

# Investigation and Research on the Influencing Factors of Catastrophe Insurance Consumers' Purchase Behavior from the Perspective of Guangdong-Hong Kong-Macao Greater Bay Area

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**Abstract:** Since June 2020, rainfall in the south of the Yangtze River, South China, and Southwest China has increased sharply, directly causing the occurrence of super floods and geological disasters in many places. The use of insurance market systems to disperse catastrophe risks under catastrophes has become the focus of both the market and the government. The China Insurance Regulatory Bureau has successively issued the "Notice on Doing a Good Job in Emergency Response to Disasters and Accidents in Flood Seasons and Typhoon-prone Seasons" to start claims settlement under catastrophes in an orderly manner. However, in terms of the current development of the catastrophe system, catastrophe insurance has not really penetrated into the consumer market. Catastrophe insurance uses an insurance system to conclude relevant contracts between local governments and insurance companies. As for the relevant research and practice on the demand of catastrophe insurance system in the actual consumer market, the research in this article will start from the perspective of factors influencing consumer purchase behavior of catastrophe insurance in the Guangdong-Hong Kong-Macao Greater Bay Area where geological disasters such as typhoons and floods occur frequently, from the four perspectives of consumer perception, consumer personal factors, market factors and insurance factors, explore the influencing factors centered on consumer purchase behavior, with a view to building a catastrophe insurance system with individual consumers as the market insurance consumer group.

## 1. An overview of Catastrophe Insurance

Catastrophe risk refers to the risk of huge property losses or casualties caused by giant disasters. ISO refers to the price fluctuations in the United States in 1998 in the definition of catastrophe risk, and defines catastrophe risk as the insurance compensation that can cause more than 25 million US dollars in some areas; Swiss Re divides catastrophe risk according to two factors, man-made and natural, and publishes the loss caused by global catastrophe risk with reference to the annual U.S. inflation level.

There are generally two ways of influencing factors of catastrophe insurance demand<sup>[1]</sup>: First, from the perspective of demand, catastrophe insurance is generally insured by the government through compulsory means, and the role of compulsory demand is more complex, so most of them are based on the subjective needs of the insured, that is, from the perspective of non-mandatory;<sup>[2]</sup> Second, there are differences between empirical data and actual catastrophe data, and it is difficult to predict losses with the help of empirical data. Due to the defects and ambiguity in the cognition of catastrophe risk itself. Therefore, it is difficult to effectively identify the actual demand for catastrophe insurance, thus making a wrong estimate of the demand situation.

## 2. An Empirical Study on Influencing Factors of Catastrophe Insurance Consumers' Purchase Behavior

### 2.1. Theory and Hypothesis <sup>[3-6]</sup>

Table 1 Research hypothesis.

hypothesis	content
1	There is a positive relationship between consumers' perception level of catastrophe risk and purchase probability
2	Freelance workers have low demand for catastrophe insurance, corporate employees have the highest demand for catastrophe insurance, and administrative and public institution employees have the lowest demand for catastrophe insurance
3	There is a positive relationship between the basic income of consumers and the probability of purchasing catastrophe insurance
4	Women are more likely to purchase catastrophe insurance than men
5	There is a positive relationship between age and the probability of purchasing catastrophe insurance
6	There is a negative relationship between the level of interest rates and the probability of purchasing catastrophe insurance
7	Inflation level and consumer catastrophe insurance purchase probability home show a negative relationship
8	There is a positive relationship between the amount of risk exposure and the probability of purchasing catastrophe insurance
9	There is a significant negative relationship between the amount of government assistance and the purchase probability of consumer catastrophe insurance

### 2.2. Sample Selection and Model Design

#### 2.2.1. Data Analysis

This research conducted a 45-day questionnaire survey on prefecture-level cities such as Hong Kong, Macau, Guangzhou, Shenzhen (first-tier), Zhuhai, Foshan (second-tier), Zhongshan, Zhanjiang, Chaozhou, Shantou (third-tier), etc. From June to July 2020, a total of 4,000 questionnaires were distributed online and offline. Based on blank questionnaires and polygraph questions, 331 invalid questionnaires were excluded, and 3,669 valid questionnaires were finally obtained. The response rate of the questionnaire was 91.73%. , in view of the fact that the purchase of catastrophe insurance requires rational people to purchase, the age distribution of the selected respondents is 20-75 years old.

