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Clan culture and participation in FinTech-based risk sharing

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ABSTRACT

Online mutual aid (MA), an innovative FinTech-based risk sharing model that emerged in China, aims to share medical costs for critical illnesses through decentralized digital platforms. Based on approximately 200 thousand claim cases from the largest MA platform (Xianghubao) in China, this study examines the impact of clan culture on MA participation. We use the number of genealogy books per thousand people of each surname to measure the strength of clan culture. The baseline result shows that individuals with stronger clan intensity are more likely to voluntarily participate in Xianghubao, which is robust to an alternative measure of clan culture, exclusion of cases without genealogy books, and exclusion of four major surnames. The positive impact of clan culture exists in both males and females, and in people with high and low educational levels. Last, we rule out four potential explanations that our clan culture measure may proxy for factors other than clan intensity within kinship networks. Our study provides great insights on the interaction between culture and FinTech development, as well as the interaction between clan-based risk sharing and FinTech-based risk sharing.

1. Introduction

Academic interest in the impact of cultural factors on the economy and finance has significantly increased over the last decade (Du et al., 2017). Clan culture has been a longstanding cultural tradition in China (Hsu, 1963), which leads to divergent institutional development trajectories between China and the West (Greif and Tabellini, 2017). Another topic that has received significant attention is the development of financial technology (FinTech, henceforth). Notably, China leapfrogs advanced economies and leads the world in FinTech development despite its depressed and inefficient financial system (Bian et al., 2023b). It is intriguing to examine the interaction between cultural factors and FinTech, which is underexplored in prior studies.

Since 2011, a FinTech-based risk sharing model called online mutual aid (MA) has emerged in China. It aims to share medical costs for critical illnesses through decentralized digital platforms. Individuals enroll in the MA platform online by just a few clicks with no initiation fee. When a MA member is diagnosed with a covered critical illness, the MA platform provides lump-sum benefits (e.g., 300,000 RMB) that are evenly shared by other members on the platform. The unique "no premium ex ante, cost-sharing ex post" rule distinguishes MA platforms from critical illness insurance or healthcare insurance, providing an alternative option for individuals to share risks associated with illness.[1] The MA platforms attract millions of members within a short period and provide healthcare coverage with a large group size and low costs. As of 2019, the MA platforms had about 150 million members, exceeding the number of

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[1] See Bian et al. (2023a) for more details on online mutual aid.

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individuals who purchased critical illness insurance and accounting for 10.7% of the total population in China (Research Institute of Ant Group, 2020; Fang et al., 2021).

Confucian clan was the dominant social structure in imperial China and has influenced the evolution of institutions and people's way of life (Cheng et al., 2021; Chen et al., 2022). A clan is composed of a group of individuals who are connected by kinship ties and share the same family name (Fei and Liu, 1982). It creates and enforces rules and norms that require clan members to live in harmony and provide assistance to those in need (Cheng et al., 2021). A clan often compiles genealogy books to record all descendants from the common ancestor and presents clan rules and codes of conduct. Genealogy compilation is a vital means for a clan to reinforce kinship ties among clan members and foster unity within the clan (e.g., Feng, 1994, 2013; Xu, 1995, 2012). The key element of the Confucian clan lies in its emphasis on family values and obligations and loyalty to the family (Cheng et al., 2021). In clan culture, people cooperate by relying on kinship-based reputation and trust while maintaining strong family ties. Members form an internal group to defend against business failures, illnesses, and disasters. Chen et al. (2022) document that the Confucian clan functions as an internal financial market among clan members for resource pooling and fund support, which depressed the development of modern banks in China. It is reasonable to expect that informal risk sharing within Confucian clans may reduce the need and necessity of participation in external FinTech-based risk sharing. As a result, individuals with stronger clan strength are less likely to voluntarily participate in online mutual aid.

However, an emerging body of research has shown that informal risk sharing may not be complete. Theoretical models identify that information asymmetries (Townsend, 1982; Ambrus et al., 2022) and imperfect enforceability of contracts (Ligon et al., 2002) are reasons for the incompleteness of informal risk sharing. Delpierre et al. (2016) point out two limitations of informal risk sharing. First, informal risk-sharing groups are of limited size. Second, informal risk-sharing groups cannot rely on credit to cover a deficit in the event of a bad year. As a result, the incomplete nature of risk sharing within clan groups may drive individuals to seek alternative forms of external risk sharing, among which online mutual aid is a potential option. This FinTech-based risk sharing model breaks through geographic boundaries, which resolves the limitation of small group sizes in Confucian clans. In addition, some MA platforms are embedded in super payment apps, which ensures the contract enforceability and deduction of sharing costs among MA members. Given these, a competing hypothesis is that individuals with stronger clan strength attach greater importance to risk sharing because of the accumulated experience in informal risk sharing. As a result, they are more likely to voluntarily participate in online mutual aid since informal risk sharing is incomplete.

Clan culture also has a direct and positive impact on individuals' participation in critical illness risk-sharing plans. This is because individuals with stronger clan strength care more about their families and are more inclined to pass on their assets to family or clan members, which is often referred to as a “bequest motive.” The bequest motive would boost demand for life insurance. Fischer (1973) points out that death destroys human capital, so an individual may purchase heavily loaded insurance against him if the weighting on the bequest function is sufficiently large. Bernheim (1991) proposes that bequest motives could change attitudes towards a decision to purchase insurance and provides empirical evidence that the probability of holding life insurance increases with the insured persons' bequest motives. Lewis (1989) explicitly includes the preferences of the dependents and beneficiaries into an insurance demand model, which reflects the significance of analyzing bequest motives. Inkmann and Michaelides (2012) and Fang and Kung (2021) employ microeconomic data for their empirical analysis and discover a positive correlation between measures of bequest motives and the demand for life insurance.

MA platforms function similarly to life insurance in fulfilling the bequest motives of participants due to the combined effect of the following two reasons. First, suffering from critical illnesses can severely damage human capital (Bleakley, 2010). In China, the most prevalent severe illness is the malignant tumor, with a significantly lower 5-year survival rate compared to developed countries (Zeng et al., 2018). Other critical illnesses, such as strokes and acute myocardial infarctions, substantially limit patients' behavior, causing greater damage to their health and human capital than malignant tumors. Second, MA platforms usually provide patients with lump-sum and substantial financial benefits. The average of the benefits provided by Xianghubao in our sample is 142,030 RMB, while the average hospitalization costs for lung cancer, stroke, and acute myocardial infarction in China in 2021 were 39,527, 10,741, and 26,518 RMB, respectively (National Bureau of Statistics of China, 2022). Therefore, MA platforms provide substantial financial security for participants' human capital and we can infer that individuals with stronger clan strength are more inclined to leave assets to their families or clan members in the event of a critical illness and are more actively engaged in critical illness risk-sharing plans.

