An Integrated Model of Factors Influencing Consumers' Internet Insurance Usage Behavior: Evidence from China

Di Yao, Bamini KPD Balakrishnan

Abstract - As Internet insurance continues to expand rapidly, it is bringing notable changes to the traditional insurance industry. However, actual consumer uptake remains relatively modest. This study proposes an integrated research model that draws on the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and Perceived Risk (PR) theory to explore the key factors influencing Internet insurance adoption in China. Using data collected through surveys and analyzed via Structural Equation Modeling (SEM) with AMOS, the results show that perceived usefulness, ease of use, and user attitude have a significant positive impact on individuals' intentions to adopt such services. In contrast, perceived risk plays a discouraging role. Interestingly, subjective norms were not found to meaningfully affect intention, suggesting that social pressure may not be a decisive factor in this domain. The study also confirms that behavioral intention mediates the link between user perceptions and actual usage behavior, while perceived behavioral control acts as a meaningful moderator. These insights highlight the importance of enhancing consumer autonomy, reducing uncertainties, and leveraging AI technologies to offer personalized experiences. From a practical standpoint, the findings suggest that improving users' digital literacy, minimizing concerns around usability and data privacy, designing more intuitive interfaces, and embedding insurance services into everyday digital platforms can help boost adoption. Overall, this research adds to the growing body of knowledge on digital financial services and offers meaningful strategies to support the ongoing development of Internet insurance in emerging markets.

***Index Terms*—Internet Insurance; Consumer Behavior; Influencing Factors; Integration Model**

I. Introduction

DRIVEN by China's "Internet Plus" and "Digital Transformation" strategies, Internet insurance has emerged as an innovative transformation of the traditional insurance business model, experiencing rapid growth. With the deep integration of Internet technology and insurance technology, Internet insurance is gradually becoming a mainstream trend in the future development of the insurance industry [1, 2]. Compared to traditional insurance, Internet insurance offers several notable advantages, including streamlined business processes, a convenient purchasing experience, cost-effective premiums, interactive customer service, and innovative product design [3, 4]. The significance of Internet insurance has been further amplified by the global COVID-19 pandemic, which has underscored the urgency of accelerating its development. In response, major insurance companies are actively expanding and promoting their Internet insurance businesses.

However, an analysis of Internet insurance premium data over the years reveals that its development in China has been marked by fluctuations. Despite steady growth, the penetration rate of Internet insurance remains below the 10% threshold, indicating that consumer adoption is still relatively limited [5].

Under the guidance of a "consumer-centric" development approach, studying consumer behavior regarding Internet insurance usage is crucial for accurately understanding market dynamics, increasing its adoption, and enhancing service quality [6, 7]. This study seeks to explore the following central research questions:

(i) Beyond the traditional Technology Acceptance Model (TAM), what additional factors influence consumers' Internet insurance usage behavior? Can the combination of these factors have a notable impact on shaping consumer behavior in this context?

(ii) What are the roles of mediating and moderating variables in consumers' Internet insurance usage? Do these variables exert a significant impact on consumer behavior?

(iii) What are the internal logical relationships among these influencing factors? How can a scientifically sound and comprehensive model be constructed to analyze the underlying mechanisms of consumers' Internet insurance usage behavior?

To explore these issues, this study conducts a questionnaire-based investigation in selected Chinese cities, including first-tier, new first-tier, and second-tier urban areas. By applying an integrated theoretical framework that combines TAM, TPB, and PR theory, structural equation modeling (SEM) is used to systematically analyze the key factors and underlying mechanisms influencing the usage behavior of Internet insurance. Drawing on the empirical results, the study offers practical suggestions aimed at encouraging greater consumer engagement in this sector. The findings not only address the current problem of limited Internet insurance uptake in China but also provide a solid theoretical basis and actionable strategies to support its broader diffusion and sustainable development.

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II. Materials and Methods

A. Research on Internet Insurance

At present, the academic community holds diverse perspectives on the definition and classification of "Internet insurance." Over time, its conceptual boundaries have gradually expanded to encompass the entire process by which insurance companies or intermediaries provide insurance products and services to customers via Internet platforms. This includes, but is not limited to, core business functions such as Internet insurance applications, underwriting, policy maintenance, and claims settlement. Additionally, Internet insurance extends to areas such as online sales of insurance products, electronic payment services, and other business management activities, driving the digital transformation and modernization of the insurance sector [8-15].

As Internet insurance continues to grow rapidly, researchers have increasingly examined its changing business models. In its early stages, Adam Klauber identified four strategic business models: Internet insurance trading platforms, job marketing, insurance business processing, and innovative insurance products. Li and colleagues further classified China's Internet insurance business models into three primary types: the official website model, the third-party e-commerce platform model (comprising both comprehensive e-commerce platforms and insurance intermediary platforms), and the specialized Internet insurance company model [2]. They highlight that with increasing technological integration, Internet insurance is set to undergo continuous business model innovation, which may significantly alter the financial market structure.

Building upon this foundation, some scholars have further broadened the scope of Internet insurance research by incorporating emerging insurance business models driven by Internet technologies. For instance, Hao and other scholars examined "Internet information security insurance" as a critical subcategory of Internet insurance [11-12]. They proposed that Internet insurance can be classified into multiple subcategories, including "Internet information security insurance," "O2O insurance business," and "Internet insurance business," thereby enriching both the conceptual framework and the business landscape of Internet insurance.

Currently, academic research on Internet insurance primarily focuses on qualitative analyses, including its development trajectory, industry scale, product innovation, and comparisons with international markets. Scholars have also examined its impact on traditional insurance, as well as regulatory and legal challenges [2, 5, 6]. For example, Song [15] and colleagues analyzed the development and challenges of the Internet insurance market in China in the era of big data, while Bian [14] explored the foundations, processes, and logic of China's connected insurance. Wang [1], drawing on international regulatory experiences, proposed policy recommendations for the healthy development of China's Internet insurance sector.

Despite the extensive research conducted on Internet insurance, several critical gaps remain. First, much of the existing literature remains in the preliminary stage, lacking systematic and in-depth analyses [9, 11]. Second, most studies rely on case-based approaches rather than quantitative analyses and empirical testing [10, 12-13]. In particular, research on consumer behavior regarding Internet insurance adoption is scarce, and empirical studies in this area are virtually nonexistent. Therefore, conducting a comprehensive quantitative investigation into the factors influencing consumers' Internet insurance usage behavior has become an urgent research priority.

B. Theory of Planned Behavior

In examining user behavior, numerous researchers have employed the Theory of Planned Behavior (TPB) as a core framework to investigate factors influencing individual actions [8, 10]. Recognized as a key model in consumer behavior studies, TPB seeks to uncover the psychological foundations of decision-making, offering insights into both behavioral intentions and actual usage behaviors.

The Theory of Planned Behavior (TPB) posits that behavioral intention is shaped by three primary determinants: attitude, subjective norms, and perceived behavioral control. Attitude refers to an individual's internal evaluation of a given action, encompassing both favorable or unfavorable perceptions and emotional tendencies. Subjective norms relate to the perceived social expectations and the influence of others' opinions on one's intention to perform a behavior. Perceived behavioral control reflects how individuals judge their capacity to carry out the behavior in question, taking into account available resources, situational opportunities, and their own sense of efficacy [12–13].

In recent years, TPB has been increasingly applied to the study of Internet insurance purchasing behavior, with scholars seeking to identify the various determinants influencing consumer adoption of Internet insurance. Empirical studies have shown that TPB serves as an effective model for interpreting consumer behavior in online environments. For instance, consumers with a more favorable attitude toward Internet insurance tend to exhibit a stronger willingness to purchase. Moreover, recommendations and endorsements from friends, family, or industry professionals can significantly impact consumers' purchasing decisions. Perceived behavioral control, which includes elements such as knowledge of insurance offerings and experience with the buying process, has also been found to significantly impact behavioral intention [16–18].

