized by fast, automatic, unconscious, intuitive and experience-based information processing, while System 2 is slow, reflective, deliberative and analytical. In general, decisions reached via System 1 are highly dependent on the agents' knowledge and experience due to bounded rationality. However, Chinese farmers are particularly short of educational, economic and vocational training; as a result, they are more likely to intuitively adopt System 1 in decision making. On the other hand, some research has disclosed a connection between poverty and cognitive capability. For instance, poverty itself can create additional psychological burdens due to the scarcity of mental or financial resources, limiting the cognitive functioning [21], capacity for attention and understanding [22], and self-control [23]. These burdens can lead the poor to make less rational, short-sighted or risk-averse decisions [24]. Low cognitive capability, in turn, exacerbates poverty. Chinese farmers represent a large and typical group of the poor and are more likely to intuitively adopt System 1 in decision making.

Empirically, one study using panel data showed that the financial decision-making behaviors of Chinese farmers are obviously influenced by MA [25], and experimental evidence from other countries supports this argument as well. For example, cross-sectional studies on the remittance behaviors of rural households in Malawi [26] and the investment behaviors of the poor in Kenya [27] have demonstrated the adaptability of MA.

Second, behavioral economics is useful for identifying the mental decision-making behind behavioral anomalies, such as those addressed in this study. Given the improvement in economic capabilities and in policies supporting agriculture in rural China, farmers' behaviors around paying the AWF can largely be regarded as a particular type of anomaly. Typically, behavioral economics incorporates cognitive psychology to investigate phenomena that cannot be satisfactorily explained by traditional economics. Conventional economics concerns the behavioral results, while psychology pays more attention to the premise of behavior under the hypothesis of bounded rationality. Behavioral economics should not be considered a subfield of economics but a tool for all economists. The use of behavioral economics can contribute to public policy in three ways: a) providing new policymaking instruments; b) improving the effectiveness of previous polices; and c) generating novel welfare implications [28].

Interdisciplinary research integrating behavioral economics into environmental and resource economics has been recently appreciated and recommended internationally [29] in areas, such as climate change [30] and energy consumption [31], that greatly concern both academics and governments. This tendency reflects a research agenda that incorporates psychology to describe or predict anomalous behaviors, especially concerning environmental goods and public resources.

The use of behavioral economics to examine water users' behaviors is well recognized as a step worth pursuing. For instance, Russell and Fielding [32] stated that psychological and behavioral factors are critical to understanding water demand behaviors. Survey data from southeast Queensland demonstrated that psychological variables are key determinants of water use behaviors [33]. Jorgensen *et al.* [34] noted that psychological and behavioral science could help determine users' actual behavioral incentives for water consumption and protection. Correia and Roseta [35] reviewed the research addressing water demand and pricing over the past decade and found that behavioral economics and psychological theories are rarely incorporated into water resource research; thus, they encouraged researchers to devote more attention to this gap.

3. Methodology

3.1. Fieldwork and Data

3.1.1. Study Site

Our fieldwork was conducted in 33 state-owned irrigation districts located in 20 counties in Sichuan Province, China, which are described in Figure 1 and Table 1.

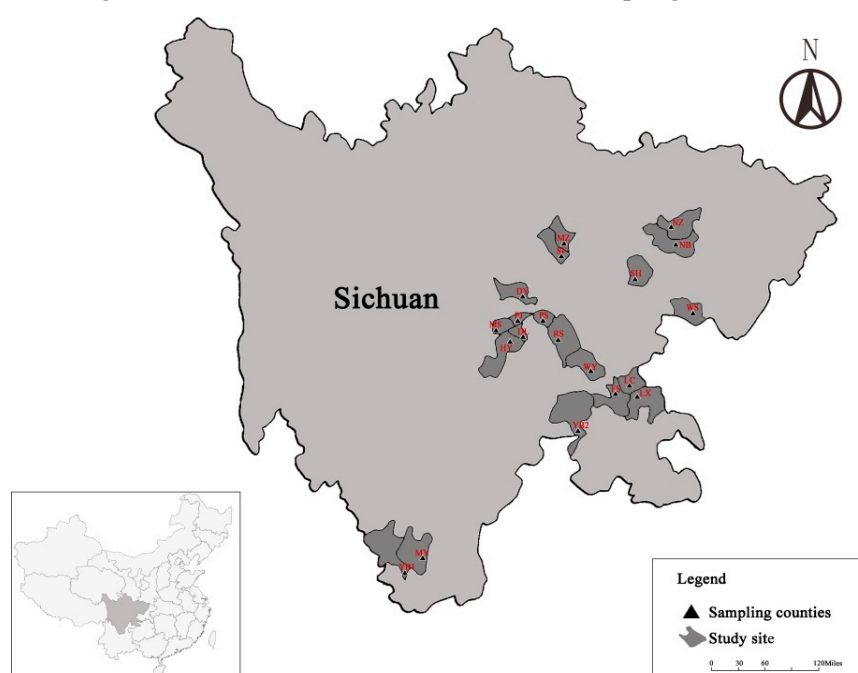
Figure 1. Location of the counties selected for sampling in Sichuan

Note: The sampling counties and their abbreviations are displayed in Table 1.

Table 1. Counties and irrigation districts selected for sampling in Sichuan

Counties	Irrigation Districts	Counties	Irrigation Districts
Pengshan (PS)	Tongjiyan	Nanbu (NB)	Baertan, Shengzhong
Danling (DL)	Shengli	Hongya (HY)	Hanwang
Shifang (SF)	Renminqu	Renshou (RS)	Heilongtan
Pujiang (PJ)	Yuxihe	Minshan (MS)	Yuxihe
Dayi (DY)	Dujiangyan	Wusheng (WS)	Wupanshui
Langzhong (LZ)	Shitan,Guanliang, Shengzhong	Mianzhu (MZ)	Guansongpeng, Hongyanqu, Renminqu
Miyi (MY)	Huangqiao, Hongqiqu	Longchang (LC)	Guyumiao, Shipantan, Yanjiatan
Yanbian (YB1)	Gaoyangou, Huimindayan	Shehong (SH)	Renminqu, Dujiangyan, Wuyin
Luxian (LX)	Zhumeitan, Maojiayan	Weiyuan (WY)	Changhu, Hulukou, Qingfeng, Hekou
Yibin (YB2)	Shaoehu, Baijiaba	Fushun (FS)	Pipagou, Bodaoling, Qianzigeng

We selected Sichuan as the study site for two reasons. First, farmers in Sichuan provide an adequate sample for investigating the aforementioned questions in China. As of 2012, there were 45.07 million rural residents in Sichuan, accounting for 56.47 percent of all residents. Sichuan is also the sole, and thus most important, grain-producing province in western China; the major local crop is grown in paddies, which are characterized by rigid and intense water demand. Therefore, Sichuan has high water demand, particularly for irrigation, that reaches approximately 15 billion cubic meters irrigated over an area of approximately 37 million acres annually. Although the AWF is commonly charged in Sichuan, the patterns noted above are clearly observed in this region, and

they represent the most prominent, typical and difficult issues facing local governments and managers in rural areas [3].