Given the above competing forces, it is of great significance to examine the impact of clan culture on the participation of FinTech-based risk sharing like online mutual aid. To answer this question, we manually collect all claim cases from the largest MA platform (Xianghubao) in China. The data on Xianghubao has several strengths, which provide an ideal setting to examine this topic. First, the insurance sector encompasses various products with differentiated terms and conditions. Thus, it is challenging to control the variations among different insurance products when using household survey data. In contrast, Xianghubao has a high level of standardization, with fixed coverage, benefit amounts, payment methods, and service standards. These characteristics provide a more precise way to explore the impact of cultural factors on individuals' participation in FinTech-based risk sharing. Second, since clan members within kinship networks share the same surname, we need information on customers' surnames to construct a proxy for the strength of the Confucian clan, which is impossible to obtain from household surveys or traditional service providers. In contrast, Xianghubao operates within a FinTech-based decentralized platform with the adoption of blockchain. It is necessary to disclose detailed information for the sake of transparency. Xianghubao releases the claim cases twice a month on its bulletin board, including claimants' surnames, which allows us to construct a proxy for clan strength. Third, customers' purchase of insurance products relies heavily on insurance agents and brokers. Thus, it is necessary to control for supply-side differences to examine customers' participation in formal insurance. In contrast, Xianghubao offers a simple and unified product operated on a single platform to all customers, excluding the potential impact from the supply side.

Compared with the seminal paper by Chen et al. (2022), a great improvement in our paper is that we innovatively measure clan culture based on surnames, which is different from the measures based on geographical regions. Specifically, we first identify the surname of each claimant in Xianghubao and then manually collect the number of genealogy books for this surname. We scale it by the total population of this surname to proxy for the strength of the Confucian clan within the kinship network that this claimant belongs to. The baseline results suggest that individuals with stronger clan intensity are more likely to voluntarily participate in the FinTech-based risk sharing. Specifically, an increase of one unit in clan intensity (the number of genealogy books per thousand people) is associated with an increase of 13.50% in the probability of individuals' voluntary participation in Xianghubao at the sample mean. Moreover, we find that the positive impact of Confucian clan centers on individuals between 30 and 60 years old, mainly because these individuals provide financial support to their clan groups and thus have more concerns about the potential threat posed by critical illnesses.

To address the endogeneity concern of clan culture, we follow Cheng et al. (2021) and Chen et al. (2022) and use the shortest distance from the center or capital of each claimant's province of birthplace to the nearest Zhu Xi academy in the twelfth century as the instrumental variable. The results confirm the positive impact of clan culture on voluntary participation in the FinTech-based risk sharing model. We also conduct several robustness tests, including using the rank measure of clan culture, excluding claim cases without genealogy books, and excluding four major surnames. All the results remain robust. In addition, we explore the impact of clan culture among diverse groups and find that Confucian clan promotes individuals' voluntary participation in Xianghubao for both males and females, and for people with lower and higher educational levels.

A potential concern is that the number of genealogy books per capita in each surname may not reflect clan strength within kinship networks but reflect other factors related to clan strength. Here, we consider four possible explanations. First, individuals possessing greater clan strength may exhibit higher levels of risk aversion, and thus, they are more likely to participate in the FinTech-based risk sharing voluntarily. However, we find no evidence for the relationship between genealogy intensity and the probability that the critical illness incurred was due to accidental factors, ruling out the risk aversion explanation. Second, the number of genealogy books may reflect economic conditions, and people with better economic conditions are more inclined to voluntarily join the FinTech-based risk sharing. As routine physical examination is a daily health maintenance method that requires economic resources, people with better economic conditions may be more likely to take routine physical examinations. However, we find no evidence that individuals from clans with more genealogy books per capita are more likely to have a critical illness that is diagnosed in routine physical examinations. Third, Alipay has grown from a pure payment tool to a super app where users can pay utility bills, book tickets and hotels, purchase mutual fund products, etc. Therefore, individuals possessing greater clan strength may be more involved in tasks related to family affairs, which can increase the likelihood of utilization of FinTech platforms such as Alipay. Since Xianghubao is embedded in Alipay, individuals possessing greater clan strength may be more familiar with Alipay and more likely to participate in Xianghubao voluntarily. To explore this mechanism, we calculate the claim preparation duration, measured as the number of days between the date the claimant was diagnosed with a critical illness and the application date for claim requests. The result does not support this mechanism, as individuals with stronger clan strength do not have a shorter claim preparation duration. Fourth, we examine whether our clan culture measure indeed reflects the strength of clans within kinship networks, not benevolence towards the general public. We calculate the number of days between the enrollment day of each claimant and the subsequent release date of claim cases in Xianghubao and the average additional sharing costs of each claimant. We find no significant association between our clan culture measure and these two proxies. This finding suggests that our clan culture measure does not reflect benevolence towards individuals beyond kinship networks.

Our study contributes to the existing literature in several respects. First, it contributes to the fast-growing body of literature on FinTech. While existing research on FinTech focuses on lending and payments (e.g. Lin et al., 2013; Foley et al., 2019; Jagtiani and Lemieux, 2019; Tang, 2019; Makarov and Schoar, 2020; Gambacorta et al., 2023), we explore the adoption of FinTech in the insurance sector and concentrate on the FinTech-based decentralized risk sharing model called online mutual aid. Several studies have started constructing theoretical models to explain the unique characteristics of online mutual aid (Fang et al., 2021; Abdikerimova and Feng, 2022; Chen et al., 2023). In this study, we use unique claim data from the largest MA platform in China and provide empirical evidence on the impact of clan culture on participation in online mutual aid, which helps us better understand this innovative risk sharing model.

Second, we extend the literature on informal risk sharing and insurance (e.g., Bramoullé and Kranton, 2007; Mobarak and Rosenzweig, 2013; Delpierre et al., 2016; Lin et al., 2020; Attanasio et al., 2023). While Chen et al. (2022) show that the Confucian clan provides an effective internal market for resource pooling among clan members, prior studies have pointed out the potential limitations of informal risk sharing (e.g., Ligon et al., 2002; Delpierre et al., 2016; Ambrus et al., 2022; Attanasio et al., 2023). Our study builds a bridge between informal risk sharing and FinTech-based risk sharing. We find that individuals may pursue FinTech-based external risk sharing when informal risk sharing within clan groups is incomplete.