Despite its strengths in explaining online consumer behavior, TPB also has notable limitations. One key drawback is its relative neglect of external environmental factors in shaping consumer decisions. For example, market risks, technological advancements, and regulatory changes can significantly influence purchasing behavior, yet these elements are not adequately accounted for within the traditional TPB framework. Future research may address these shortcomings by extending TPB with supplementary external factors to establish a more inclusive model of behavior [15].

Furthermore, incorporating complementary theoretical in conclusion, while TPB remains a valuable framework for studying usage behavior, continuous refinement and expansion are necessary. To better capture the complexity of consumer decision-making, it is essential to integrate both external variables and alternative theoretical approaches.

C. Perceived Risk Theory

Perceived Risk Theory offers a foundational lens for

examining how consumers make decisions in uncertain situations where negative outcomes are possible. Introduced by Raymond Bauer, the theory has been widely utilized in consumer behavior studies. It posits that individuals evaluate the potential risks tied to purchasing or using a product or service, and these risk perceptions play a significant role in shaping their decisions. When perceived risk is high, consumers are more inclined to avoid the behavior or choose options they consider safer.

Building on Bauer's original concept, later research has refined the understanding of perceived risk by delineating it into specific categories. Stone identified six key types of perceived risk: time, financial, physical, social, psychological, and functional. Empirical evidence indicates that these six dimensions collectively explain 88.8% of the total perceived risk, making this categorization the most widely accepted structure in the field of perceived risk studies [19–21].

Perceived Risk Theory is particularly relevant in the context of Internet insurance, offering key insights into consumer decision-making. Users engaging with Internet insurance platforms often encounter various perceived risks that shape their adoption behavior. Financial risk stems from uncertainties surrounding claim reliability and potential exclusions, casting doubt on whether the coverage will deliver the promised financial security. Functional risk reflects concerns over service quality and platform performance, including fears of technical malfunctions, delays, or insufficient customer support. Privacy risk is also prominent, as consumers worry about the security of their personal data and the possibility of unauthorized access or misuse. Collectively, these risks influence users' confidence and reduce their willingness to engage with Internet insurance, emphasizing the need for providers to implement effective risk reduction measures.

Feng et al. have confirmed the negative influence of perceived risk on online purchase adoption behavior [5, 12]. Likewise, Xu integrated Perceived Risk Theory into the Technology Acceptance Model (TAM) and provided empirical evidence that perceived risk serves as a significant deterrent to consumers' intention to engage with online products [22].

D. Technology Acceptance Model

The Technology Acceptance Model (TAM), a foundational theory for analyzing consumer behavior in technology adoption and usage, was first proposed by Fred Davis in 1986. Since its inception, TAM has been widely applied and recognized across information systems research. Grounded in psychological and social psychological theories, particularly the Theory of Reasoned Action (TRA), the model has been extended and refined to address the characteristics of technology adoption behavior [21].

Within the Technology Acceptance Model (TAM), perceived ease of use is considered a fundamental predictor of perceived usefulness. When users perceive a system as intuitive and simple to navigate, they are more inclined to recognize its benefits and overall value. Consequently, both perceived usefulness and ease of use contribute to shaping individuals' attitudes toward adopting the technology, which in turn affects their intention to use it and, eventually, their actual usage behavior [22].

A key feature that distinguishes TAM is its adaptability and potential for extension [23]. The framework is designed to accommodate additional variables that may affect users' perceptions of usefulness and ease of use. Nevertheless, TAM does not provide a fixed set of such external factors, thereby offering flexibility for researchers to interpret, enhance, and adapt the model from various analytical standpoints.

To enhance its explanatory power, scholars have integrated TAM with the Theory of Planned Behavior (TPB), creating a hybrid model that provides a more comprehensive understanding of technology adoption [23-25]. This integration is commonly utilized in research examining consumer actions, particularly in financial and e-commerce contexts. For example, Pan et al. utilized this combined framework to examine consumer purchasing behaviors for financial products, while Wang et al. applied the model to explore the factors influencing online shopping intentions [24-25]. These empirical studies highlight the practical value and effectiveness of the integrated TAM-TPB model in explaining real-world consumer behaviors.

With the continuous progress in Internet and mobile communication technologies, the TAM framework has been increasingly applied to emerging technology adoption. Researchers have continued to enhance TAM by integrating additional theoretical perspectives to better explain and predict consumer behavior in adopting new digital services.

E. Integrating TAM, TPB, and Perceived Risk for Internet Insurance Usage Behavior Research

Given the increasing relevance of Internet insurance, and in light of unresolved issues in prior studies, this study proposes the use of an integrated TAM-TPB-PR framework to explore the determinants of Internet insurance usage among Chinese consumers. By incorporating TAM's perspective on technology acceptance, TPB's emphasis on key psychological factors—such as consumer attitudes, perceived social expectations, and control over behavior—and the dimension of perceived risk, this study develops a more holistic model for explaining the complex motivations that shape Internet insurance adoption.

The integration of these three theoretical perspectives not only address the limitations of single-theory models but also provides a robust framework for analyzing consumer decision-making in the digital insurance context. The findings contribute to both academic inquiry and industry application, guiding the design and promotion of Internet insurance products that are better aligned with consumer expectations and risk perceptions.

III. Research Framework Construction, Hypotheses Development, and Questionnaire Design

Grounded in three foundational theories—namely the Technology Acceptance Model (TAM) introduced by Davis in 1989, the Theory of Planned Behavior (TPB) developed by Ajzen in 2019, and Bauer's Perceived Risk Theory from 1960—this study offers a detailed examination of how Internet insurance has evolved in the Chinese market. It further develops a conceptual framework aimed at identifying the key factors that shape Chinese consumers' behavioral responses toward Internet insurance adoption.

Drawing on these three classical theoretical models, the paper proposes theoretical relationships among the relevant variables and designs a questionnaire to empirically test these hypotheses. Specifically, this study employs the TAM framework to examine how users' perceptions of usefulness and ease of use jointly impact their behavioral decisions regarding the adoption of Internet insurance. Furthermore, by integrating the TPB perspective, it delves into the mechanisms through which the two key variables—attitude towards use and subjective norms—affect behavioral intention. This study also examines how behavioral intention functions as a mediator in the relationship between key influencing variables and actual usage behavior. In addition, it investigates the moderating effect of perceived behavioral control on the linkage between intention to use and the corresponding usage actions. This study integrates Perceived Risk Theory to assess how consumers' risk perceptions may affect their engagement with Internet insurance services. The primary objective is to identify the key determinants shaping consumer usage patterns through methodologically sound and systematic research. The findings aim to contribute both theoretically and practically, offering insights that support the sustainable advancement of China's digital insurance sector.

To validate the proposed hypotheses, this study constructs a structural equation model grounded in the previously discussed theoretical framework. The model's structure and core concepts are illustrated in Figure 1.

A. Research Hypotheses

Drawing upon prior literature, defined research aims, theoretical underpinnings, and the conceptual structure of the Internet insurance usage behavior model—developed using the integrated TAM-TPB-PR approach—this study puts forward twelve research hypotheses. These hypotheses are categorized into four focal themes: (i) how various influencing factors affect Chinese consumers' behavioral intention to use Internet insurance; (ii) the linkage between users' intention to adopt and their actual usage behavior; (iii) the mediating function of behavioral intention in connecting each influencing factor with final usage behavior; and (iv) the moderating effect of perceived behavioral control on the intention–behavior relationship. Detailed hypotheses are summarized in Table I.