Second, farmers in Sichuan provide a good transitional explanatory element for linking higher- and lower-income farmers throughout the country. We aim to study the psychological factors of economic decision making among residents who are engaged in traditional farming activities and represent a low-income group in China. The per capita income of farmers in Sichuan ranked 21st among 31 provinces from 2007 to 2013 in China, demonstrating that the economic conditions of farmers in Sichuan were relatively stable and remained near the middle of the range for the entire country over the past several years.

3.1.2. Sampling

3.1.2.1. Questionnaire Design

The main respondents in our study were farmers who were cultivating paddies, paying the AWF and living in the irrigation districts displayed in Table 1. The other respondents were water managers in the selected counties.

Two questionnaires were designed. The questionnaire for farmers consisted of three parts: a) part one included questions on the farmers' demographics and economic conditions; b) part two included questions on the farmers' cognition of the AWF, including information about irrigation districts, charging sectors, acres irrigated, total amount and unit price of the AWF paid last year, willingness to pay the AWF; and c) part three included questions about the farmers' perceptions of the differences between the AWF and the RTF, as well as between the AWF and the DAS.

The questionnaire for managers covered four aspects through open-ended questions: a) the circumstances of the local AWF, such as the frequency, collection methods and charging patterns; b) information on local irrigation districts and recommended townships for sampling; and c) local farmers' behaviors or attitudes toward paying the AWF due to RTF reform and DAS programs, as well as their interpretations of these behaviors.

3.1.2.2. Sampling Procedures

The fieldwork was conducted during July and September 2013 in four steps. First, before the final investigation, we conducted preparatory work to improve the questionnaires and communication, including brainstorming sessions, focus groups, conducting a pilot study and training enumerators. Second, 20 counties were chosen based on their size (large, medium and small) and the distribution of irrigation districts in Sichuan. The major irrigation districts in Sichuan within these three size categories were all considered. Third, the enumerators scheduled and conducted interviews with local water district managers and asked them to recommend two or three townships in each county based on the rule that townships with better and worse implementation of local AWF should be included. Fourth, the enumerators visited the townships and the village leaders, who helped them randomly select 25 to 30 farmers who paid the AWF for face-to-face interviews. To incentivize the farmers to participate in the fieldwork, we prepared a gift for each of them.

3.1.3. General Demographic Characteristics

This fieldwork involved 595 farmers and 20 managers; 587 farmer questionnaires and 20 manager questionnaires were successfully gathered, and the data for 577 farmers and 20 managers are used in this paper.

The general demographic characteristics show that the sampled farmers were older, less educated and lower income, which is a realistic portrayal of the farmers left behind in contemporary rural China. The following characteristics are considered: age (Mean=47.94; Standard Deviation (SD)=10.70); sex (female (39.66%), male (60.34%)); years of education (Mean=6.94; SD=3.22); number of family members (Mean=4.91; SD=1.75); and personal annual income (Mean=1.31; SD=0.75; this factor was measured using categories with a grading standard of 5000 yuan, *e.g.*, 1=fewer than 5000 yuan, 2=5000–10000 yuan).

3.1.4. Testing the Questions and Cognitive Causes of Respondents

Our data show that the four patterns identified in Section 1 could be observed at the study sites; and the cognitive reasons for these patterns will be tested from the perspectives of both farmers and managers.

3.1.4.1. Are Negative Behaviors Observed at the Study Sites?

Testing the sampled farmers: Suppose that when the farmers' willingness to pay the AWF equals 0 or is lower than the required AWF, they might refuse to pay or display negative emotions in paying the AWF. Using the data from part two of the farmer questionnaire, Table 2 compares the willingness to pay and the required AWF, indicating that up to 92.72% of the sampled farmers might refuse or show negative emotions in paying the AWF. Additionally, when some sampled farmers learned that the enumerators were graduate and undergraduate students researching the AWF rather than civil servants, they expressed dissatisfaction with or complaints about the AWF to them.

Table 2. Comparison of farmer willingness to pay and the required AWF

		Frequency	Proportion	
Willingness to pay≠0	Willingness to pay > Required AWF	11	1.91%	
	Willingness to pay = Required AWF	31	5.37%	
	Willingness to pay < Required AWF	296	**51.30%**	**92.72%**
Willingness to pay=0		239	**41.42%**	
Total		577	100%	

Testing the interviewed managers: Data from the manager questionnaires indicate that nearly all managers noted that when RTF were cancelled in 2006, sudden refusals and negative emotions about paying the AWF were clearly observed among farmers. They also stressed that even after RTF cancellation and DAS implementation, conflicts and complaints about paying the AWF persist and are still observed apparently.

3.1.4.2. Respondents' Cognitive Causes

Testing the sampled farmers: In part two of the farmer questionnaires, farmers were asked the following question: "If you believe that the government should no longer charge an AWF, please select the reasons below." Table 3 shows the statistics for their choices, which indicate that government-related factors (R1, R2 and R3) account for up to 93.51%.

Table 3. Reasons farmers thought they should not pay the AWF

Reasons	Frequency	Proportion	
R1: The AWF should be undertaken by the government.	296	**32.56%**	
R2: Long-term RTF have been exempted, so should the AWF.	246	**27.06%**	**93.51%**
R3: The AWF should be subsidized by the government due to the intensified DAS programs.	308	**33.88%**	
R4: We built water conservancy projects, so we should not pay the AWF.	40	4.40%	
R5: The AWF is not affordable due to my lower income.	19	2.09%	

Note: Farmers could make multiple selections.

Testing the interviewed managers: Using data from the 20 manager questionnaires, at least 15 managers indicated that the farmers' behaviors in paying the AWF can be attributed to their gradually strengthening psychological dependence on the government. As long as the government provides and increases assistance or giving, they continue to hope that the government could provide or give more.