Third, our study is related to an emerging strand of literature that examines the consequences of clan culture (e.g., Greif and Tabellini, 2017; de la Croix et al., 2018; Zhang, 2020; Chen et al., 2022; Huang et al., 2022; Tang and Zhao, 2023). Compared with clan culture measures based on geographical regions, our measure based on surname is more closely related to genealogy and exhibits greater variations among sample individuals. While prior studies focus primarily on the impact of clan culture on sustaining cooperation (Greif and Tabellini, 2017), entrepreneurship (Zhang, 2020), and family ownership concentration (Cheng et al., 2021), we extend this literature by examining the impact of clan culture on individuals' participation in the FinTech-based risk sharing. Our study offers a novel perspective to understand the relation between traditional culture and FinTech development.

The remainder of this paper is organized as follows. Section 2 provides the institutional background of the MA sector and introduces Xianghubao. Section 3 describes the data and variable definitions. Section 4 shows the baseline results, the heterogeneous impact of

clan culture in different age groups, the instrumental variable estimation, and the robustness tests. Section 5 rules out other potential explanations. Section 6 concludes.

2. Institutional background: A brief introduction to MA and Xianghubao

Online mutual aid (MA), a FinTech-based risk sharing model, emerged in China in 2011 and disrupted the insurance industry. Table 1 summarizes four main differences between online mutual aid and insurance. MA covers over 100 types of critical illnesses, such as cancer, acute myocardial infarction (heart attack), and end-stage renal disease. The application process is intentionally designed to be straightforward and efficient, enabling individuals to complete their application within the app with just a few clicks. There is no upfront premium requirement in this process. Applicants are only required to confirm their lack of pre-existing conditions and give consent to participate in the collective sharing of medical costs. Thus, "no premium ex ante" is one of the distinctive attributes of MA.

Moreover, within this decentralized platform, members evenly distribute the costs among themselves following the occurrence of critical illnesses, eliminating the need for insurance companies to act as intermediaries. This "cost sharing ex post" scheme differs from insurance, where differential pricing is used and upfront premiums are needed.

Since 2018, notable Chinese Internet giants such as Ant Group, Tencent, and Meituan have entered the sector, injecting capital and drawing upon their vast customer bases to fuel the expansion of the MA market. Notably, the largest MA platform in China, Xianghubao, was launched by Ant Group in October 2018 and achieved a remarkable milestone of amassing over 100 million members within its first year of establishment.

Xianghubao is embedded in Ant Group's digital wallet app—Alipay. Alipay is the world's largest mobile payment platform, with over one billion users and 80 million merchants.[2] Participation in Xianghubao's MA program requires individuals to be between 30 days and 59 years old, without pre-existing conditions, and does not entail an initiation fee. The program offers a comprehensive coverage of over 100 critical illnesses, with lump-sum payments varying based on the severity of the illness and the claimant's age. In May 2019, Xianghubao introduced a specialized MA program tailored for individuals between 60 and 70 years old. Xianghubao releases the claim cases investigated by its team every 7th and 21st of each month, making them available on its bulletin board. On the 14th and 28th of each month, the claimants' indemnities, along with an 8% management fee, are distributed equally among all members on the platform. As Xianghubao is built on the Alipay platform, the shared costs of each member are automatically deducted from the bank accounts linked to their Alipay accounts.

Unexpectedly, on January 28, 2022, Alipay abruptly shut down Xianghubao, possibly due to regulatory pressures placed on Internet giants and operational challenges within the e-commerce giant Alibaba. But the shutdown of Xianghubao does not affect the contributions of our work. The medium-sized MA platforms such as Kangai Community, Zhongtopia, and Ehuzhu are still alive in the sector. Existing literature has shown the limitations of informal risk sharing and inadequate health insurance coverage for the poor (Dickstein et al., 2015; Delpierre et al., 2016; Finkelstein et al., 2019).[3] Empowered by FinTech, MA has a large group size and provides a novel option for individuals to share health risks with low costs. The annual sharing costs for each MA member are as low as about 120 RMB (approximately US$16.8), while the indemnity payments could be up to 300,000 RMB (approximately US$42,017). Thus, our work provides unique insights into the relationship between informal and FinTech-based risk sharing.

3. Data and variables

3.1. The strength of clan culture

We use the number of genealogy books of each surname, scaled by the total population of this surname, to proxy for the strength of clan culture. The genealogy data is manually collected from *The General Catalog of Chinese Genealogy*, which keeps the most comprehensive records of all available Chinese genealogies.[4] For each genealogy book, the catalog records its surname, written date, and the clan's location.

We obtain the earliest, large-sample, and randomized information on Chinese surnames from the *Frequency Table of Chinese Surnames* in the Appendix of *The Chinese Dictionary*.[5] This table contains data on the top 500 surnames and their corresponding population in 1982. The population of the top 500 surnames accounted for 99.62% of the total population in China. The dataset was based on the sample data from the Third National Population Census in 1982. This population census, with a sample size of 537,421 individuals, was obtained using statistical principles and equal distance sampling based on the population proportion in each region.

Then, for the top 500 surnames, we use the number of genealogy books prior to 1982 per thousand people of each surname to measure clan culture (*Clan*). For surnames that are not in the top 500 and have zero genealogy books, the value of clan culture is recorded as 0. The population data was unavailable for surnames that are not in the top 500 but have at least one genealogy book, making it impossible to measure the strength of clan culture.

[2] Data source: the IPO prospectus of the Ant Group, 2020.

[3] See Bian et al. (2023a) for more details about informal risk sharing.

[4] *The General Catalog of Chinese Genealogy* was published in 2009 by the Shanghai Ancient Books Publishing House in Shanghai. It consists of the genealogies of up to 52,306 clans, covering 283 prefectures in China and more than 700 Chinese surnames.

[5] *The Chinese Dictionary* was compiled by the Language Research Institute of the Ministry of Education of China and the Editorial Department of the Zhonghua Book Company, and published by Zhonghua Book Company in Beijing in 1999.

Table 1
The differences between online mutual aid and insurance.

	Online mutual aid (MA)	Insurance
Premium collection and cost sharing	Members join the MA platform with no premium ex ante, and the claim costs and management fees are shared by members ex post.	Policyholders pay premiums to insurers in advance to gain insurance coverage from insurers.
Reserves	Given the "no premium ex ante and cost sharing ex post" scheme, MA platforms have no reserves.	Insurers keep a portion of premiums as reserves according to regulatory requirements in order to handle potential claims filed by policyholders.
Risk sharing and risk transfer	MA is a decentralized form of risk sharing with no financial intermediaries, where all members share the risks.	Insurance is a centralized form of risk sharing, where policyholders transfer the risks to insurers.
Pricing	The participation costs are the same for all members, but the benefit payments to high-risk groups are lower than those to low-risk groups.	Differential pricing is used to identify individuals with different risks and to alleviate adverse selection.