In the specific research process, the questionnaire is designed into two sections, the risk perception section and the personal information section. The regional catastrophe risk is used as the background and basis for the questionnaire setting, and through the Likert scale, the personal risk reserve knowledge, effect performance, willingness, effective risk knowledge, risk control degree, risk novelty, casualty outbreak sequence, The degree of disaster and the degree of fear are scored. The higher the perception score, the higher the perception ability; the personal information section includes age, income, gender, occupation, interest rate level (data from the World Bank), price level (data from China Statistical Yearbook). Finally, the collected data were entered into the statistical software SPSS.

#### 2.2.2. Model Settings

The basic situation of variable selection in the study is shown in Table 2.

Table 2 Variable selection.

variable	first-level indicator	Secondary indicators	three-level indicator	symbol
<b>Explained variable</b>	purchase behavior	Purchase probability	Purchase probability	P
<b>Explanatory variables</b>	personal reason	Age	20-35 years old	Age1
			36-55 years old	Age2
			56 years old and above	Age3
		Gender	male	M
			Female	F
		Income	Below 2000	Income1
			2001-5000	Income2
			5001-8000	Income3
			8001 and above	Income4
		Profession	civil servant	Job1
			Enterprise employees	Job2
			Freelancers	Job3
	perceptual factor	meteorological disaster	meteorological disaster	MD
		Geological disaster	Geological disaster	GD
		biological disaster	biological disaster	BD
	market factors	interest rate level	interest rate level	IR
Inflation rate		Inflation rate	PL	
insurance factor	Catastrophe risk exposure limit	Catastrophe risk exposure limit	Exposure	
	Government aid amount	Government aid amount	Assistance	

In the specific research, a multiple regression model is constructed to carry out the research. The probability of purchasing catastrophe insurance is measured by means of dummy variables, the purchase P is 1, the non-purchase P is 0, and the collinearity problem of variables is solved by the following path "Analyze—Regression—Binary Logistic—Backward :conditional", and finally remove the variables Age3, Income 1, Income 2, Job1, and job3. The main reason for the removal of variables is that the income, age and occupational differences of individual groups cause the lower probability of purchasing catastrophe insurance.

After eliminating the above-mentioned collinear variables, the multiple linear regression econometric model is finally obtained as shown in the following formulas (1) and (2):

$$P_i = \frac{1}{1+e^{-z_i}} \quad (1)$$

$$p = Z + \alpha_1 MD_1 + \alpha_2 BD_1 + \alpha_3 GD_1 + \alpha_4 Age_1 + \alpha_5 Age_2 + \alpha_6 Income_3 + \alpha_7 Income_4 + \alpha_8 Job_2 + \alpha_9 IR + \alpha_{10} PL + \alpha_{11} Exposure + \alpha_{12} Assistance + \varepsilon_0 \quad (2)$$

In the above formula,  $\varepsilon_0$  is a random disturbance term, Z is a constant term, and  $\alpha_i$  is a variable coefficient.

## 2.3. Evidence Results

### 2.3.1. Regression Analysis

The regression coefficients are standardized, and the standardized treatment formula is shown in the following formula (3):

$$\beta_i = b_i \times \frac{s_i}{\pi \div \sqrt{3}} \approx b_i \times \frac{s_i}{1.7628} \quad (3)$$

In the above formula,  $\beta_i$  mainly refers to the standardized regression coefficient of the *i*th explanatory variable,  $b_i$  mainly refers to the unstandardized regression coefficient of the *i*th

explanatory variable,  $s_i$  mainly refers to the standard deviation of the  $i$ th explanatory variable, and 1.7628 mainly refers to the standard multiple regression The standard deviation of the distribution. After standardization, the final regression results are shown in Table 3:

Table 3 Regression results.