B. Questionnaire Design

Based on the model of factors influencing Chinese consumers' Internet insurance usage behavior, this paper designs three types of questionnaires: a personal information questionnaire, an Internet insurance usage behavior questionnaire, and an opinion and suggestion questionnaire. The design is informed by literature, interviews with consumers from different age groups, and feedback from industry experts. Additionally, to control for potential social desirability bias and enhance the validity of the responses, three social desirability questions were included in the questionnaire. These questions assess the extent to which respondents may provide socially desirable answers rather than their true opinions, thereby improving the reliability of the collected data.

(1) Personal Information Questionnaire

This questionnaire included six demographic items designed to collect essential background information from participants, such as gender, age, education, occupation, income level, and place of residence.

(2) Internet Insurance Usage Behavior Questionnaire

Based on the integrated theoretical model, the core section of the behavioral questionnaire examines eight key dimensions, including determinants of Internet insurance adoption, intention to use, and perceived behavioral control. A total of 31 items were included. Responses were recorded on a five-point Likert scale. The measurement items were modified from validated instruments proposed by Venkatesh et al. and Aldousari et al., and were tailored to suit the specific characteristics of this study's research context [26–27].

(3) Opinion and Suggestion Questionnaire

This questionnaire collected consumers' opinions and suggestions on Internet insurance through multiple-choice questions. The objective was to explore consumers' views on the advantages of Internet insurance and to better understand their expectations.

(4) Social Desirability Questions

Social desirability bias was examined using an established scale, including three social desirability questions, to further assess Common Method Bias (CMB). We compared the coefficient of determination (R^2) between models with and without social desirability items. The results showed that R^2 changed only marginally, indicating that respondents' answers were not significantly influenced by social desirability bias and that CMB was unlikely to have affected the validity of the findings.

To obtain a more accurate measurement of Internet insurance usage behavior and its influencing factors, we adopted a two-wave time survey approach. The first survey collected data on respondents' usage behavior, personal information, and opinions, along with social desirability questions to control for potential bias. After an interval of 14 days, the second survey was conducted with the same group of respondents, focusing on measuring key factors influencing Internet insurance usage behavior.

To reach a broad and diverse respondent pool, the questionnaire was shared via WeChat Official Accounts—one of the most commonly used digital platforms in China. This method facilitated reaching a diverse group of respondents while maintaining high response rates and engagement levels. Previous studies have shown that WeChat-based surveys are an effective tool for gathering consumer insights in China due to their convenience, high penetration rate, and user familiarity with the platform [25].

(5) Two-Wave Data Collection

The main purpose of employing a two-wave survey design was to minimize the risk of common method bias (CMB) and to strengthen the internal validity of the research [28]. By separating the measurement of independent and dependent variables across different time periods, this strategy helps reduce potential biases commonly associated with single-time-point data collection. It also helps minimize the impact of short-term memory effects on respondents' answers, improving the stability and credibility of the data. The use of a trusted and familiar survey distribution channel (WeChat Public Accounts) also contributed to reducing non-response bias and increasing the reliability of responses. This approach strengthens the credibility and methodological

soundness of the study's findings [29].

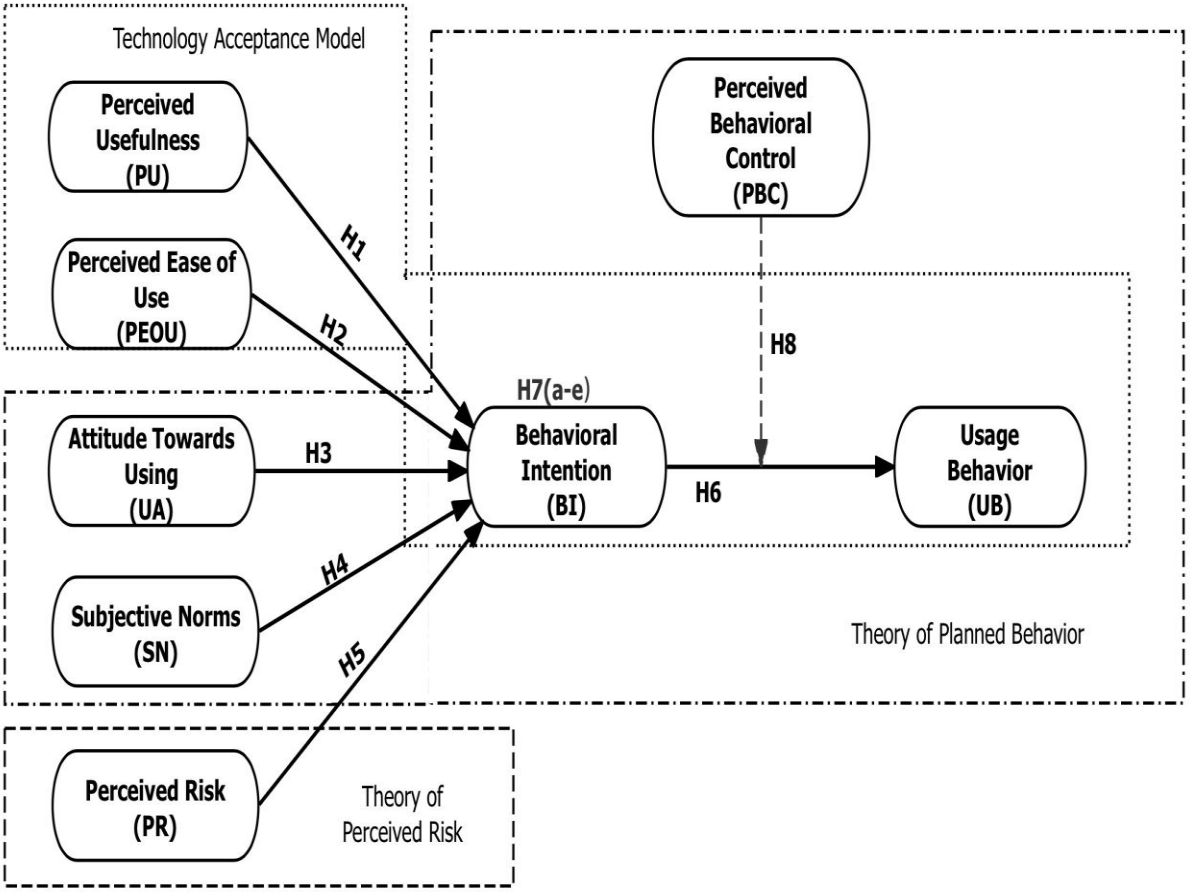

Fig. 1. Model framework and theory diagram.

TABLE I
RESEARCH HYPOTHESES

Category	Hypothesis	Content
Influence Factors on Behavioral Intention	H1	Perceived usefulness has a positive relationship with the behavioral intention of Internet insurance in China.
	H2	Perceived ease of use has a positive relationship with the behavioral intention of Internet insurance in China.
	H3	Attitude towards using has a positive relationship with the behavioral intention of Internet insurance in China.
	H4	Subjective Norms have a positive relationship with the behavioral intention of Internet insurance in China.
	H5	Perceived Risk has a negative relationship with the behavioral intention of Internet insurance in China.
Influence of Behavioral Intentions on Usage Behavior	H6	Behavioral Intention has a positive relationship with the Usage Behavior of Internet insurance in China.
Mediating Role of Behavioral Intention between Independent Variables and Usage Behavior	H7a	Behavioral intention mediates the relationship between perceived usefulness and usage behavior of Internet insurance in China.
	H7b	Behavioral intention mediates the relationship between perceived ease of use and usage behavior of Internet insurance in China.
	H7c	Behavioral intention mediates the relationship between attitude towards using and usage behavior of Internet insurance in China.
	H7d	Behavioral intention mediates the relationship between subjective norms and usage behavior of Internet insurance in China.
	H7e	Behavioral intention mediates the relationship between perceived risk and usage behavior of Internet insurance in China.
Moderating Role of Perceived Behavioral Control between Behavioral Intention and Usage Behavior	H8	Perceived behavioral control moderates the relationship between behavioral intention and usage behavior of Internet insurance in China, in which the higher the perceived behavioral control, the stronger the relationship between behavioral intention and usage behavior.