3.2. Dependent variable: Participation in Xianghubao in person

We manually collect all (203,244) claim cases in Xianghubao from its inception to April 2022. The data source is the public announcement bulletin of Xianghubao. The information of each case includes members' basic information such as their surname, national identity number,[6] gender, age, province of residence, the location (province) of the hospital where the claimant was diagnosed, whether the claimant participated in Xianghubao in person, whether and when a member made a claim, the type of critical illness, the accumulated sharing costs, as well as the amounts of indemnities received from Xianghubao.

We remove claimants who enrolled in Xianghubao under 18 years old, as they cannot make an independent decision on participation. The sample is reduced to 199,458 cases, covering 956 surnames associated with the claimants. Among these, 483 surnames belong to the top 500 surnames in the *Frequency Table of Chinese Surnames*, with a total of 198,214 cases, accounting for 98.14% of the total sample. For the remaining 473 surnames outside the top 500 surnames, 398 have zero genealogy books; thus, the value of clan culture is coded as 0. These surnames comprise 882 claim cases, representing 0.43% of the total sample. The remaining 75 surnames outside the top 500 surnames but with at least one genealogy book were excluded since we do not have their population data. This situation comprises 362 cases, only making up 0.18% of the full sample. Our final sample consists of 199,096 (=198,214 + 882) cases.

We construct an indicator variable, *Insur_active*, which takes a value of 1 if the claimant participated in Xianghubao in person and zero otherwise. It is worth noting that Xianghubao allows members to participate either in person or by their relatives, indicating that a member's proxy can use their Alipay accounts to enroll in Xianghubao on behalf of the member. Since every claimant in our sample has the ability to make independent decisions (excluding those below 18 years old), participation in person indicates that a member enrolls in Xianghubao voluntarily rather than doing so passively. In this study, we examine whether clan culture improves or impedes the voluntary participation of this FinTech-based risk sharing model. We rule out other potential explanations in Section 5.

3.3. Control variables

We include a set of control variables that may affect claimants' participation in Xianghubao. (1) The claimant's gender (*Male*) is an indicator variable with a value of one for males and zero for females. (2) The claimant's educational level (*Edu*) is measured by the average sentence length of the *self-description of disease discovery and medical process* in the claim materials. Considering the overall low level of education among Chinese residents, we use the average sentence length in writing as a proxy for the educational level (Nesi and Sheena, 2012). The average sentence length is defined as the number of Chinese words divided by the number of sentences. We considered commas, semicolons, periods, exclamation marks, question marks, and ellipses for dividing sentences. (3) The claimant's age (*Age*) is proxied by a series of categorical variables corresponding to different age groups, namely: [18–25), [25–30), [30–35), [35–40), [40–45), [45–50), [50–55), [55–60), [60–65), and [65–72). (4) Hospital grade (*G_hospital*) is proxied by an ordinal variable ranging from 0 to 9, where larger values indicate higher grades.[7] (5) *Indemnity* is the amount of indemnities that the claimant received from Xianghubao.

3.4. Descriptive statistics

Table 2 presents descriptive statistics of the main variables used in our analyses. For claim cases in Xianghubao, about 47.2% of them participated in Xianghubao in person. The mean value of *Clan* is 0.036, which amounts to 0.036 genealogy books per thousand people. The average educational level, measured by the average sentence length of the *self-description of disease discovery and medical process* in the claim materials, is 19.18. About 52.2% of the claimants at Xianghubao are males, and the average age is 48. Over half of the claimants were diagnosed in a hospital with Grade 9. On average, a claimant received indemnities of 142.03 thousand RMB from Xianghubao.

[6] The national identity number has 18 digits. We have access to the first two digits and the 9-14th digits.

[7] In China, hospitals are categorized into three levels, with each level further divided into three sublevels. Therefore, China's hospitals are classified into nine grades. Grade 9 is the highest level of hospitals.

4. Empirical results

To formally examine how clan culture affects the likelihood of individuals' voluntary participation in Xianghubao, we adopt the Probit model and estimate the following regression model:

$$Insur\_active_{i,j,k} = \beta_0 + \beta_1 Clan_j + \gamma' Control + \delta_k + \theta_{illness} + \varphi_{month} + \varepsilon_{i,j,k} \quad (1)$$

where *i, j, k* denotes individuals, surnames, and provinces, respectively. The dependent variable is $Insur\_active_{i,j,k}$, an indicator variable that equals one if the claimant *i* with surname *j* in province *k* participated in Xianghubao in person and zero otherwise. The key independent variable of interest is $Clan_j$, which is the clan intensity of surname *j*. *Control* denotes a set of control variables mentioned in Section 3.3, including the claimant's gender (*Male* = 1 for males and 0 for females), educational level (*Edu*), age (*Age*), hospital grade (*G_hospital*), and indemnity amounts (*Indemnity*).

To obtain a clean identification, we include an array of fixed effects for critical illness types (*Illness type FEs*, $\theta_{illness}$) and for the month when the claimant was diagnosed (*Month FEs*, φ_{month}). To account for variations in clan culture across regions, we introduce three province fixed effects in our analysis: the province of the claimant's birthplace, the province of residence, and the province of the hospital where the claimant was diagnosed with a critical illness. The province where the claimant was born is identified using the first two digits of the claimant's national identity number. $\varepsilon_{i,j,k}$ is the error term. All the standard errors are clustered at the surname level.

4.1. Baseline results

Table 3 reports the baseline results. In column (1), we estimate Eq. (1) after controlling for three basic individual-level characteristics, including gender, education level, and age. The coefficient of *Clan* is positive and statistically significant at the 1% level, indicating that clan culture positively impacts individuals' voluntary participation in Xianghubao. This effect still holds after controlling for other variables, illness type fixed effects, and month fixed effects (see column (2)). In column (3), we include three province fixed effects based on column (1), and the coefficient of *Clan* remains significantly positive. Column (4) controls all the variables and fixed effects, and we find that clan culture significantly promotes individuals' voluntary participation in Xianghubao. The marginal effect of clan culture is 0.135, indicating that an increase of one unit in clan intensity (number of genealogy books per thousand people) for the claimant's surname is associated with an increase of 13.5% in the probability of participating in Xianghubao in person at the sample mean.

4.2. The heterogeneous impacts of clan culture among different age groups

The baseline results support the view that the accumulated risk sharing experience in stronger clan culture prompts individuals to participate in FinTech-based risk sharing when risk sharing within clans is incomplete. Notably, individuals in different age groups may exhibit varying levels of perception on clan culture. Thus, we further examine the impact of clan culture on individuals' voluntary participation in Xianghubao among different age groups, namely: [18–30), [30–40), [40–50), [50–60), and [60–72). The results in Table 4 show that the coefficients of *Clan* are significantly positive in the age groups of 30 to 60 years old, while the coefficients are insignificant in groups aged below 30 and above 60.