variable	B	S.E	Wald	Df	Sig	Exp(B)	Std	Beta
Age1	1.084	0.185	126.394	1	0.000	0.124	0.193	0.170***
Age2	1.032	0.171	154.988	1	0.000	0.138	0.129	0.138***
Age3	1.361	0.164	112.138	1	0.128	0.183	0.148	0.134
M	1.167	0.127	85.595	1	0.083	0.129	0.132	0.148
F	0.936	0.123	189.234	1	0.091	0.149	0.122	0.134
Income1	1.391	0.162	126.232	1	0.102	0.128	0.130	0.194
Income2	0.135	0.150	74.359	1	0.097	0.182	0.124	0.203
Income3	0.056	0.121	82.039	1	0.011	0.192	0.133	0.154***
Income4	0.811	0.203	145.204	1	0.013	0.127	0.136	0.294***
Job1	0.464	0.186	171.593	1	0.002	0.174	0.195	0.134
Job2	1.271	0.154	3.394	1	0.019	0.101	0.185	0.133***
Job3	1.212	0.191	83.599	1	0.001	0.148	0.123	0.120
MD	0.468	0.165	73.485	1	0.004	0.193	0.132	0.143***
GD	0.663	0.177	124.824	1	0.001	0.154	0.194	0.195***
BD	0.663	0.154	124.923	1	0.001	0.122	0.128	0.138***
IR	0.631	0.198	15.841	1	0.001	0.143	0.125	0.148***
PL	1.352	0.133	113.294	1	0.001	0.169	0.183	0.201***
Exposure	0.597	0.125	84.273	1	0.001	0.183	0.170	0.145***
Assistance	0.672	0.157	70.273	1	0.001	0.139	0.170	0.139***
constant	-3.561	0.984	153.912	1	0.001	0.132		

Note: \*\*\* means significant at the 1% level, \*\* means significant at the 5% level, \* means significant at the 10% level.

In view of the above regression results, it can be confirmed that Hypothesis 1, Hypothesis 3, Hypothesis 2, Hypothesis 6, Hypothesis 7, Hypothesis 8, and Hypothesis 9 are all established in this study.

It can be clearly seen from the regression results that there is a positive correlation between the perception level and the purchase probability of catastrophe insurance in Hypothesis 1, and MD/GD/BD as consumer perception factors in meteorological disasters, geological disasters, and biological disasters are all in 1% level which is significant, and the correlation coefficients are 0.14, 0.20, and 0.14 respectively. When the meteorological disaster index increases by 1%, the probability of consumers purchasing catastrophe insurance will increase by 14%; when the geological disaster index increases by 1%, then consumers The probability of purchasing catastrophe insurance will increase by 20%; when the biological disaster index increases by 1%, the probability of consumers purchasing catastrophe insurance will increase by 14%, which means that hypothesis 1 is established;

In Hypothesis 2, the type of work has a clear impact on the probability of purchasing catastrophe insurance for consumers. It can be seen from the empirical regression results that the correlation coefficient between freelancers and the purchasing probability of catastrophe insurance is 0.12, which is not significant; The correlation coefficient of the probability of purchasing catastrophe insurance is 0.13, which is significant at the level of about 1%; the correlation coefficient of the employees of administrative institutions to the probability of purchasing catastrophe insurance is 0.13, and it is not significant. From the magnitude of the correlation coefficient and the degree of significance, the hypothesis can be seen 2 established;

Assumption 3, there is a certain relationship between the consumer's income and the purchase probability of catastrophe insurance. Based on the regression results, it can be seen that when the

consumer's income is higher than 5,000 yuan, the consumer's catastrophe insurance purchase probability is higher. The correlation coefficient is 0.15 when it is 8,000 yuan, which is significant at the 1% level. When the income is higher than 8,000 yuan, the correlation coefficient is 0.29, which is significant at the 1% level. The fluctuation of this correlation coefficient means that between 5,000 yuan and 8,000 yuan income and 8,000 yuan The above income has obvious differences in the purchase of catastrophe insurance. The probability of purchasing catastrophe insurance for groups with an income of more than 8,000 yuan exceeds the probability of purchasing catastrophe insurance for groups with an income of 5,000 to 8,000 yuan, which means that Hypothesis 3 is established;

In Hypothesis 4, there is no significant difference in the influence of gender on the purchase probability of consumer catastrophe insurance, and the regression is not significant, which means that Hypothesis 4 does not hold;

In Hypothesis 5, there is no significant difference in the influence of age on the purchase probability of consumer catastrophe insurance, and the regression is not significant, which means that Hypothesis 5 does not hold;

Assumption 6, the impact of interest rate on the purchase probability of consumer catastrophe insurance is significant at the 1% level, and the correlation coefficient is 0.15, which means that there is a positive correlation between interest rate and consumer catastrophe insurance purchase probability. The purchase probability of catastrophe insurance will increase by 15%, which means that hypothesis 6 is established.