IV Empirical Analysis

A. Descriptive Statistical Analyses

As indicated in Table II, the survey involved 520 participants, with a gender ratio that is nearly equal—49.0% male and 51.0% female. This even gender distribution reflects equal participation from both genders, ensuring that the survey results are representative in terms of gender.

TABLE II
Personal information questionnaire

Category	Items
Basic Information	Your Gender
	Your Age
	Your Educational Level
	Your Occupation
	Your Annual Income
	Your Location

Regarding age distribution, 39.1% of the participants are between 25 and 34 years old, making it the largest group, followed by those aged 35 to 44, who comprise 24.7% of the sample. Respondents aged 45-54 years make up 20.5%, while those aged 24 years and below represent 12.2%. The smallest age group, 55 years and above, accounts for 3.5%.

Regarding education, a significant portion of respondents (53.6%) hold an undergraduate degree, followed by 25.3% with a college education. Those with a master's degree or higher make up 14.4%, while 6.7% of respondents have a high school education or less.

With respect to employment, 49.8% of participants work in the private sector, representing nearly half of the total sample. Self-employed individuals represent 16.1% of the sample, while 12.9% work in the government sector. Students account for 7.2%, retirees for 5.3%, and 8.7% fall under other occupations.

The largest proportion of respondents (35.9%) report an annual income ranging from 200,000 to 500,000 RMB. This is followed by 32.3% of respondents earning between 100,000 and 200,000 RMB. Those earning more than 500,000 RMB account for 21.2%, and 10.6% of respondents earn less than 100,000 RMB.

The location distribution shows that respondents are fairly evenly spread across different city tiers. Participants from first-tier cities make up 30.9% of the sample, while new first-tier cities and second-tier cities represent 29.7% and 31.4%, respectively. Respondents from other locations account for 8.0%. The broad range of demographic attributes helps capture an inclusive profile of the sample.

In summary, the survey results reflect a balanced gender composition, with a slight female majority. The largest proportion of participants falls within the 25–34 age bracket. Most individuals in the sample possess a bachelor's degree and are employed in privately owned enterprises. In terms of income distribution, the majority report annual earnings ranging from 100,000 to 500,000 RMB, particularly concentrated within the 100,000–200,000 and 200,000–500,000 RMB ranges. Geographically, the respondents are evenly distributed across first-tier, new first-tier, and second-tier cities. This demographic profile ensures a representative sample for analyzing Internet insurance usage behavior.

B. Structural Equation Modelling Results

(1) Reliability and Validity Assessment

This study assessed the reliability of the Internet insurance usage behavior scale, with indicator values ranging from 0.7 to 1.0—demonstrating solid internal consistency and scale dependability. The Cronbach's alpha coefficients for all independent, dependent, and mediating constructs exceeded the 0.7 threshold, validating the reliability of the measurements. Bartlett's test for sphericity yielded a p-value below 0.05, indicating that the dataset met the assumptions necessary for factor analysis. Further analysis revealed that each item exhibited a factor loading above 0.6, confirming that the items were well aligned with the constructs they were intended to represent. These results reflect a meaningful association between the observed variables and their corresponding latent factors, showing that the instruments effectively captured the intended dimensions.

In addition, convergent validity (AVE) and composite reliability (CR) were examined for each construct in the measurement model. The findings showed that all AVE scores were above 0.5, while CR values surpassed the 0.7 benchmark. These outcomes suggest that the model demonstrates acceptable levels of convergence and reliability across all measured constructs. More detailed results can be found in Table III.

(2) Structural Modeling and Path Assessment

The model of factors influencing Internet insurance usage behavior in China, constructed in this paper, includes several independent variables, a mediating variable, a control variable, and a dependent variable. All independent variables in the model contain residual terms, while the mediator, moderator, and dependent variables are associated with their respective variance terms.

Following the reliability and validity evaluations, Amos 28.0 was employed as the primary software for structural modeling. Guided by the study's conceptual framework and proposed hypotheses, a structural equation model (SEM) was developed. Although the chi-square to degrees of freedom ratio slightly surpassed the ideal cutoff of 3, most other model fit indicators fell within acceptable thresholds. Specifically, values for RMSEA, RMR, CFI, and IFI all demonstrated satisfactory model performance. While GFI and TLI were marginally below the 0.9 benchmark, they still indicated an acceptable overall model fit.

Based on these results, the model was revised. During the revision process, paths with significance levels greater than 0.05 were sequentially eliminated, and the data for various indicators were reorganized. A diagram of the modified structural model is presented below, providing a more rigorous and reliable basis for subsequent research (see Fig. 2).

(3) Model Fit Test

After modification, the overall fit of the model of factors influencing Internet insurance usage behavior in China showed strong performance. Specifically, The CMIN/DF statistic, representing the chi-square divided by degrees of freedom was 2.865, which fell within the acceptable range of 1 to 3. The RMSEA value was 0.057, below the critical threshold of 0.08, and the RMR value was 0.061, also lower than the critical value of 0.08. Additionally, the model's CFI, IFI, and TLI were all above 0.9, indicating a good fit.

Although the GFI was slightly below 0.9, this did not impact the overall model fit. A comprehensive analysis of the indicators demonstrated that the revised model of influencing factors of Internet insurance usage behavior in China exhibited good adaptability and more accurately reflected the actual data (see Table IV).