This is mainly because individuals aged 30 to 60 often serve as the pillars of their clan groups. They have more concerns about the potential threat posed by critical illnesses. As a result, they place a greater emphasis on risk sharing and are more inclined to voluntarily participate in FinTech-based risk sharing.

4.3. The instrumental variable approach

Thus far, we have shown that clan culture promotes individuals' voluntary participation in Xianghubao. Our clan culture is defined based on the number of genealogy books and population before 1982, while the participation in Xianghubao occurred after 2018. Coupled with the inclusion of various fixed effects, the endogeneity of clan culture may not be a major concern. However, we still present the results of the instrumental variable approach to make our results more convincing. Following Cheng et al. (2021) and Chen et al. (2022), we use the shortest distance from the center of each claimant's province of birthplace to the nearest Zhu Xi academy in the twelfth century (*Dist_cen*) as an instrumental variable for clan culture.[8] We also consider the shortest distance from the capital of each claimant's province of birthplace to the nearest Zhu Xi academy in the twelfth century (*Dist_capital*) as the second instrumental variable.

Zhu Xi is an ardent supporter of the development of clan organizations in China, and provinces closer to the academies he established were more exposed to clan culture. Moreover, the location choices of the three academies are largely random, and a province's distance to the nearest Zhu Xi academy is not related to economic conditions or other aspects of local environments (Chen et al., 2022).

Table 5 reports the results of the instrumental variable approach. Columns (1) and (3) show that the coefficients of *Dist_cen* and

[8] The three Zhu Xi academies include Yuelu Academy in Changsha (Hunan province), Hanquan Academy in Jianyang (Fujian province) and Bailudong Academy in Jiujiang (Jiangxi province).

Table 2
Descriptive statistics, This table reports descriptive statistics of the main variables used in our analysis. The sample consists of 199,096 claim cases at Xianghubao from its inception to April 2022. The detailed definitions of the variables are presented in the Appendix.

Variable	N	Mean	Std. Dev	Min	p50	Max
Insur_active	199,096	0.472	0.499	0	0	1
Clan	199,096	0.036	0.027	0	0.027	0.871
Male	199,096	0.522	0.500	0	1	1
Edu	199,096	19.176	9.718	1.917	15.857	47
Age	199,096	48.152	12.121	18.010	49.780	71.450
G_hospital	199,096	8.481	1.123	1	9	9
Indemnity (10,000 RMB)	199,096	14.203	8.606	5	10	30

Table 3
Clan culture and individuals' voluntary participation in Xianghubao, This table reports the impact of clan culture on individuals' voluntary participation in Xianghubao. The dependent variable is *Insur_active*, defined as an indicator variable that equals one if the claimant participated in Xianghubao in person and zero otherwise. The key independent variable is *Clan*, defined as the number of genealogy books per thousand people of each surname. The detailed definitions of the control variables are presented in the Appendix. We additionally control the illness type FEs and the month FEs in columns (2) and (4), and control an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs in columns (3) and (4). The average marginal effects at the sample mean are reported. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	The dependent variable: *Insur_active*			
	(1)	(2)	(3)	(4)
Clan	0.2233***	0.2206***	0.1350***	0.1350***
	(0.0391)	(0.0387)	(0.0335)	(0.0334)
Male	0.0309***	0.0334***	0.0326***	0.0342***
	(0.0018)	(0.0018)	(0.0018)	(0.0017)
Edu	0.0007***	0.0009***	0.0007***	0.0009***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Age	Yes	Yes	Yes	Yes
G_hospital		0.0124***		0.0112***
		(0.0009)		(0.0008)
Indemnity		−0.0014***		−0.0014***
		(0.0002)		(0.0002)
Illness type FEs		Yes		Yes
Month FEs		Yes		Yes
Province of birthplace FEs			Yes	Yes
Province of residence FEs			Yes	Yes
Province of hospital FEs			Yes	Yes
Pseudo R^2	0.380	0.383	0.386	0.389
Obs.	199,096	199,061	197,635	197,602

Table 4
Clan culture and individuals' voluntary participation in Xianghubao among different age groups, This table reports the impact of clan culture on individuals' voluntary participation in Xianghubao among different age groups, namely: [18–30), [30–40), [40–50), [50–60), and [60–72). The dependent variable is *Insur_active*, defined as an indicator variable that equals one if the claimant participated in Xianghubao in person and zero otherwise. The key independent variable of interest is *Clan*, defined as the number of genealogy books per thousand people of each surname. The detailed definitions of the control variables are presented in the Appendix. We control the illness type FEs, the month FEs, and an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs. The average marginal effects at the sample mean are reported. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	The dependent variable: *Insur_active*				
	(1) [18–30)	(2) [30–40)	(3) [40–50)	(4) [50–60)	(5) [60–72)
Clan	0.1204	0.1896**	0.2102**	0.1456**	0.0207
	(0.0942)	(0.0785)	(0.0906)	(0.0649)	(0.0333)
Controls	Yes	Yes	Yes	Yes	Yes
Illness type FEs	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes
Province of birthplace FEs	Yes	Yes	Yes	Yes	Yes
Province of residence FEs	Yes	Yes	Yes	Yes	Yes
Province of hospital FEs	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.093	0.028	0.065	0.051	0.035
Obs.	16,938	38,554	44,165	58,247	39,372

Dist_capital are both significantly negative at the 1% level in the first stage. This suggests that provinces closer to the Zhu Xi academy are related to stronger clan cultural influences, confirming the validity of our instrumental variables. In the second stage, as shown in columns (2) and (4), the coefficients of *Clan* are both positive and significant, indicating that clan culture has a significantly positive impact on individuals' voluntary participation in Xianghubao. The Wald *F*-statistics are 31.97 and 33.52, implying that our instrumental variables are not weak.

4.4. Robustness tests

In this subsection, we provide a series of robustness tests, including using rank measures of clan culture, excluding cases without genealogy books, and excluding four major surnames. We also explore the effects of clan culture on individuals' voluntary participation in Xianghubao among diverse groups.

4.4.1. Rank measure of clan culture

In the baseline regression, we calculate the number of genealogy books per thousand population to measure the strength of clan culture. To check if our results are sensitive to alternative measures of clan culture, we construct a rank measure of clan culture (*Clan2*) and re-run the regression. Specifically, we first sort the top 500 surnames in ascending order based on the number of genealogy books prior to 1982. These surnames are then labeled from 1 to 500. Second, we sort the top 500 surnames in ascending order based on their population size in 1982. Similarly, these surnames are labeled from 1 to 500. Finally, we construct *Clan2* by calculating the difference between the rank of genealogy books and the rank of population size. A higher value of *Clan2* indicates a higher strength of clan culture. The results in column (1) of Table 6 show that the coefficient of *Clan2* is still significantly positive at the 1% level.