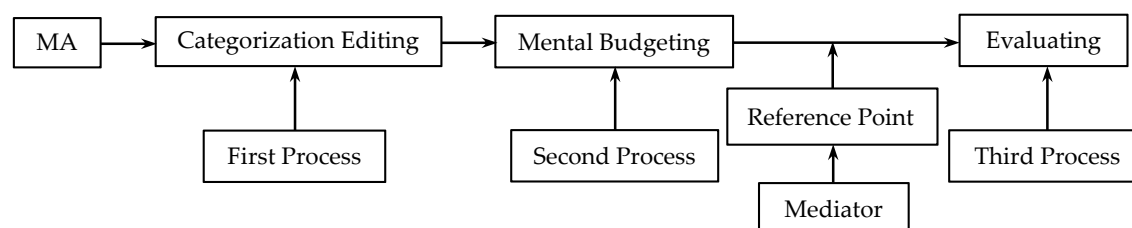
3.2. Theoretical Framework: Mental Accounting (MA)

3.2.1. Rationales

The rationales underlying MA can be described as the System 1, heuristics and categorization heuristics. First, the two-brain system mentioned above is the starting point at which human decision making is activated, and MA is a mental judgment made under uncertainty using System 1 [20]; therefore, System 1 is a prime driver of MA. Second, information processing through System 1 leads to heuristics, of which MA is an example [20]; therefore, heuristics can represent another rationale for MA. Third, agents often process information through categorization heuristics [36]. In the field of economic decision making, MA is a classic categorization heuristic [18]. The influence of MA on behaviors can be attributed to distinct ways of information processing in different categories caused by categorizing.

3.2.2. Three Sequential Decision-making Processes and Underlying Principles behind Each Process

We need to illustrate the sequential decision-making processes of MA and then explain the principles behind each process. The decision-making process is the frame and the trajectory of information processing used to comprehend agents' behaviors; yet, the principles behind one process are the rules used to infer the information processing results from that process.

Kahneman and Tversky [37] held that the heuristic consists of two activities: editing and evaluating. Thaler [16] proposed that MA includes four cognitive activities: editing, categorizing, budgeting and evaluating. Drawing on those arguments and the goal of each activity, we propose the framework of three sequential processes for MA decision making described in Flowchart 1. The three processes and underlying principles are explained next.

Flowchart 1. Three sequential decision-making processes of MA

3.2.2.1. Categorization Editing and Underlying Principles

Incorporating the above two-phase [37] and four-phase [16] processes, the goal of editing is to mentally classify events. Thus, we integrate editing and categorizing into a single process: categorization editing.

As for the principles, canonical heuristic principles can provide a basis for categorization editing. Tversky and Kahneman [38] proposed three decision-making principles in heuristics: representativeness, availability and anchoring, where each plays a role in categorization editing. Importantly, representativeness is the primary principle, as it may mediate availability and anchoring.

Principle of Representativeness: Representativeness means that the more similar (or consistent) the representativeness of various events is, the more likely the agent is to assign them into the same mental category (such as the same MA); the more dissimilar they are, the more likely they are to be placed in different mental categories.

Principle of Availability: Availability means that if an event with a specific representativeness is more easily perceived or recalled, the possibility is higher that other events sharing this or a similar representativeness will be judged rapidly and with a higher weight. Availability indicates that if event B is the target event, and it shares representativeness with event A, the greater the availability of this representativeness, the more likely they are to be assigned into the same MA.

Principle of Anchoring: Anchoring means that the prior information or experiences anchored in the mind will influence subsequent decisions. Anchoring indicates that if event B is the target event, and it shares representativeness with a previous event A, the more deeply this representativeness is anchored, the more likely they are to be assigned into the same MA.

3.2.2.2. Mental Budgeting and Underlying Principles

Mental budgeting refers to an information process through which agents integrate stimulating factors to track and predict target events. This process uses various principles through mental resource allocation to eventually shape a reference point (such as an expectation or a preference) according to the agents' wishes. Kahneman and Tversky [37] noted that a subliminal reference point is formed via a series of information processing activities before evaluating.

Principle of Nonfungibility: Nonfungibility is the most typical budgeting rule in MA [16]. It can cause discrimination against diverse MAs in decision-making, resulting in inappropriate mental resource allocations for those MAs. As a result, some MAs will be valued while others will not.

Principle of Hedonic Editing: Hedonic Editing affects whether agents prefer the integration or the separation of various events in mental budgeting. Thaler [16] indicated that when agents confront two or more net loss events, they might prefer integration to separation of those events; this is one rule of Hedonic Editing (for more rules, see Thaler [16]).

Principle of Dual-Entry MA: The order of payment and consumption and the interval between the two matter in mental budgeting. Agents intuitively prefer to pay first and then consume, with a long interval between both acts to better enjoy the pleasure of consuming. Prelec and Loewenstein [39] considered consumption activities to be primarily composed of the acts of paying and consuming, and agents can use a prospective dual-entry MA to create a distinctive hedonic valuation. For example, the act of paying creates the pain of paying, while the act of consuming creates the pleasure of consuming. The coupling effect of dual hedonic valuation is critical and depends on the order of the acts, as well as the interval between them. The ideal scenario is for the pain of paying to be completely coupled with the pleasure of consuming, while the pleasure of consuming would be as decoupled as possible from the pain of paying.

Principle of Reference for Expectation Dependency: If both events are in the same MA, previous experience of event B will act as a reference for expectations of event A; therefore, judging event A will depend on how event B was judged. As a result, the judgments of both events may be similar or even identical. We call this the Reference for Expectation Dependency Principle. Even if agents are uncertain about how to judge event A, it is easy and quick for them to search for similar or correlated events (such as event B) through a heuristic involving attribute replacement [40].

Principle of Depreciation of Opening: The frequency with which one MA is opened influences mental budgeting. A lower frequency of opening a particular MA means that the marginal willingness to budget or the mental resources allocated to the events in this MA will be low. Normally, if an MA is opened with a higher frequency, agents are more likely to continue opening it over time due to the inertia created by the mental familiarity of repeated openings, and agents may intuitively assign a greater weight to higher-frequency events and a lower weight to lower-frequency events. Conversely, if an MA is not opened frequently, agents' inertia will lead them to open it quite rarely, which will negatively influence opening over time. We call this mental effect the Depreciation of Opening Principle.

Principle of Endowment Effect: The Endowment Effect indicates that different property rights will result in different evaluations due to asymmetric mental assessments of gains and losses. For example, if an agent's pricing for a product is A when he owns it but B when he does not, then A is usually higher than B. Thus, the degree of ownership and its change matter in mental budgeting.

Principle of Loss Aversion: If agents believe that an event may cause a net loss, this event might be intuitively avoided or discriminated against when allocating mental resources due to mental aversion; this principle is fundamental to understanding decision-making results.

3.2.2.3. Evaluating and Underlying Principles

At this stage, agents combine the reference point (as the mediator) formed through the two earlier processes with the facts to evaluate and make a final decision.