Assumption 7, the influence of inflation rate on the purchase probability of consumer catastrophe insurance is significant at the 1% level, and the correlation coefficient is 0.201, which means that there is a positive correlation between the inflation rate and the purchase probability of consumer catastrophe insurance. When the inflation rate increases by 1 %, then consumers' purchase probability of catastrophe insurance will increase by 20.1%, which means Hypothesis 7 is established.

Assumption 8, the influence of the amount of risk exposure on the purchase probability of consumer catastrophe insurance is significant at the 1% level, and the correlation coefficient is 0.145, which means that there is a positive correlation between the amount of risk exposure and the purchase probability of consumer catastrophe insurance. When the amount of risk exposure increases by 1, then consumers' purchase probability of catastrophe insurance will increase by 14.5%, which means Hypothesis 8 is established.

Assumption 9, the influence of the amount of government assistance on the purchase probability of consumer catastrophe insurance is significant at the 1% level, and the correlation coefficient is 0.139, which means that there is a positive correlation between the amount of government assistance and the purchase probability of consumer catastrophe insurance. When the amount of government assistance increases by 1 %, then consumers' purchase probability of catastrophe insurance will increase by 13.9%, which means Hypothesis 9 is established.

### 2.3.2. Model Evaluation

As shown in Table 4 and Table 5, among the total parameters of the regression equation, the adjusted fitting coefficient is 63.1%, the F statistic is 155.693, and the DW value is 1.700, indicating that the equation has good explanatory power.

Table 4 General parameters of regression equation.

Model	R	R <sup>2</sup>	AdjustmentR <sup>2</sup>	standard estimate error	DW value
1	0.797 <sup>R</sup>	0.635	0.631	0.44280	1.700

Table 5 Regression analysis of variance table.

Model	sum of square	df	mean square	F	Sig.
Regression	163.412	4	32.682	155.693	0.000 <sup>R</sup>
Residual	93.920	190	0.196		
total	257.332	194			

### 2.3.3. Analysis of Results

Under the double argument of theory and practice, the following conclusions can be drawn:

(1) Among the individual factors of consumers, there is an upper limit on the influence of consumers' age on the purchasing behavior of catastrophe insurance. In the actual purchase demand, the age limit for purchasing catastrophe insurance is 20 to 55 years old, and the older the age within this age range. The higher the probability of purchasing catastrophe insurance; from the perspective of income groups, in Guangdong, Hong Kong and Macao, consumers with an income of more than 8,000 yuan have a higher probability of purchasing catastrophe insurance. The higher the level, the higher the level of income in the year-on-year income, the greater the possibility of purchasing catastrophe insurance; from the perspective of occupation, the demand for catastrophe insurance for employees at work is the greatest.

(2) Among the consumer perception factors, the higher the consumer's understanding of catastrophe insurance, the higher the purchasing probability of consumer catastrophe insurance. The understanding of catastrophe insurance includes the degree of understanding of catastrophe. The higher the perception level of meteorological disasters, geological disasters and biological disasters, the higher the probability of people buying catastrophe insurance. Among them, geological disasters have the greatest impact on the probability of consumers purchasing catastrophe insurance, followed by meteorological disasters, and finally biological disasters. The main reason for this kind of impact is that people in Guangdong, Hong Kong and Macao have encountered more meteorological and geological disasters in recent years. <sup>[7]</sup>

(3) Among market factors, both the interest rate level and the price level have a negative correlation with the purchase of catastrophe insurance. The higher the interest rate level, the lower the probability of consumers purchasing catastrophe insurance. The purchase probability of catastrophe insurance has decreased. Both fluctuations represent that the basic risk factors of the market can interfere with the purchase of catastrophe insurance by the public. Therefore, encouraging the implementation of catastrophe insurance products can start with macroeconomic control.

(4) Among the insurance factors, the nature of catastrophe insurance itself is affected by the amount of risk exposure and the government's post-disaster subsidy. The higher the government's post-disaster subsidy, the higher the public's dependence on it, and the lower the risk of purchasing catastrophe insurance. The higher the amount of risk exposure, the greater the loss of consumers in the catastrophe, the higher the demand for catastrophe insurance, and the greater the positive impact on the purchase of catastrophe insurance.