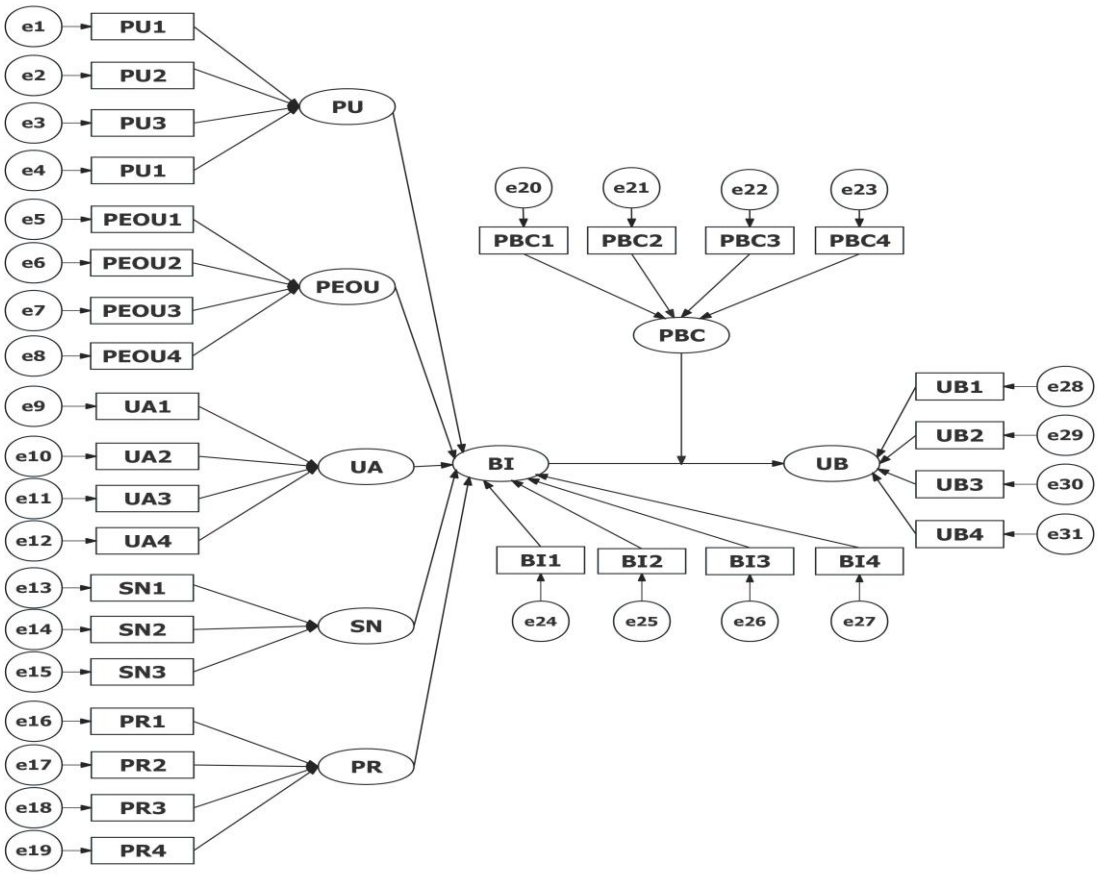

Fig. 2. Hypothesis testing path diagram for the modified structural equation model.

TABLE III
ASSESSMENT OF INTERNAL RELIABILITY AND CONVERGENT VALIDITY

Construct	Indicators	Loading	Composite Reliability	Cronbach's Alpha	AVE
Perceived Usefulness	PU1	0.785	0.797	0.921	0.749
	PU2	0.651			
	PU3	0.908			
	PU4	0.748			
Perceived Ease of Use	PEOU1	0.674	0.919	0.744	0.595
	PEOU2	0.771			
	PEOU4	0.950			
	PEOU5	0.785			
Attitude Toward Using	UA1	0.945	0.805	0.831	0.674
	UA2	0.676			
	UA3	0.785			
	UA4	0.604			
Subjective Norm	SN1	0.789	0.979	0.853	0.588
	SN3	0.624			
	SN4	0.919			
	SN5	0.999			
Perceived Risk	PR2	0.725	0.931	0.829	0.715
	PR3	0.692			
	PR4	0.856			
	PR5	0.972			
Perceived Behavior Control	PBC1	0.832	0.741	0.768	0.761
	PBC2	0.825			
	PBC5	0.852			
Behavioral Intention	BI1	0.765	0.740	0.863	0.654
	BI2	0.732			
	BI3	0.969			
	BI5	0.718			
Usage Behavior	UB1	0.668	0.945	0.801	0.654
	UB2	0.971			
	UB3	0.767			
	UB4	0.834			

(4). Structural Equation Analysis

Table V displays the findings from the structural equation modeling, detailing the path coefficients and their significance levels. The small standard error (S.E.) coefficients indicate that the parameter estimates are highly accurate. The path coefficient of 0 for some hypotheses suggests that there is no correlation between the two variables, meaning those hypotheses are not valid. Based on the 5% significance level, hypothesis H4 was not supported, while the remaining hypotheses were confirmed.

TABLE IV
MODIFIED MODEL FITNESS TEST

Fit Indices	Reference Values	Test Results	Fitness Assessment
CMIN/DF	1 - 3	2.865	Good
RMSEA	< 0.08	0.057	Good
RMR	< 0.08	0.061	Good
GFI	> 0.90	0.887	Acceptable
CFI	> 0.90	0.972	Good
IFI	> 0.90	0.926	Good
TLI	> 0.90	0.969	Good

TABLE V
RESULTS FOR STRUCTURAL MODEL ANALYSIS

Hypotheses		Std. Beta	S. E.	C. R.	P-Value	Result
H1	PU→ BI	0.520	0.062	6.054	0.000	Supported
H2	PEOU→BI	0.631	0.022	7.932	0.001	Supported
H3	UA→BI	0.248	0.028	3.423	0.005	Supported
H4	SN → BI	0.000			0.593	Not Supported
H5	PR → BI	-0.046	0.063	1.560	0.001	Supported
H6	BI → UB	0.782	0.014	2.354	0.000	Supported

The structural equation modeling results revealed several significant paths. First, perceived usefulness (PU) had a positive and significant effect on behavioral intention (BI) ($\beta = 0.520$, $p < 0.001$), indicating that higher perceived usefulness enhances users' intention to use Internet insurance. Second, perceived ease of use (PEOU) also positively influenced BI ($\beta = 0.631$, $p = 0.001 < 0.05$), suggesting that the easier a platform is to use, the stronger the behavioral intention. Third, usage attitude (UA) had a significant positive effect on BI ($\beta = 0.248$, $p = 0.005 < 0.05$), implying that favorable attitudes toward usage promote intention to use. Thus, a more positive usage attitude results in a higher behavioral intention.

Subjective norms (SN) showed no significant effect on behavioral intention (BI) ($\beta = 0.000$, $p = 0.593 > 0.05$), indicating limited social influence in this context. In contrast, perceived risk (PR) negatively affected BI ($\beta = -0.046$, $p = 0.001 < 0.05$), suggesting that higher perceived risk reduces intention.

Behavioral intention significantly predicted usage behavior (UB) ($\beta = 0.782$, $p = 0.000 < 0.05$), confirming that stronger intention leads to greater actual use. This suggests that higher behavioral intention leads to higher usage behavior.

(5) Mediation Effect Analysis

Structural equation models using the bootstrap method provide a more accurate way to test mediation effects, enhancing the validity of statistical inferences. It is important to note that the bootstrap method does not impose special requirements on the distribution of mediation effects, nor does it rely on large sample sizes or normality assumptions. Additionally, it does not require the use of standard errors to estimate mediation effect intervals, making it widely applicable in various types of mediation analyses. Given these advantages, this paper primarily utilizes the bootstrap method and AMOS software to conduct a comprehensive analysis of mediation effects.

The results confirmed that behavioral intention (BI) played a significant mediating role in several relationships. Specifically, BI significantly mediated the effects of perceived usefulness (PU) ($\beta = 0.081$, $p < 0.001$, 95% CI [0.027, 0.151]), perceived ease of use (PEOU) ($\beta = 0.095$, $p = 0.001$, 95% CI [0.099, 0.132]), and usage attitude (UA) ($\beta = 0.072$, $p = 0.002$, 95% CI [0.048, 0.149]) on usage behavior (UB), with all confidence intervals excluding zero, thus supporting the significance of these indirect effects. Conversely, the mediating effect of BI in the relationship between subjective norms (SN) and usage behavior was not significant ($p = 0.480 > 0.05$). In contrast, BI significantly mediated the relationship between perceived risk (PR) and usage behavior ($\beta = 0.088$, $p < 0.001$, 95% CI [0.191, 0.556]), further confirming its central role as a mediator in the model.

Based on these results, hypothesis H7d, which proposed the mediating effect of subjective norms, was not supported. All other hypotheses related to the mediating effects were valid, as determined by the 5% significance level (see Table VI).

(6) Moderation Effect Analysis

Perceived Behavioral Control (PBC) was included in the model as a moderating variable. As shown in Table VII, the findings indicated that PBC exerted a significant and positive moderating effect on the link between behavioral intention (BI) and usage behavior (UB) ($p = 0.001 < 0.05$). This suggests that individuals with higher perceived control are more likely to translate their intentions into actual usage behavior. Therefore, Hypothesis H8 was supported.