Principle of Matching: If the facts match or exceed expectations, the event will be evaluated positively; on the contrary, if the facts fall short of expectations, the event will be evaluated negatively. Matching is the most fundamental and general principle of evaluating.

Principle of Norm Theory: Norm Theory indicates that the more incompatible the match, the stronger the resulting emotional reaction. Emotional reactions are usually positive or negative. If the expectation is matched or exceeded by the facts, the emotional response will be positive, as in surprise or delight. On the contrary, if the facts fall short of expectations, the emotional response will be negative, as in conflicts, complaints or anger. Norm Theory is appropriate for analyzing anomalies, particularly when stressing agents' emotional responses via matching [41].

3.2.3. Measures in Three Decision-making Processes

3.2.3.1. Measures in Categorization Editing: Salient Representativeness

Salient representativeness is the most significant type of representativeness influencing MA decision making. Therefore, we focus on the respective salient representativeness of AWF, RTF and DAS and compare them to seek out their consistent salient representativeness.

Salient representativeness can usually be elicited by a high probability of a perception or preference in the agents' cognition. We draw on a typical method, descriptive analysis, to investigate the probability of the perception and, thereby, to identify the salient representativeness; this method was used by Thaler [16] as well as Kahneman and Tversky [37] to elicit the probabilities of respondents' perceptions or preferences in discussing mental effects.

3.2.3.2. Measures in Mental Budgeting and Evaluating: Attributes

Attributes are key factors that stimulate the mental acts of budgeting and evaluating in agents. The attributes of an event can be internal (termed "*internal attributes*" in this paper) or correlated with other events (termed "*correlated attributes*" in this paper), *e.g.,* events in the same MA. Usually, internal attributes are characteristics or representatives of an event, and correlated attributes are important acts occurring within correlated events or belonging to policies enjoyed by correlated events. In this study, correlated attributes refer to those between AWF and RTF as well as between AWF and DAS; internal attributes refer to the AWF in rural China.

4. Using Mental Accounting (MA) to Understand Farmers' Decisions to Pay Agricultural Water Fee (AWF)

In section 3, our data demonstrate the salience of the four research questions and indicate that government-related factors or policies are important in influencing farmers' behaviors in Sichuan. This section uses the MA framework and the data obtained to explore how the aforementioned RTF reform, DAS programs and AWF individually influence farmers' behaviors around paying the AWF to answer those questions.

4.1. Salient Representativeness in Categorization Editing

The data from part three of the farmers' questionnaires will be used to elicit the salient representativeness of AWF, RTF and DAS.

4.1.1. Salient Representativeness of AWF

Agricultural production cost: Statistics suggests that the agricultural production cost is a salient representativeness of AWF in farmers' perceptions. The AWF is one of four types of agricultural production costs in rural China, along with investments in seeds, pesticides and fertilizers; however, we need data to verify that farmers recognize this subjectively. We designed Q1 (Do you think the AWF is a part of the agricultural production cost?), as shown in Table 4, to determine this using the farmers' questionnaire. The data show that 525 farmers answered "yes", accounting for 90.99 percent of respondents, while 52 farmers answered "no", accounting for 9.01 percent.

Table 4. Questions addressing farmers' perceptions of the salient representativeness of AWF, RTF and DAS

Questions	Answers		Total
	Yes	No	
Q1: Do you think the AWF is a part of the agricultural production cost?	525 (90.99%)	52 (9.01%)	577
Q2: Do you think the AWF is a type of political charge?	550 (95.32%)	27 (4.68%)	577
Q3: Do you think that the costs of seeds, pesticides or fertilizers are political charges?	508 (88.04%)	69 (11.96%)	577
Q4: Do you think the previous agricultural tax was a part of the agricultural production cost?	530 (91.85%)	47 (8.15%)	577
Q5: Do you think the previous RTF was a type of political charge?	553 (95.84%)	24 (4.16%)	577
Q6: Do you think the AWF is a type of RTF?	544 (94.28%)	33 (5.72%)	577
Q7: Do you think that DAS programs are implemented by the government?	542 (93.93%)	35 (6.07%)	577
Q8: Do you think that DAS programs are implemented to incentivize agricultural production activities?	526 (91.16%)	51 (8.84%)	577

Political charge: The data indicate that the AWF holds an exceedingly salient representativeness of a political charge from the farmers' perspective, unlike the other three typical agricultural production costs. Seeds, pesticides and fertilizers can be acquired via market transactions with haggling and self-determined options in China, whereas agricultural water must be purchased from local governmental agencies without such options. In fact, purchasing from the market versus from the government is a significant element distinguishing political from other types of charges.

To verify this observation, we designed two questions in the farmer questionnaire (Q2: Do you think the AWF is a type of political charge? and Q3: Do you think that the costs of seeds, pesticides or fertilizers are political charges?). As shown in Table 4, for Q2, 550 farmers answered "yes", accounting for a very high 95.32 percent, while 27 farmers answered "no", accounting for 4.68 percent. Clearly, the AWF is recognized as a political charge by farmers. As for Q3, 508 farmers answered "no", accounting for 88.04 percent, while 69 farmers answered "yes", accounting for 11.96 percent.

4.1.2. Salient Representativeness of RTF

Agricultural production cost: The data show that RTF has a salient representativeness of agricultural production cost from the farmers' perspective. Rural taxes, the chief component of RTF, primarily refer to agriculture-related taxes, as mentioned earlier. Therefore, we designed a question (Q4: Do you think the previous agricultural tax was a part of the agricultural production cost?), as shown in Table 4, to verify whether farmers have this perception. Our data show that 530 farmers answered "yes", accounting for 91.85 percent, while 47 farmers answered "no", accounting for 8.15 percent.

Political charge: The data indicate that RTF also holds an exceedingly salient representativeness of political charge from the farmers' perspective. We need data, however, to determine whether farmers recognize RTF as essentially political charges in China. Therefore, we included a question in the questionnaire (Q5: Do you think the previous RTF was a type of political charge?), as shown in Table 4, to address this. Our data show that 553 farmers answered "yes", accounting for a very high 95.84 percent, while 24 farmers answered "no", accounting for 4.16 percent.

4.1.3. Salient Representativeness of DAS

Government as the executing sector: The data indicate that the government as the executing sector is a salient representativeness for DAS from the farmers' perspective. The government indeed executes DAS programs in China, but we added a question (Q7: Do you think that DAS programs are implemented by the government?), as shown in Table 4, to identify whether farmers perceived this. The data show that 542 farmers answered "yes", accounting for 93.93 percent, while 35 farmers answered "no", accounting for 6.07 percent.