4.4.2. Exclusion of cases without genealogy books

We remove claim cases without genealogy books to verify that our results are not driven by potential outliers in the clan culture measure. The results are shown in column (2). Our main findings in the baseline regression still hold.

4.4.3. Exclusion of four major surnames

To avoid the possibility that our results are driven by extreme values of surnames with particularly large population, we exclude 53,434 claim cases belonging to the four major surnames, including Wang (王), Li (李), Zhang (张), and Liu (刘). Column (3) shows that our results remain robust.

4.4.4. The impact of clan culture among diverse groups

Based on two fundamental demographic variables, we further explore the effects of clan culture on individuals' voluntary participation in Xianghubao among diverse groups, including males and females, and people with lower and higher educational levels.

First, we perform the baseline regression for males and females, respectively. As shown in columns (1) and (2) in Table 7, the coefficients of *Clan* are both significantly positive, indicating that clan culture positively impacts individuals' voluntary participation in Xianghubao for both males and females.

Second, we divide the sample based on whether the claimant's educational level is above or below the median and re-estimate the baseline model for the two subsamples. As mentioned before, the educational level is measured by the average sentence length of the *self-description of disease discovery and medical process* in the claim materials. Results are shown in columns (3) and (4). The coefficients of *Clan* are both positive and statistically significant, suggesting that clan culture promotes individuals' voluntary participation in Xianghubao for people with both lower and higher educational levels.

5. Rule out other potential explanations

A potential concern is that the number of genealogy intensity in each surname may not reflect clan strength within kinship networks but reflect other factors related to clan strength. Here, we consider four possible explanations: the risk aversion mechanism, the economic condition mechanism, the FinTech utilization mechanism, and benevolence towards the general public mechanism. Next, we provide evidence to rule out these explanations.

5.1. Risk aversion

One possibility is that individuals possessing stronger clan strength might be more concerned with their responsibilities in clan groups, and thus, they are more likely to participate in risk sharing (Fischer, 1973; Borch, 1962) and exhibit less risk-taking behavior (Huang et al., 2022). If this is true, we expect that individuals with a higher level of genealogy intensity have a lower probability of critical illness occurrence being accidental. This is because risk-averse individuals tend to be more cautious and less prone to unexpected accidents. To test this conjecture, we replace the outcome variable in the baseline regression with an indicator variable

Table 5
The instrumental variable approach: clan culture and individuals' voluntary participation in Xianghubao, This table reports the instrumental regression results of the impact of clan culture on individuals' voluntary participation in Xianghubao. The dependent variable is *Insur_active*, defined as an indicator variable that equals one if the claimant participated in Xianghubao in person and zero otherwise. The key independent variable of interest is *Clan*, defined as the number of genealogy books per thousand people of each surname. The detailed definitions of the control variables are presented in the Appendix. The instrumental variables are the shortest distance from the center of each claimant's province of birthplace to the nearest Zhu Xi academy (*Dist_cen*), and the shortest distance from the capital of each claimant's province of birthplace to the nearest Zhu Xi academy (*Dist_capital*). Columns (1) and (3) report the first stage results, and columns (2) and (4) report the second stage results with the average marginal effects at the sample mean. We control the illness type FEs, the month FEs, and an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	Clan	*Insur_active*	*Clan*	*Insur_active*
	(1)	(2)	(3)	(4)
	First stage	Second stage	First stage	Second stage
Clan		1.8850**		1.8743**
		(0.8277)		(0.8231)
Dist_cen	−0.0045***			
	(0.0006)			
Dist_capital			−0.0049***	
			(0.0007)	
Controls	Yes	Yes	Yes	Yes
Illness type FEs	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes
Province of residence FEs	Yes	Yes	Yes	Yes
Province of hospital FEs	Yes	Yes	Yes	Yes
Wald test of exogeneity	31.97		33.52	
Obs.	197,602		197,602	

Table 6
Robustness tests: clan culture and individuals' voluntary participation in Xianghubao
This table reports the results of robustness tests, including using rank measures of clan culture, excluding cases without genealogy books, and excluding four major surnames. The dependent variable is *Insur_active*, defined as an indicator variable that equals one if the claimant participated in Xianghubao in person and zero otherwise. The key independent variable of interest is *Clan*, defined as the number of genealogy books per thousand people of each surname. The second independent variable *Clan2* is a rank measure of the strength of clan culture, calculated by the rank of the surname based on the number of genealogy books prior to 1982 (sorted in ascending order) minus the rank of the surname based on the population size in 1982 (sorted in ascending order). The detailed definitions of the control variables are presented in the Appendix. We control the illness type fixed effects, the month fixed effects, and an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs. The average marginal effects at the sample mean are reported. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	The dependent variable: *Insur_active*		
	Rank measure of clan culture	Exclusion of cases without genealogy books	Exclusion of four major surnames
	(1)	(2)	(3)
Clan2	0.0001***		
	(0.0000)		
Clan		0.1345***	0.1490***
		(0.0352)	(0.0321)
Controls	Yes	Yes	Yes
Illness type FEs	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes
Province of birthplace FEs	Yes	Yes	Yes
Province of residence FEs	Yes	Yes	Yes
Province of hospital FEs	Yes	Yes	Yes
Pseudo R^2	0.389	0.389	0.352
Obs.	196,726	194,203	144,549

D_accident that equals one if the occurrence of the critical illness was accidental and zero otherwise.[9] There are 38,849 cases where the occurrence of the critical illness was accidental, accounting for 19.51% of the total sample. Columns (1) and (2) of Table 8 show that the coefficients of *Clan* are insignificant, which does not support the risk aversion mechanism.

[9] We define the occurrence of the critical illness as accidental if any of the following terms appear in the *disease discovery and medical process* section of each case in Xianghubao: external force, injury, car accident, burn, scald, gas, accident, fall, collision, accidental, sudden, abrupt, acute, explosive, faint, and infection.