TABLE VI
RESULTS FROM MEDIATION ANALYSIS

Hypotheses		Estimate	Lower	Upper	P-Value	Result
H7a	PU → BI → UB	0.081	0.027	0.151	0.000	Supported
H7b	PEOU → BI → UB	0.095	0.099	0.132	0.001	Supported
H7c	UA → BI → UB	0.072	0.045	0.149	0.002	Supported
H7d	SN → BI → UB				0.480	Not Supported
H7e	PR → BI → UB	0.088	0.191	0.556	0.000	Supported

TABLE VII
RESULT FOR MODERATION ANALYSIS

	Hypotheses	Estimate	Std. Beta	P-Value	Result
H8	BI*PBC→UB	0.125	0.066	0.000	Supported

Figure 3 presents the visual analysis of perceived behavioral control (PBC) as a moderator in the relationship between behavioral intention and usage behavior. The results indicate that individuals with higher levels of PBC tend to show stronger behavioral intention toward Internet insurance and demonstrate greater usage behavior than those with lower PBC. As behavioral intention increases, usage behavior also rises for both high and low PBC groups, though the increase is more pronounced among individuals with high PBC. This suggests that users with strong perceived control are more likely to convert intention into action. Within the Chinese Internet insurance context, PBC functions as a facilitating moderator, reinforcing the link between intention and actual usage.

(7) Robustness Test

As shown in Table VIII, the reliability, validity, and model fit tests met the required standards. The path coefficients for hypotheses H4 and H7d, proposed in this paper, were 0, indicating that these hypotheses were not supported. The remaining path coefficients reached statistical significance at the 5% level, indicating support for the rest of the proposed hypotheses. These findings align with those derived from the primary regression analysis. A visualization of these outcomes is provided in Figure 4, which illustrates the post-standardized robustness test on Internet insurance usage behavior using Amos software.

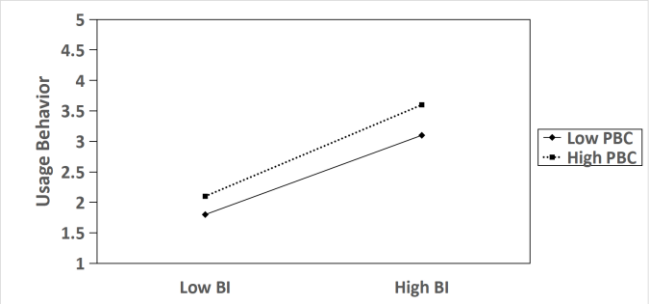

Fig. 3. Perceived behavioral control moderating the behavioral intention–usage behavior relationship.

C. Consumer Opinions and Suggestions on Internet Insurance

At the end of the questionnaire, respondents' opinions and suggestions on Internet insurance were collected through multiple-choice questions. The results, summarized in Table VIII, reveal the key factors that attract consumers to Internet insurance, as well as their expectations for its future development.

In terms of attractive features, respondents were most drawn to competitive pricing and discounted premiums, alongside the convenience and speed of the purchasing process. The ability to easily compare different products online and access a wide range of insurance options with customizable services was also highly valued. Additionally, respondents appreciated the flexibility to purchase and manage insurance at any time and from anywhere, as well as the availability of comprehensive insurance product information and educational resources.

TABLE VIII
ROBUSTNESS TEST ANALYSIS

Hypotheses		Std. Beta	S. E.	C. R.	P-Value	Result
H1	PU → BI	0.159	0.068	4.717	0.000	Supported
H2	PEOU → BI	0.104	0.039	3.604	0.001	Supported
H3	UA → BI	0.274	0.059	5.013	0.000	Supported
H4	SN → BI	0.000				Not Supported
H5	PR → BI	0.137	0.031	6.999	0.010	Supported
H6	BI → UB	0.261	0.063	3.840	0.019	Supported
H7a	PU → BI → UB	0.254	0.031	6.942	0.000	Supported
H7b	PEOU → BI → UB	0.131	0.054	5.088	0.013	Supported
H7c	UA → BI → UB	0.110	0.050	3.039	0.001	Supported
H7d	SN → BI → UB	0.000				Not Supported
H7e	PR → BI → UB	0.371	0.048	6.746	0.007	Supported
H8	BI * PBC → UB	0.345	0.054	6.805	0.016	Supported

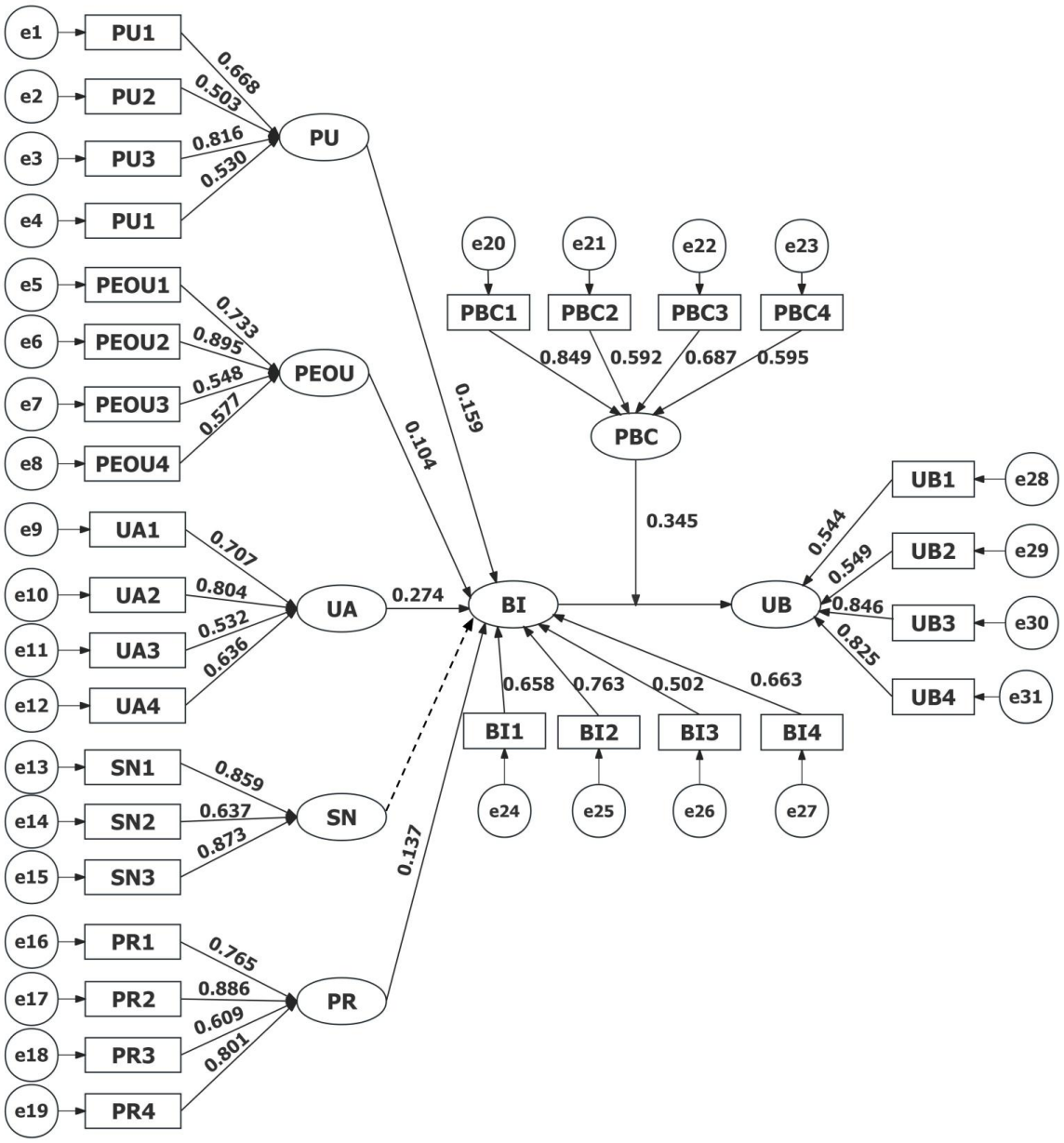

Fig. 4. Results of robustness test analysis of Internet insurance usage behavior based on Amos (Standardized).