Association with agricultural production: The data also indicate that association with agricultural production is also a salient representativeness for DAS from the farmers' perspective. As mentioned earlier, DAS programs were initiated to support rural agricultural production in China, and we added a question (Q8: Do you think that DAS programs are implemented to incentivize agricultural production activities?), as shown in Table 4, to determine whether farmers perceived this to be the case. The data show that 526 farmers replied "yes", accounting for 91.16 percent, while 51 farmers replied "no", accounting for 8.84 percent.

4.1.4. Consistent Salient Representativeness

4.1.4.1. Consistent Salient Representativeness between AWF and RTF

Consistent salient representativeness: agricultural production cost. There is a high probability that AWF (90.99 percent "yes" in Q1) and RTF (91.85 percent "yes" in Q4) share a common salient representativeness in some farmers' perceptions of agricultural production cost.

Consistent salient representativeness: political charge. There is a quite high probability that AWF (95.32 percent "yes" in Q2) and RTF (95.84 percent "yes" in Q5) share a common salient representativeness in some farmers' perceptions of political charge.

The concept of a political charge is particularly salient for the following reasons. First, AWF in rural China are charged by government agencies, such as township governments, village collectives, and water management sectors. Table 5 displays the statistics for the agents who levy the local AWF in the sampling area based on farmers' responses; government agencies represent 87.87 percent. Generally, as long as the charging agents are government agencies, farmers will find it difficult to differentiate among the various charges and may consider them all political charges. Second, AWF and other political charges have histories dating back thousands of years in rural China; therefore, all taxes and fees hold the salient representativeness of political charge that are profoundly anchored in farmers' perceptions.

Table 5. Statistics for agents charging the AWF in the sampling area

Charging Agents	Township Governments or Village Collectives	Water User Associations	Water Management Sectors	Others	Total
Frequency	452	69	58	1	577
Proportion	77.99%	11.96%	9.88%	0.17%	100.00%

4.1.4.2. Consistent Salient Representativeness between AWF and DAS

Consistent salient representativeness: government as the executing sector. There is a very high possibility that AWF (95.32 percent "yes" in Q2) and DAS (93.93 percent "yes" in Q7) share a common salient representativeness in farmers' perceptions in that the government operates as the executing agent for both.

Consistent salient representativeness: association with agricultural production. There is a high possibility that AWF (90.99 percent "yes" in Q1) and DAS (91.16 percent "yes" in Q8) share a common salient representativeness in farmers' perceptions in that both are related to agricultural production.

4.2. Attributes in Mental Budgeting and Evaluating

Data from the managers' questionnaires and the institutional context of AWF, RTF and DAS will be integrated to deduce the AWF's correlated attributes and internal attributes.

4.2.1. Correlated Attributes between AWF and RTF

Correlated attribute 1: Cancellation of political charges. The AWF and RTF are both political charges in farmers' minds, but China has been eliminating political charges since 2001. For example, in the RTF reform, the "Three Cancellations Program" removed some fees, taxes and volunteer services (such as Township Planning Fees, Educational Crowdfunding, Animal Slaughtering Taxes, Rural

Cumulative Labor Service, and Rural Volunteer Service). The "Two Adjustments Program" regulated agricultural taxes, which were then eliminated in 2006. The "One Reform Program" highlighted a revolution in the Rural Accumulation Fund, which was also eventually cancelled in 2006 [7].

Correlated attribute 2: Cancellation of Rural Cumulative Labor Service, Rural Volunteer Service and Rural Accumulation Fund. The AWF is a charge for using agricultural water and maintaining water conservation facilities, and three items cancelled by the RTF reform were associated with agricultural water resources, they are indirectly relevant to the AWF and, thus, influence farmers' perceptions about paying it to some degree. For example, the Rural Cumulative Labor Service stated that farmers should bear annual responsibility for certain tasks related to water conservancy construction and maintenance (such as building and dredging canals). The Rural Volunteer Service stated that farmers should be obliged to manage flood protection, and the Rural Accumulation Fund was designated to be partially allocated to the establishment of irrigation and water conservancy projects [7].

Correlated attribute 3: Identical timing for charges. Before the RTF reform, local government agencies were responsible for collecting a range of taxes and fees in rural China and usually combined most of them for convenience. For example, the AWF and the agricultural tax were typically collected together [1]. Our interviews with local 20 managers confirmed this practice. Even if they were paid via different means (*e.g.*, paying agricultural taxes with grain but paying the AWF in cash), this does not influence farmers' perceptions that RTF and AWF share the correlated attribute of identical timing for charges.

4.3.2. Correlated Attributes between AWF and DAS

Correlated attribute 4: Agricultural production costs have recently been intensely subsidized. Farmers see that the AWF and DAS are related to agricultural production and executed by governments; moreover, China's central government has been increasingly subsidizing agricultural production costs via DAS programs since 2003, as mentioned earlier, to incentivize agricultural activities. For instance, the "Four Direct Subsidies Program" was recently intensified by increasing the level from 14.52 billion yuan in 2004 to 166.8 billion yuan in 2012 [8].

4.3.3. Internal Attributes of AWF

 We generalize four internal attributes of the AWF through the interviews with 20 water sector managers in the sampling area.

Internal attribute 1: The AWF is generally charged once a year.

Internal attribute 2: Farmers consume water resources first, but the payment is delayed. Thus, the AWF process is to consume first and pay later.

Internal attribute 3: The interval between consuming and paying is usually one to three seasons.

Internal attribute 4: The AWF is the only remaining political charge in rural China; it is unique locally.

 Specifically, our interviews indicated that the major crop in sampling area was single-cropped rice; agricultural water is thus intensively used for annual spring irrigation in April or May. The AWF is typically charged once a year after the fall harvest (in August, September or even later). Some agencies even collect the AWF during the Chinese New Year (usually in January or February of the next year). At least 15 managers argued that due to the increasing difficulty of collecting the AWF, it was better to postpone it until the Chinese New Year for several reasons: a) traditionally, holding onto debt from the past year is not propitious for the new year in China; b) the Chinese New Year is the most important annual festival in China, and the associated positive emotions can partially offset farmers' negative feelings about paying the AWF; and c) the Chinese New Year is also a reunion festival for which many rural migrant workers who are wealthier and more understanding, and thus more likely to pay the AWF, return home.

4.3. Results and Discussion

Next, we discuss information processing in decision making using the three MA processes successively by incorporating the associated underlying principles and measures. Our findings indicate that three AWF-related MAs can be formed in categorization editing, so we divide the decision-making into three information processing scenarios.