Table 7
Clan culture and individuals' voluntary participation in Xianghubao among diverse groups, This table reports the impact of clan culture on individuals' voluntary participation in Xianghubao among males and females, and people with lower and higher education levels. The dependent variable is *Insur_active*, defined as an indicator variable that equals one if the claimant participated in Xianghubao in person and zero otherwise. The key independent variable of interest is *Clan*, defined as the number of genealogy books per thousand people of each surname. The detailed definitions of the control variables are presented in the Appendix. We control the illness type fixed effects, the month fixed effects, and an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs. The average marginal effects at the sample mean are reported. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	The dependent variable: *Insur_active*			
	(1)	(2)	(3)	(4)
	Female	Male	Lower education	Higher education
Clan	0.1120**	0.1551***	0.1488**	0.1215***
	(0.0560)	(0.0402)	(0.0604)	(0.0455)
Controls	Yes	Yes	Yes	Yes
Illness type FEs	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes
Province of birthplace FEs	Yes	Yes	Yes	Yes
Province of residence FEs	Yes	Yes	Yes	Yes
Province of hospital FEs	Yes	Yes	Yes	Yes
Pseudo R^2	0.330	0.454	0.397	0.383
Obs.	94,227	103,338	98,838	98,709

5.2. Economic condition

Another possibility is that clans with better economic conditions may be more capable of compiling and preserving genealogy books. Meanwhile, people with better economic conditions are more likely to share costs in risk-sharing plans, especially in developing countries like China.

In the baseline regression, we have included an array of province fixed effects to control the variation of economic conditions across regions. To further resolve this concern, we investigate the impact of clan culture on the likelihood of critical illnesses found in routine physical examinations. Routine physical examination is a daily health maintenance method that individuals with relatively good economic conditions are more likely to participate in (Coburn and Pope, 1974). Given this, we conjecture that people in good economic conditions are more likely to take routine physical examinations. As a result, a critical illness is more likely to be diagnosed in these examinations. To test it, we replace the outcome variable in the baseline model with an indicator variable *D_routine*, which equals one if the critical illness was diagnosed in routine physical examinations and zero otherwise. There are 18,861 cases where the critical illness was diagnosed in routine physical examinations, accounting for 9.47% of the total sample. Given the insignificance of the coefficient estimates on *Clan* (see columns (3) and (4) of Table 8), we find no evidence to support the economic condition mechanism.

5.3. FinTech utilization

People can use Alipay to handle various family-related work, such as paying utility bills, reserving tickets and hotels for themselves and their family members. Individuals with stronger clan strength might engage more in family-related tasks, leading to a greater likelihood of using Alipay as a payment tool in their daily lives. As a result, they would be more familiar with Xianghubao–an Alipay-based digital platform, and more likely to participate in it voluntarily.

To investigate this mechanism, we replace the outcome variable in the baseline model with the claim preparation duration (*Claim_duration*), measured as the number of days between the date when the claimant was diagnosed with a critical illness and the application date for claim requests. When a MA member is diagnosed with a critical illness, he or she files a claim request online through the claim management system within the Alipay app. As Xianghubao automates the application process of claim requests, the claim preparation duration is determined by both the state of illness and the claimants' awareness and operation of Xianghubao. Since the state of illness is well controlled by including illness type fixed effects and hospital grade (*G_hospital*) in the regression, the claim preparation duration can to some extent measure the degree of claimants' FinTech utilization. If this mechanism is true, we expect that individuals with a higher level of genealogy intensity would experience a shorter claim preparation duration. As seen from columns (5) and (6), the coefficients of *Clan* are both statistically insignificant, ruling out the FinTech utilization mechanism.

5.4. Benevolence towards the general public

Clan culture reflects Ren'ai, which is the essential value of Chinese Confucian culture (Tao and Guo, 2012; McCarthy, 2013). The core of Ren'ai is the love for family and clan members, which is different from the “universal love” in Christian culture that focuses on the love for the general public. We argue that the number of genealogy books of each surname scaled by population is a good proxy for clan culture. However, if people with stronger genealogy intensity exhibit benevolence towards individuals not limited to kinship networks, our research findings may not support the influence of traditional Chinese culture or Confucian culture.

Table 8

Ruling out three possible mechanisms, This table reports the tests to rule out the risk aversion mechanism, the economic condition mechanism, and the FinTech utilization mechanism. The dependent variable *D_Accident* in columns (1) and (2) is an indicator variable that equals one if the occurrence of the critical illness was due to accidental factors and zero otherwise. The dependent variable *D_routine* in columns (3) and (4) is an indicator variable that equals one if the critical illness was diagnosed in routine physical examinations and zero otherwise. The dependent variable *Claim_duration* in columns (5) and (6) is the claim preparation duration, measured as the number of days between the date when the claimant was diagnosed with a critical illness and the application date for claim requests. The key independent variable of interest is *Clan*, defined as the number of genealogy books per thousand people of each surname. The detailed definitions of the control variables are presented in the Appendix. We control an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs in all the regression. We also include the illness type fixed effects and the month fixed effects in columns (2), (4), and (6). The average marginal effects at the sample mean are reported. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	Test1		*Test2*		*Test3*	
	D_Accident		*D_routine*		*Claim_duration*	
	(1)	(2)	(3)	(4)	(5)	(6)
Clan	−0.0010	0.0178	0.0230	0.0201	7.2905	7.3606
	(0.0300)	(0.0268)	(0.0202)	(0.0200)	(7.6239)	(7.0392)
Male	0.1538***	0.0249***	−0.0323***	−0.0089***	1.8169***	−1.7002***
	(0.0026)	(0.0017)	(0.0012)	(0.0013)	(0.3792)	(0.4049)
Edu	−0.0029***	−0.0030***	−0.0013***	−0.0012***	0.4000***	0.3878***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0192)	(0.0178)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
G_hospital		−0.0023***		−0.0175***		−0.2081*
		(0.0005)		(0.0008)		(0.1261)
Indemnity		0.0026***		−0.0050***		−0.3880***
		(0.0001)		(0.0001)		(0.0360)
Illness type FEs		Yes		Yes		Yes
Month FEs		Yes		Yes		Yes
Province of birthplace FEs	Yes	Yes	Yes	Yes	Yes	Yes
Province of residence FEs	Yes	Yes	Yes	Yes	Yes	Yes
Province of hospital FEs	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.079	0.129	0.035	0.102	0.015	0.1096
Obs.	197,635	184,264	197,620	195,439	197,392	197,392

We construct two variables to check whether our clan culture measure is a proxy for risk sharing within kinship networks or benevolence towards the general public. First, on the 7th and 21st of each month, Xianghubao publicly announces new claims reviewed and verified by their investigation team over the prior two weeks. Members who need to share the costs are determined by the list on the 7th and 21st of that month. This suggests that, compared with individuals who join Xianghubao on the 8th or 22nd of a month, individuals who join on the 6th or 20th have to participate in an additional period of cost sharing. We calculate the number of days between the enrollment day of the member and the next release date of Xianghubao (*Freedays*) to determine if the member is more likely to choose the enrollment day to take advantage of this policy. We replace the outcome variable in the baseline model with *Freedays* and examine the regression using the whole sample and those participating in Xianghubao in person, respectively. The coefficients of *Clan* in columns (1) and (2) of Table 9 are insignificant, suggesting no difference in the choice of enrollment time between claimants with varying levels of genealogy intensity.