Regarding their expectations for Internet insurance, respondents highlighted the importance of reasonable premiums and efficient purchasing and claims processes. Security and reliability in online payments and transaction protection were also significant concerns. Consumers expressed a desire for a diverse selection of flexible insurance products, as well as professional online customer service and consultation support. Clear, detailed explanations of insurance product information and terms were also emphasized. Furthermore, an open-ended option allowed respondents to provide additional personalized suggestions for improvement.

These findings offer valuable insights for Internet insurance providers, underscoring the importance of affordability, convenience, security, product variety, and customer support in meeting consumer expectations and improving overall satisfaction.

V. Discussion

By constructing and empirically assessing an integrated model based on TAM, TPB, and PR, this research enriches the literature with a more comprehensive view of Internet insurance adoption.

A. Interpretation of Key Findings

The analysis underscores the significant roles of perceived usefulness, ease of use, usage attitude, and perceived risk in shaping behavioral intention. Favorable perceptions facilitate adoption, while concerns about risk hinder it. These results align with prior research in digital financial services adoption, emphasizing the importance of user experience and perception in influencing adoption behavior [26-27, 30].

One noteworthy outcome is that subjective norm exhibits no significant influence on behavioral intention within the Internet insurance setting. This deviates from traditional TPB assumptions, suggesting that in China, consumers' decisions regarding Internet insurance are less influenced by societal

expectations and more driven by personal assessments of utility, ease of use, and risk. Possible explanations include:

(1) Personal Networks over General Social Norms

Chinese consumers may rely more on family, close friends, and social circles rather than broader societal norms when making financial decisions. Unlike in other digital service adoptions where subjective norms are strong, insurance purchases tend to be more individualized and risk-sensitive [31-32].

(2) Information Asymmetry and Limited Trust

The prevalence of information asymmetry in Internet insurance may reduce individuals' reliance on external opinions. Consumers may prioritize self-research over peer recommendations due to the complexity and long-term implications of insurance products [33].

(3) Dominance of Trust and Risk Perception

Consumers' trust in Internet insurance platforms, as well as their personal risk tolerance, may overshadow the influence of social norms. Unlike social media or e-commerce adoption, insurance requires greater financial commitment, leading to a more rational decision-making process [34].

(4) Demographic and Contextual Factors

The effect of subjective norm may be further mediated by demographic factors such as age, education, digital literacy, and financial knowledge, influencing how much consumers weigh societal expectations in their decision-making process [35].

B. The Mediating Role of Behavioral Intention

The results further confirm that behavioral intention plays a critical mediating role between perceived usefulness, perceived ease of use, attitude toward using, perceived risk, and actual usage behavior. This outcome aligns with existing literature, which indicates that individuals with stronger behavioral intentions are more likely to engage with digital financial services. Nevertheless, the indirect influence of subjective norms on usage behavior was found to be statistically insignificant, highlighting their limited role in shaping Internet insurance adoption among Chinese consumers.

C. The Moderating Role of Perceived Behavioral Control

A key contribution of this paper is the identification of Perceived Behavioral Control (PBC) as a significant moderator between behavioral intention and usage behavior. The findings suggest that higher perceived control strengthens this relationship, reinforcing the TPB framework. This implies that even when individuals intend to use Internet insurance, their ability to translate this intention into actual behavior depends on their confidence in their resources, knowledge, and self-efficacy in navigating Internet insurance platforms.

These results underscore the importance of enhancing consumer empowerment for both policymakers and industry practitioners. To effectively promote Internet insurance adoption, several practical strategies should be considered. First, improving user education, offering clear and transparent policy information, and designing intuitive digital interfaces can enhance users' confidence and ease of access. Second, leveraging big data enables personalized product offerings, dynamic pricing, and risk-based recommendations that align with individual consumer needs. Third, applying AI technologies—such as automated underwriting, intelligent chatbots, and claims automation—can significantly enhance service efficiency and user satisfaction. Ensuring a secure and seamless digital experience through robust cybersecurity measures, simplified processes, and real-time technical support is also vital. Additionally, rather than relying on generalized social influence campaigns, reframing marketing efforts to involve trusted key opinion leaders and financial influencers may yield greater credibility and impact. Lastly, integrating insurance into users' daily life scenarios—via IoT devices and mobile applications—can improve accessibility and relevance. Providing reliable and responsive customer support remains essential in building trust and driving sustained engagement with Internet insurance platforms.

D. Theoretical and Practical Implications

We provided a robust theoretical framework by integrating the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Perceived Risk (PR) theory. Interestingly, the study identified that subjective norms do not exhibit a statistically meaningful connection with individuals' intentions to adopt Internet insurance, which contrasts with common expectations in behavioral research. This result challenges the traditional assumptions in TPB, particularly in the context of China. The limited influence of subjective norms suggests that consumers may prioritize personal perceptions of ease of use, utility, and risk over subjective norms. This is consistent with findings in other emerging markets, where individual decision-making is less influenced by societal pressures and more by personal experiences and knowledge.

This divergence from traditional models prompts a deeper exploration of cultural factors and market-specific dynamics. In the Chinese context, family and close social networks may play a more significant role in financial decisions than broader societal norms, as seen in previous studies [31]. Moreover, the unique market structure of Internet insurance, characterized by information asymmetry and evolving consumer education, could further reduce the impact of social influence. Therefore, future research should consider the role of cultural factors and local market conditions in shaping Internet insurance adoption, especially in developing economies.

Practically, these findings offer valuable guidance for regulatory authorities, service operators, and platform designers working to promote the uptake of Internet-based insurance in the Chinese market.

(1) Enhance Consumer Empowerment Through Digital Literacy and Transparency

Policymakers and insurers should invest in targeted digital literacy campaigns that help users understand the fundamentals of Internet insurance. Educational initiatives—including interactive tutorials, insurance literacy workshops, and mobile-friendly learning platforms—can boost consumers' confidence and perceived behavioral control. In addition, improving platform transparency by clearly disclosing policy details, exclusions, and procedures for claims can reduce perceived risk and promote trust in digital channels.

(2) Leverage Big Data for Personalized Insurance Solutions

Insurance providers can use big data analytics to develop dynamic pricing models and personalized insurance plans. By analyzing behavioral patterns, health metrics, and lifestyle data, platforms can offer tailored product recommendations that align more closely with individual consumer needs. This data-driven personalization increases perceived usefulness and strengthens consumers' intention to adopt Internet insurance.

(3) Employ AI to Improve Service Efficiency and User Experience

Artificial intelligence (AI) technologies—such as chatbots, virtual assistants, and image recognition tools—can significantly enhance the functional quality of Internet insurance services. AI-driven customer support can provide real-time responses to inquiries, automate claim verification through OCR (optical character recognition), and streamline underwriting processes. These features improve the perceived ease of use and reliability of Internet insurance platforms.