Notably, we combine the information processing of mental budgeting and evaluating in each MA. Because there are various information processing inferences in the mental budgeting of each MA, and every inference will result in multiple corresponding results, therefore, separating budgeting and evaluating could induce confusion and undermine consistency.

4.3.1. First Scenario: Information Processing in the Joint MA for RTF and AWF

4.3.1.1. Information Processing in Categorization Editing

In this process, some farmers intuitively combine the AWF and RTF, and consider them as a group to form the joint MA for RTF and AWF.

The RTF is very easily tracked and recalled by farmers when paying the AWF. First, in terms of the degree to which the concept of a political charge is anchored, the RTF will be anchored most deeply. RTF has a history of several thousand years in China and was the primary and greatest political charge before its reform, anchoring it deeply in farmers' minds. The AWF is currently the only political charge in rural China, and the RTF is the most likely reference for the AWF in farmers' minds. Therefore, according to the principle of anchoring, the RTF will be easily recalled. Second, the relationship between AWF and RTF is very ambiguous in farmers' minds, as they were charged by the same organization (government) at the same time. We included a question (Q6: Do you think the AWF is a type of RTF?), as shown in Table 4, to examine this connection. The data show that 544 farmers answered "yes", accounting for as high as 94.28 percent, which verifies that the AWF and RTF are closely linked in farmers' minds. According to the principle of availability, if the AWF is highly related to RTF, the probability and the speed of RTF being tracked and recalled in memory are high.

When RTF is tracked and recalled while paying the AWF, they will be mentally combined to create a joint MA in farmers' minds. Because they share two points of salient representativeness (agricultural production cost and political charge) from farmers' perspectives, according to the principle of representativeness, they are very readily combined in this manner.

4.3.1.2. Information Processing in Mental Budgeting and Evaluating

In mental budgeting, some farmers form one conditional intuitive expectation and four conditional intuitive preferences that are not matched during evaluating, this partly illuminates the above four questions in China.

1. *The conditional intuitive expectation in mental budgeting: the AWF could be cancelled as with the cancellation of RTF.* Because AWF and RTF are in the same MA, when most political charges were removed by the RTF reform in 2006 (*correlated attribute 1*), according to Reference for Expectation Dependency, the experience with RTF (cancelled) served as a reference for AWF expectations. Therefore, farmers wish that the 2006 reform also cancelled the AWF, and this sense of expectation was the strongest when political charges were eliminated via the RTF reform in 2006.

    However, in evaluating, this expectation has not been satisfied because this condition cannot be matched with the fact that AWF has not been cancelled. According to the principle of matching, farmers have been negatively evaluating the AWF since 2006, which partially explains why refusal behaviors have been seen until now (*Question 3*). Additionally, this sense of expectation was strongest in 2006, and it was not met at that time, farmers suddenly began to refuse to pay the AWF (*Question 1*). Further, according to the principle of Norm Theory, this context can partially explain why negative emotions (such as conflicts, complaints and angry expressions) were suddenly observed (*Question 2*) in 2006 and can be seen now (*Question 4*).

2. *The conditional intuitive preference in mental budgeting: a higher degree of participation in water-related activities will raise their compliance with paying the AWF.* According to the Endowment Effect principle, participating in one event denotes enjoying its property rights; thus, raising the participation rate means enjoying greater property rights, causing a stronger perception of ownership and improving compliance.

    However, in evaluating, this preference is not satisfied because this condition cannot be matched due to the RTF reform. Because these activities were cancelled by the RTF reform (*correlated attribute 2*). Thus, according to the principle of matching, farmers negatively evaluate paying the AWF, which again partially explains why farmers are refusing to pay (*Question 3*).

3. *The conditional intuitive preference in mental budgeting: if other charging items are integrated with the AWF, they will become more likely to pay the AWF.* According to the principle of Hedonic Editing, when agents face two or more events with a net loss, they prefer the integration rather than the separation of those events.

    However, in evaluating, this preference is not satisfied because this condition cannot be matched due to the RTF reform. Before the RTF reform, the AWF was usually charged with the agricultural tax (*correlated attribute 3*), which conforms to the preference for integration. Yet, the agricultural tax was cancelled by the RTF reform, and there are no longer other charges to be integrated with the AWF because it is unique in rural areas. Thus, according to the principle of matching, farmers negatively evaluate paying the AWF, which partially explains why farmers are now refusing to pay (*Question 3*).

4. *The conditional intuitive preference in mental budgeting: if the joint MA for RTF and AWF is considered as a potential net loss, farmers will be averse to opening this MA due to Loss Aversion.*
    However, in evaluating, this preference is not satisfied because this condition cannot be matched due to the RTF reform. In this case, the principle of matching partially explains why farmers are now refusing to pay (*Question 3*). Currently, the AWF represents the entire set of political charges (*internal attribute 4*), and the net loss is completely psychologically attached to the AWF. Accordingly, it is difficult for farmers to mentally open one MA with a potential net loss event (AWF).

5. *The conditional intuitive preference in mental budgeting: if the joint MA for RTF and AWF is opened more frequently, it will become more likely to be opened over time, and farmers' budgeting propensity for mental resources allocated to the AWF will be high.* According to the principle of the Depreciation of Opening, a higher-frequency opening for one MA will create stronger mental inertia toward opening it over time, and vice versa.

    However, in evaluating, this preference has not been satisfied because this condition is not matched due to the lower frequency of the AWF. This partially explains why farmers' refusal to pay can be seen now (*Question 3*). Because the AWF is now charged once a year (*internal attribute 1*), the joint MA for RTF and AWF is opened once a year, which is too low for inertia to lead farmers to open it over time. If the joint MA for RTF and AWF is not opened, mental resources cannot be allocated to it, and refusal to pay the AWF can be observed.

4.3.2. Second Scenario: Information Processing in the Joint MA for DAS and AWF

4.3.2.1. Information Processing in Categorization Editing

In categorization editing, some farmers intuitively place the AWF and DAS programs together, considering them to form the joint MA of DAS and AWF.

DAS programs are easily tracked and recalled in farmers' minds when paying the AWF. First, DAS programs were initiated in 2003, and the subsidy amount has been increasing. Therefore, the degree of anchoring with DAS will also increase gradually. According to the principle of anchoring, DAS will be easily tracked and recalled. Second, farmers are very sensitive to government policies regardless of whether they represent giving or taking. For example, DAS is a type of giving, while the AWF is a type of taking; however, as long as they are implemented by the government, they will be mentally linked. According to the principle of availability, when the taking (AWF) occurs, giving (DAS) will be easily tracked and recalled in memory.