## 3. The Sales Strategy of Guangdong-Hong Kong-Macao In-depth Linkage Catastrophe Insurance Based on Empirical Analysis

According to the development of catastrophe insurance in Guangdong, Hong Kong and Macao and the purchase of catastrophe insurance for consumers, the following catastrophe insurance sales strategies will be proposed based on the perspective of deep linkage between Guangdong, Hong Kong and Macao:

### 3.1. Enterprise-demand Catastrophe Insurance with Linkage Nature

Enterprises play an important pivotal role in the linkage of catastrophic disasters in Guangdong, Hong Kong and Macao. If the amount of risk exposure, perception factors etc., have no distinct characteristics on the individual, but if the individual is formed as a group of enterprises, the demand effect of catastrophe insurance will also be are superimposed. <sup>[8]</sup> At the same time, the in-depth linkage between Guangdong, Hong Kong and Macao requires the creation of a permeable financial circle to reduce the risk of regional development. The construction of the catastrophe insurance compensation mechanism also needs to be carried out in this way. It can be seen from the empirical research that consumers in Guangdong, Hong Kong and Macao The catastrophe purchase probability remains in the catastrophe cognition. To launch a promotional catastrophe insurance

sales plan, we must start from the perspective of catastrophe losses in Guangdong, Hong Kong and Macao in recent years. "Mangosteen", "Hagupit" and other typhoons have been intervening in successive years, resulting in heavy losses for small and medium-sized enterprises in Guangdong, Hong Kong and Macao. The government should link up the catastrophe insurance system for small and medium-sized enterprises in Macao, and also launch catastrophe insurance for small and medium-sized enterprises in Guangdong and Hong Kong. The system enables enterprises with industrial distribution in Guangdong, Hong Kong and Macao to enjoy insurance compensation brought by meteorological disasters under this insurance system.

### **3.2. Personalized Catastrophe Insurance Plan**

Based on the individual characteristics of consumers, a personalized catastrophe compensation plan is launched. In view of the obvious influence of personal factors on the purchase probability of catastrophe insurance in the study, insurance companies can formulate preferential plans for the purchase of catastrophe insurance for enterprises, preferential plans for women's catastrophe insurance, and preferential plans for middle-aged groups to purchase catastrophe insurance. The catastrophe insurance purchase plan was launched in Guangdong, Hong Kong and Macao due to the individual factors of the catastrophe insurance purchase group.

This kind of idea of integrating individual characteristics into the catastrophe insurance compensation system needs to truly classify individuals with cluster characteristics, plan and design detailed product types, and launch personalized catastrophe insurance plans, such as integrating middle-aged and elderly and female characteristics, launched a portfolio of catastrophe insurance preferential products for middle-aged and elderly women; integrated the characteristics of freelancers and middle-aged and elderly people, launched freelance middle-aged and elderly catastrophe products, etc., from the perspective of greater practicality and coverage, launched catastrophe insurance products with obvious individual characteristics.

### **3.3. Dynamic Supervision of the Catastrophe Insurance System**

Based on the macroeconomic and data-based characteristics, we have launched special catastrophe insurance products. The macroeconomic orientation is mainly interest rate fluctuations and price fluctuations. The Guangdong-Hong Kong-Macao Insurance Regulatory Bureau can cooperate with regional insurance companies and institutions to dynamically detect market trends, strengthen the specificity of catastrophe products under the guidance of market factors, and combine catastrophe insurance products with insurance products. Government catastrophe subsidies are differentiated, and with the help of the Insurance Regulatory Bureau to observe market trends and policy fluctuations, a set of characteristic catastrophe insurance products that avoid policy characteristics is finally formed. For example, the government focuses on information release in regular monitoring, and launches commercial emergency products for catastrophe insurance within a week of information release, so that people can purchase catastrophe insurance products within a week of the impending disaster. Obtain 15% subsidy for post-disaster compensation and 85% subsidy after insurance claim settlement, while people who have not purchased catastrophe insurance can only receive 15% subsidy for post-disaster loss compensation, and establish this kind of rapid catastrophe insurance claims linkage mechanism between business and government, dynamic regulation and catastrophe risk reduction.

To sum up, the launch and marketing of catastrophe insurance products in Guangdong, Hong Kong and Macao need to combine the characteristics of individual factors, macroeconomic characteristics, risk perception and the core of insurance development. Only by fully combining the above four points can we truly build Guangdong Hong Kong and Macao catastrophe risk compensation linkage mechanism.

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