Second, we calculate the average additional sharing costs of each claimant (*Donative_sharing*) by dividing the amounts of sharing costs of the claimant that exceed the average sharing costs of all the claimants during the same coverage period by the number of days between the enrollment day and the release date on Xianghubao's bulletin board. A higher value of *Donative_sharing* indicates that individuals voluntarily share more costs beyond their obligatory share, as a form of donation, thereby exhibiting greater benevolence towards all the members of Xianghubao. We replace the outcome variable in the baseline model with *Donative_sharing*. As shown in columns (3) and (4) of Table 9, the coefficients on *Clan* are insignificant, suggesting that claimants with stronger genealogy intensity do not demonstrate greater benevolence towards those beyond linkage networks. Although online mutual aid, as a FinTech-based risk sharing model, breaks through geographic limitations, individuals join MA platforms mainly because of caring members within kinship networks, not because of benevolence towards the general public.

6. Conclusion

To examine the impact of clan culture on individuals' voluntary participation in FinTech-based risk sharing, we manually collect two unique datasets: all claim cases from the largest online mutual aid platform in China since its inception to April 2022, and the number of genealogy books of each surname. Our results show that clan culture promotes individuals' voluntary participation in Xianghubao, suggesting that individuals with stronger clan strength are more likely to voluntarily participate in FinTech-based risk sharing. Moreover, we find the positive impact of clan culture only exists in the age groups of 30 to 60 years old, mainly because they provide financial support to their clan groups and have more concerns about the potential threat posed by critical illnesses. To address the endogeneity problems of clan culture, we employ an instrumental variable approach, and the results remain unchanged. We also

Table 9
Caring about members within kinship networks vs. benevolence towards the general public, This table reports the test on whether our clan measure exhibits caring within kinship networks rather than benevolence towards the general public. The dependent variable *Freedays* in columns (1) and (2) is the number of days between the enrollment day and the next release date of Xianghubao. The dependent variable *Donative_Sharing* in columns (3) and (4) is each claimant's average additional sharing costs. The key independent variable of interest is *Clan*, defined as the number of genealogy books per thousand people of each surname. The detailed definitions of the control variables are presented in the Appendix. We control the illness type fixed effects, the month fixed effects, and an array of province fixed effects, including the province of birthplace FEs, the province of residence FEs, and the province of hospital FEs. The ordinary least squares (OLS) estimates are reported. The standard errors, clustered at the surname level, are shown in parentheses. *, **, and *** represent the significance at the 10%, 5%, and 1% level, respectively.

	Freedays		*Donative_sharing*	
	(1)	(2)	(3)	(4)
	All	In person	All	In person
Clan	−0.0744	0.5814	0.0235	−0.0085
	(0.4403)	(0.5526)	(0.0147)	(0.0158)
Male	−0.0371**	−0.0534*	0.0042***	−0.0001
	(0.0180)	(0.0282)	(0.0009)	(0.0010)
Edu	−0.0160	−0.0011	0.0001	−0.0002***
	(0.0193)	(0.0014)	(0.0001)	(0.0000)
Age	Yes	Yes	Yes	Yes
G_hospital	0.0089	0.0116**	0.0027***	0.0026***
	(0.0083)	(0.0191)	(0.0003)	(0.0004)
Indemnity	−0.0046**	−0.0049**	−0.0004***	−0.0001***
	(0.0020)	(0.0024)	(0.0001)	(0.0001)
Illness type FEs	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes
Province of birthplace FEs	Yes	Yes	Yes	Yes
Province of residence FEs	Yes	Yes	Yes	Yes
Province of hospital FEs	Yes	Yes	Yes	Yes
R^2	0.002	0.003	0.572	0.227
Obs.	197,636	93,023	197,636	93,023

conduct several robustness tests, including using the rank measure of clan culture, excluding cases without genealogy books, and excluding four major surnames. All the results remain robust. In addition, we explore the effects of clan culture among diverse groups, and find that clan culture significantly promotes individuals' voluntary participation in Xianghubao for both males and females, and for people with lower and higher educational levels. Finally, we rule out the risk aversion mechanism, the economic condition mechanism, the FinTech utilization mechanism, and the benevolence towards the general public mechanism. Our study provides great insights into the interaction between clan-based risk sharing and FinTech-based risk sharing. When clan-based risk sharing is incomplete, individuals may choose external FinTech-based risk sharing as an alternative option.

CRediT authorship contribution statement

Xiangnan Wang: Conceptualization, Data curation, Methodology. **Kexin She**: Formal analysis, Writing – original draft, Writing – review & editing. **Wenlong Bian**: Formal analysis, Writing – original draft, Writing – review & editing, Funding acquisition.

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Appendix. Variable Definitions

Variable	Definition
Insur_active	Indicator variable that equals one if the claimant participated in Xianghubao in person and zero otherwise.
Clan	The number of genealogy books per thousand people of each surname.
Clan2	A rank measure of clan culture, defined by the rank of the surname based on the number of genealogy book extending to 1982 (sorted in ascending order) minus the rank of the surname based on the population size in 1982 (sorted in ascending order).
Male	Indicator variable with a value of one for males and zero for females.
Edu	The average sentence length of the *self-description of disease discovery and medical process* in the claim materials. The average sentence length is defined as the number of Chinese words divided by the number of sentences.
Age	A series of categorical variables corresponding to different age groups, namely: [18–25), [25–30), [30–35), [35–40), [40–45), [45–50), [50–55), [55–60), [60–65), and [65–72).
G_hospital	Hospital grade, proxied by an ordinal variable ranging from 0 to 9.

(*continued on next page*)

(*continued*)

Variable	Definition
Indemnity	The amounts of indemnities that the claimant received from Xianghubao.
Dist_cen	The shortest distance from the center of each claimant's province of birthplace to the nearest Zhu Xi academy.
Dist_capital	The shortest distance from the capital of each claimant's province of birthplace to the nearest Zhu Xi academy.
D_accident	Indicator variable equals one if the occurrence of the critical illness was accidental and zero otherwise.
D_routine	Indicator variable that equals one if the critical illness was diagnosed in routine physical examinations and zero otherwise.
Claim_duration	Claim preparation time is calculated as the number of days between the date the claimant was diagnosed with a critical illness and the application date for claim requests.
Freedays	The number of days between the enrollment day of the member and the next release date of Xianghubao.
Donative_sharing	Average additional sharing costs of each claimant, measured by dividing the amounts of sharing costs of the claimant that exceed the average sharing costs of all the claimants during the same coverage period by the number of days between the enrollment day and the release date on Xianghubao's bulletin board.

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