When DAS is tracked and recalled while paying the AWF, the two policies will be mentally combined to create a joint MA. According to the principle of representativeness, they share two areas of consistent salient representativeness (the executing sector is the government, and they relate to agricultural production), and farmers will easily combine them mentally.

4.3.2.2. Information Processing in Mental Budgeting and Evaluating

In mental budgeting, farmers form one conditional intuitive expectation and one conditional intuitive preference that are not matched in the evaluating. This partly illuminates two of the above questions in China.

1. *The conditional intuitive expectation in mental budgeting: the AWF could be subsidized in a way similar to the DAS.* Because AWF and DAS are in the same MA, and most agricultural production costs have been increasingly subsidized by the government (*correlated attribute 4*) since 2003, according to the Reference for Expectation Dependency, the experience (subsidies) of DAS has served as a reference for expectations regarding the AWF. Therefore, farmers have also been intuitively wishing for AWF to also be subsidized since 2003.

   However, in evaluating, this expectation has not been satisfied because this condition cannot be matched with the fact that AWF has not been subsidized. According to the principle of matching, farmers have been negatively evaluating paying the AWF, thus partially explaining the refusal behaviors seen to date (*Question 3*). Additionally, Norm Theory can explain why negative emotions (such as conflict, complaints and anger) are now seen (*Question 4*).

2. According to the Depreciation of Opening, the frequency of the annual charge (*internal attribute 1*) can also block the opening of the joint MA for DAS and AWF (*Question 3*), as it does for the joint MA for RTF and AWF.

4.3.3. Third Scenario: Information Processing in the Single MA for AWF

4.3.3.1. Information Processing in Categorization Editing

Given that the uniqueness of the AWF highlights its current peculiarity and salience in rural China, some farmers may form a single MA for AWF in categorization editing.

Context is critical for decision making, namely, information processing for categorization editing is context dependent, relying on the inclusion and abstraction of representativeness [42]. However, one event can be grouped either into a MA with other correlated events or into an individual MA. An event is more likely to be independently considered when it is specific or its representativeness is different from that of others. For instance, in terms of the classification of someone's social MA, it can be defined as a relational MA when considering the relationship between him and others, or as an individual MA when considering his individuality or distinctiveness.

4.3.3.2. Information Processing in Mental Budgeting and Evaluating

In mental budgeting, farmers form four conditional intuitive preferences that are not matched in evaluating, which partly illuminates one of the above questions in China.

1. *The conditional intuitive preference in mental budgeting: if the order is paying first and then consuming, it could raise farmers' compliance in paying the AWF.* According to Dual-Entry MA, if farmers consume first and then pay, the pleasure of consuming is barely coupled with the anticipated pain of paying; they will then have the illusion that this merchandise has nothing to do with them but the full charge needs to be paid when payment is required. Therefore, due to their pursuit of hedonic pleasure, farmers prefer to pay first and consume later.

    However, in evaluating, this preference cannot be satisfied because the condition is incompatible with the fact that the AWF is currently charged as a consume first and then pay fee (*internal attribute 2*). Based on the principle of matching, this partially explains why refusal behaviors are now being seen (*Question 3*).

2. *The conditional intuitive preference in mental budgeting: a shorter interval between the acts of paying and consuming can raise farmers' compliance in paying the AWF.* Because the current order is to consume first and then pay, according to Dual-Entry MA, the shorter the interval between the dual acts is, a shorter interval between the two acts increases the coupling of the hedonic valuations and decreases the pain of paying.

    However, in evaluating, this preference is not satisfied because the existing relatively longer interval (*internal attribute 3*) cannot match the condition of a shorter interval. According to the principle of matching, this gap partially explains why refusal behaviors are currently seen (*Question 3*). Because it is difficult to couple the pain of paying with the pleasure of consuming over such a long interval, the pain of paying causes refusal behaviors when paying the AWF.

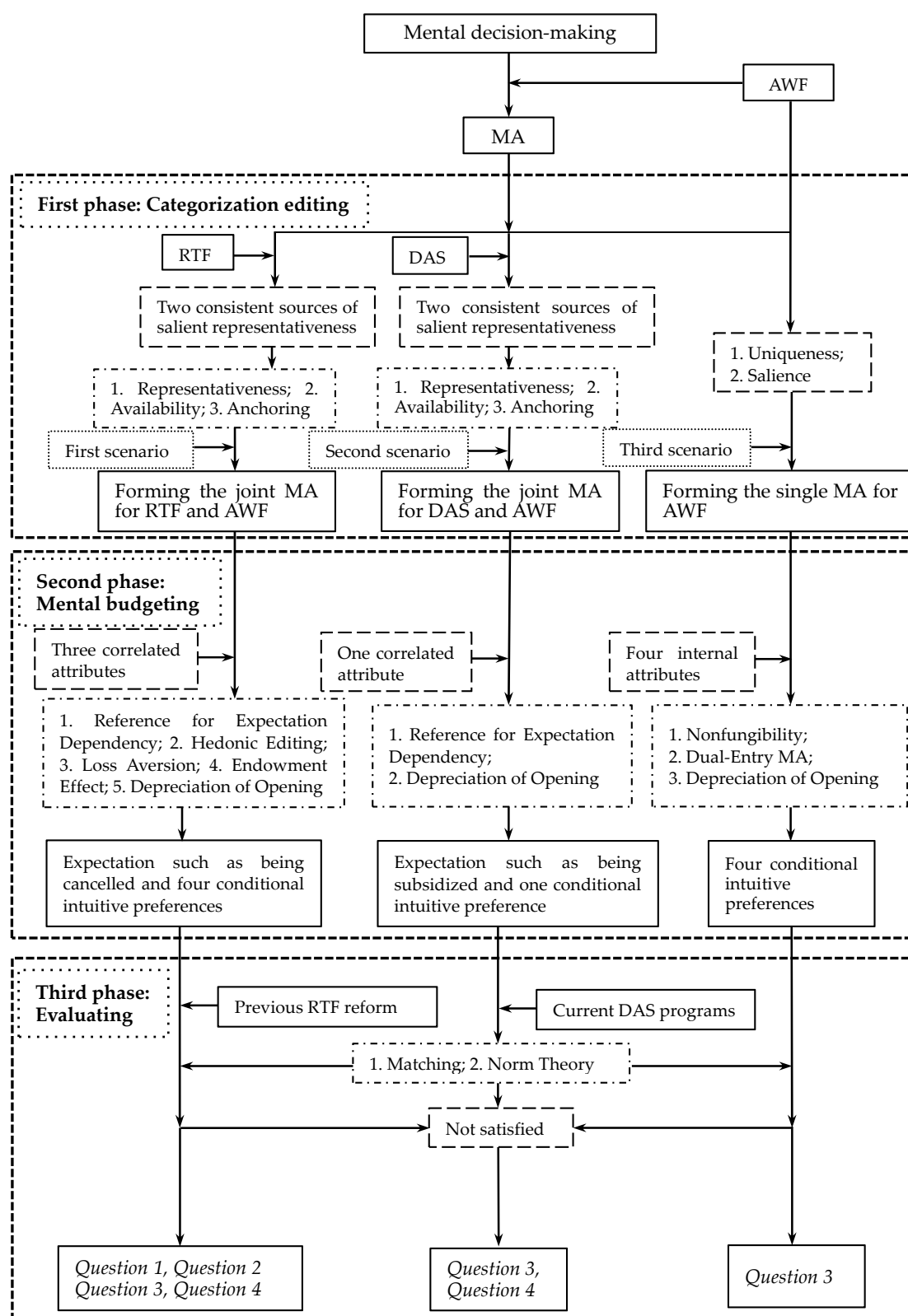
3. *The conditional intuitive preference in mental budgeting: if the AWF is not unusual or is fungible, it will raise farmers' compliance in paying the AWF.* According to Nonfungibility, if the AWF is not unique, it will not be isolated mentally; thus, farmers will not mentally discriminate against the AWF, and it can be allocated more mental resources.