(4) Build a Trust-Based Ecosystem with Secure, Seamless Digital Services

Insurers must prioritize cybersecurity infrastructure to protect consumer data and transactions. The use of blockchain for secure record-keeping and smart contracts can increase transparency and reduce perceived privacy and financial risk. At the same time, seamless mobile interfaces, responsive design, and simplified user journeys can minimize usability barriers and improve digital engagement.

(5) Rethink Social Influence Strategies with Credible Digital Advocates

Given the limited impact of subjective norms in this study, traditional mass marketing may be less effective in influencing adoption. Instead, leveraging trusted key opinion leaders (KOLs), financial influencers, and peer-review platforms can offer more authentic and targeted forms of social influence. This approach is especially valuable in building trust among younger or digitally native user segments.

(6) Integrate Internet Insurance with Broader Life Scenarios

To improve consumer engagement and retention, providers can connect insurance offerings with broader life services such as health management, elderly care, and travel assistance. The integration of insurance into daily life ecosystems—enabled by IoT devices and continuous data feedback—can create a more holistic, value-added experience that increases platform stickiness and behavioral usage.

E. Comprehensive Evaluation of Results

The findings also warrant a more holistic evaluation of Internet insurance adoption. For instance, although perceived usefulness and ease of use are key predictors of adoption, psychological aspects like aversion to risk also exert a notable influence. Consumers' risk perceptions may not only stem from the product's characteristics but also from broader societal concerns, such as the security of online financial transactions. A more nuanced approach is needed to explore these psychological drivers, drawing on behavioral economics and psychology to understand the decision-making process more deeply [36].

Furthermore, social psychology could provide valuable insights into how consumers form attitudes toward Internet insurance based on their interactions with peers, family members, and media. These factors might explain the limited role of social norms in this paper, offering an interesting direction for future research. Future studies could integrate multiple theories, such as cognitive psychology or social learning theory, to examine how consumers' perceptions of risk and reward are influenced by both personal and social factors [37].

F. Reflections on Limitations and Uncertainty

Although the study provides meaningful contributions, it has certain constraints. Specifically, the use of cross-sectional data limits the ability to capture dynamic changes over time. Although a two-wave survey approach was used to mitigate common method bias, the data still captures a snapshot in time, making it difficult to assess how consumer attitudes and behaviors evolve over the long term. A longitudinal study could provide more dynamic insights into how Internet insurance adoption progresses as consumers gain more experience and information.

Additionally, the sample characteristics could introduce biases. Since the study targeted individuals proficient in Internet use, the sample may not adequately reflect the general population, especially those less accustomed to digital technologies. Future investigations are encouraged to incorporate more heterogeneous participants to assess whether the outcomes remain consistent across various demographic segments, such as age, education, or regional background.

Furthermore, depending on self-reported information may lead to potential biases in responses, particularly in areas such as perceived risk and behavioral intention. While efforts were made to mitigate common method bias, future studies could use a combination of qualitative interviews and behavioral data to triangulate findings and reduce potential biases.

VI. Conclusions

This study enhances comprehension of Internet insurance adoption by combining the TAM, TPB, and PR frameworks into an integrated analytical model. The empirical findings provide insights into how these theoretical frameworks collectively explain consumer behavior focusing on Internet insurance usage in China. The study underscores the importance of perceived usefulness, ease of use, attitude toward using, and perceived risk in shaping behavioral intentions. These results align with previous research on digital financial services adoption, confirming the important role these factors play in influencing consumers' adoption decisions.

An intriguing and unexpected finding of this paper is the weak influence of subjective norms on behavioral intentions. This result deviates from traditional assumptions in the TPB framework, which typically asserts that subjective norms significantly contribute to individuals' decisions to adopt technology. In China's Internet insurance sector, the relatively weak influence of social norms indicates that

individuals tend to base their decisions more on perceived usefulness, ease of use, and risk evaluation. This could be attributed to specific cultural factors and market dynamics within China. For example, family and close-knit social networks may have a more significant role in decision-making, while broader societal norms may have a reduced effect. This finding prompts further investigation into how local market conditions, cultural influences, and consumer behavior in emerging markets shape adoption decisions. Researchers should explore how social and cultural factors, particularly in developing economies, interact with individual perceptions of risk and utility.

A notable outcome of the study is the confirmed moderating influence of perceived behavioral control (PBC) on the link between behavioral intention and actual usage behavior. This emphasizes the importance of consumer empowerment, indicating that individuals are inclined to act on their intentions when they feel confident in navigating online platforms. As such, Internet insurance providers should focus on improving consumer empowerment by enhancing platform usability, providing clear instructions, and offering comprehensive educational resources to reduce perceived barriers and increase perceived control.

From a practical standpoint, this paper provides actionable recommendations for policymakers and industry practitioners. In particular, empowering consumers through targeted education initiatives and intuitive platform design can lower entry barriers and promote more confident decision-making. The strategic use of big data enables the delivery of personalized insurance solutions tailored to users' specific risk profiles and preferences, while AI-driven services improve operational efficiency and responsiveness. To further foster trust and adoption, it is essential to ensure platform security and streamline digital interactions. Additionally, shifting marketing strategies from generic promotions to trust-based engagement, such as leveraging financial influencers, can resonate more effectively with users. Embedding insurance offerings into everyday digital touchpoints, supported by responsive customer service, can help normalize usage and drive sustained participation in Internet insurance ecosystems. These efforts are vital in promoting consumer adoption and supporting the continued development of Internet insurance in the Chinese market.

While the findings regarding subjective norms suggest that subjective norms may not be a key driver in this context, marketing strategies should focus on building trust and engaging consumers through personalized experiences. The use of key opinion leaders (KOLs) or trusted financial influencers may prove more effective than relying on broad social endorsement strategies. Such strategies align with consumer preferences and the growing need for personalized financial services.

Nonetheless, this study acknowledges certain constraints, which present meaningful directions for subsequent investigations. Specifically, the use of cross-sectional data restricts the ability to observe temporal changes in perceptions and behavioral patterns. An extended-period study would provide more comprehensive insights into how consumer attitudes toward Internet insurance develop as they gain more experience with digital platforms. Additionally, depending solely on participants' self-reports may lead to distortions, especially when assessing variables like perceived risk and behavioral intention. Future research could combine qualitative methods, such as interviews, with quantitative data to address these limitations and facilitate a deeper exploration of the various factors contributing to adoption behavior.

In addition, this study primarily examined digitally experienced participants, which might limit its generalizability to the wider population—particularly individuals with limited digital proficiency. Variables like age, education level, and financial literacy may also play an intermediary role in shaping how perceived influences affect adoption behavior. Future research should explore these demographic influences to tailor marketing and educational strategies for different consumer groups.

To summarize, this study offers an in-depth perspective on the key determinants affecting the uptake of Internet insurance in China, particularly emphasizing the notable effects of users' perceived benefits, simplicity of use, and concerns about potential risks. By challenging traditional assumptions about subjective norms, this paper offers new insights into consumer behavior in digital financial services. The findings underscore the critical role of consumer empowerment, trust-building, and data-driven personalization in advancing Internet insurance adoption. To support the sustainable development of this sector, policymakers and industry practitioners should not only reduce perceived risks and improve usability but also leverage emerging technologies—such as big data analytics and AI—to deliver personalized, responsive, and seamless user experiences. Moreover, embedding insurance services into everyday digital scenarios and ensuring strong customer support can further enhance consumer engagement. Looking ahead, future research should examine the interplay of psychological, cultural, and policy factors, and adopt longitudinal and multi-method approaches to better capture the evolving dynamics of digital financial service adoption in emerging markets.

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