    However, in evaluating, this preference is not satisfied because the condition is not matched by the facts: the AWF is currently the only political charge in rural China (*internal attribute 4*). Based on the principle of matching, this partially explains why refusal behaviors can now be seen (*Question 3*). This will lead farmers to discriminate against the single MA for AWF when allocating mental resources, causing a low marginal propensity to allocate mental resources to the AWF.

    In another study involving the same respondents, we verified the farmers' lower marginal propensity to allocate mental resources to the AWF. Only 4.35 percent and 1.91 percent of farmers were willing to consider using their farm income and work income, respectively, to pay the AWF (both are the conventional and primary sources of revenue for farmers in China) [43].

4. According to the Depreciation of Opening, the yearly charging frequency for the MA (*internal attribute 1*) can also block the opening of the single MA for AWF (*Question 3*), as occurs for the joint MA for RTF and AWF, as well as the joint MA for DAS and AWF.

4.3.4. Summary of Information Processing for the Decision to Pay the AWF

Overall, the information processing behind farmers' decisions to pay the AWF through MA can psychologically answer the four questions we asked, which is delineated in the Flowchart 2.

Flowchart 2. Information processing for farmers' decisions to paying the AWF via MA in China

5. Conclusions

Four questions are raised regarding the negative behaviors of farmers in rural China in paying the AWF: why did farmers suddenly refuse (*Question 1*) or show negative emotions (*Question 2*) to pay the AWF in 2006, and why do they continue to exhibit such refusal behaviors (*Question 3*) or negative emotions (*Question 4*)? The facts indicate that RTF reform and DAS programs may have great effects on those behaviors. Our fieldwork data, collected from 577 farmers and 20 water

managers in Sichuan, confirm this argument and indicate that the four patterns exist in the sampling area. Most farmers reported that they hoped that the government would cover the AWF; however, these hopes have not been met, causing their observed negative behaviors. In addition, managers reported that those behaviors can be largely attributed to farmers' increasing psychological dependence on the government.

We first applies a behavioral economics MA framework to explore how the RTF reform, implementation of DAS programs and the peculiarity of the AWF psychologically influence farmers' decisions to pay the AWF to answer above questions. Using these fieldwork data, farmers' information processing regarding paying the AWF is explored via three sequential MA processes, with associated underlying principles and measures behind each process. Our findings suggest that the four questions raised can be explained by the information processing in three AWF-related MA scenarios:

1. In the first scenario, some farmers form a joint MA for RTF and AWF; then, this MA forms one conditional intuitive expectation that the AWF can be cancelled like the RTF, however, this condition cannot be matched with the fact that AWF has not been cancelled so far. This scenario explains the *Question 1*, *Question 2*, *Question 3* and *Question 4*; meanwhile, this MA also forms four conditional intuitive preferences, but these conditions cannot be matched with the facts due to the RTF reform and the lower annual charging frequency of AWF, which explains the *Question 3*.

2. In the second scenario, some farmers form a joint MA for DAS and AWF; then, this MA forms one conditional intuitive expectation that the AWF can be subsidized like the DAS, however, this condition cannot be matched with the fact that AWF is not subsidized currently, which explains *Question 3* and *Question 4*; meanwhile, this MA also forms another conditional intuitive preference, but this condition cannot be matched with the fact due to the lower annual charging frequency of AWF, which explains *Question 3*.

3. In the third scenario, some farmers form a single MA for AWF; then, this MA forms four conditional intuitive preferences, but these conditions cannot be matched with the facts due to four internal attributes of AWF, which explains *Question 3*.

6. Implications and Limitations

This research also provides insights into how negative psychological externalities (such as Chinese farmers' psychological dependence on the government, as reported by the interviewed managers) are formed through the MA path. We show that earlier policies can affect agents' compliance with subsequent polices. A greater level of previous giving (such as eliminating RTF or increasing DAS programs) is likely to increase the likelihood of farmers' psychological dependence on the giver (the government), which results in growing negative mental externalities connected to the fulfillment of future correlated obligations. This type of mental effect is more likely to be linked to behaviors in using or conserving common pool resources, such as deteriorated water and environmental resources. Therefore, when "giving" occurs, it is important to remember its important negative psychological externalities. Actions are then needed to mitigate these drawbacks, which can be done via decision making questing, such as probing the information processing behind the behaviors.

Additionally, the information processing framework for decision making via MA proposed in this study (Flowchart 2) can be extended to elucidate other daily behaviors, particularly those marked by categorization or negative sentiments.

The limitations of this paper point to the need for more work. First, we focus on explaining rather than resolving the observed questions; therefore, follow-up field experiments aiming at improving farmers' compliance with the AWF are needed. Thaler and Sunstein [44] argued that when agents' decisions are difficult, infrequent and have delayed effects, supportive nudging can guide them to reconcile with the decision and to be better off. Thus, considering the decision making around paying the AWF, some choice architecture is needed to nudge farmers to intuitively

change their behaviors. Second, given the small sample size and the limited area covered in this study, extensive local fieldwork with more participants is needed.

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Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

The following abbreviations are used in this manuscript:

MA: Mental Accounting
AWF: Agricultural Water Fee
RTF: Rural Taxes and Fees
DAS: Direct Agricultural Subsidies

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