

**International Journal of Financial Systems**

Volume 1, Number 1 (2023)

January-June 2023

Page : 57-82

E-ISSN : xxxx-xxxx

P-ISSN : xxxx-xxxx

DOI : <https://doi.org/10.61459/ijfs.v1i1.7>

Article History

Received : 03/07/2023

Revised : 05/09/2023

Accepted : 07/05/2023

Available Online : 09/13/2023

# Formulating Natural Disaster Insurance Scheme for Micro, Small, and Medium Enterprises (MSMEs) in Indonesia

## ABSTRACT

The existence of disaster insurance in Indonesia is particularly important for disaster-prone areas. In recent years, only 2.96% of 64 million MSMEs have disaster insurance. This is because the existing disaster insurance scheme has not fully met the expectations of MSMEs regarding its premium value, its claims mechanism and MSMEs financial capability. This research seeks to explore the factors that influence MSMEs to own disaster insurance, by using quantitative analysis of Panel Fixed Effects Model as the first model and Probit Models as the second and third models as well as qualitative analysis. The result will be utilized to formulate the appropriate disaster insurance product which optimize insurance features based on MSMEs' demand, encourage regulatory support and improve government funding capacity. Indonesia is currently facing approximately IDR19.75 trillion (USD1.4 billion) financing gap to cover the loss caused by disasters hence, there is also a need to create a high-level financing scheme to cover the gap.

**Keywords:** Econometrics, Insurance Scheme, Insurance, Natural Disaster,

JEL Code: C01 G22 G29

**Edi Setijawan<sup>1</sup>,  
Guntur Sutiyono<sup>2</sup>,  
Gandhi Cahyo Wicaksono<sup>1</sup>,  
Historya Ardiyanti<sup>2</sup>,  
Petra Christi<sup>2</sup>**

---

<sup>1</sup>Otoritas Jasa Keuangan, Indonesia, Email : [e\\_setijawan@ojk.go.id](mailto:e_setijawan@ojk.go.id)

<sup>2</sup>Climateworks Centre, Indonesia

## I. Introduction

Indonesia's geographical location along the equator has made it vulnerable to natural disasters. This often brings economic losses and loss of human life, thus slowing down the pace of economic growth in Indonesia. The Indonesia's National Disaster Management Agency (BNPB) data shows that within the last 5 years there has been an increase in the frequency of natural disasters in Indonesia. In 2019 alone, there were more than 9,000 natural disaster events including earthquakes, floods, bushfires, and volcanic eruptions. BNPB estimates that the yearly economic losses from natural disasters can reach up to IDR 80 trillion (USD5.6 billion) (BNPB, 2016).

A study conducted by the World Bank (2006) has shown that private sectors are most affected by natural disasters in the form of damage to housing, and the cessation of the production process resulting in layoffs. As a disaster-prone country, Indonesia requires adequate disaster management policies tailored to the needs of the public in particular, the micro, small and medium enterprises (MSMEs). Indonesia's economic structure is dominated by MSMEs, reaching 99%, with a contribution of up to 60.34% to Indonesian GDP in 2019. This group has become one of the most vulnerable groups once hit by a natural disaster due to low literacy in both finance and natural disasters.

To determine MSMEs demand and behavior towards purchasing natural disaster insurance and measure the performance of the current natural disaster insurance market, this research addresses the questions through both qualitative and quantitative methods. The quantitative analysis uses Panel Fixed Effects Model and Probit Models. The qualitative analysis will address product feature adequacy, regulatory support, funding instruments, and distribution channels through benchmarking analysis of insurance programs in several disaster-prone countries and analyzing Indonesia's insurance market performance, regulatory and financing gaps. This paper also features a high-level discussion on several alternatives for disaster insurance financing mechanisms along with the natural disaster insurance features framework Indonesia can work on.

## II. Literature Review

### A. Natural disaster insurance in disaster-prone countries

A series of benchmarking below aims to evaluate and acknowledge the mechanism and structure of natural disaster insurance programs in various countries. There are 5 countries: the USA, Japan, Mexico, the Philippines, and

Thailand which provide a variety of characters to provide insights in planning disaster insurance programs for Indonesia.

## 1. The United States of America (USA)

One of USA's national natural disaster insurance programs, the National Flood Insurance Program (NFIP), offers a maximum coverage of USD 250,000 for private homes and USD 100,000 for building contents. Despite the availability of disaster insurance through the private sector, the US government still functions as the main insurance provider where the government insists on a suppression rate for insurance companies to limit the difference between the rates that can be charged for different disaster classifications and places more stringent limits on the rates for high-risk classifications (He & Faure, 2017). This program is regulated in the National Flood Insurance Act of 1968, the National Flood Insurance Reform Act of 1994, and the Flood Disaster Protection Act 1973. The Flood Disaster Protection Act of 1973 makes it clear that lenders require special flood insurance for properties located in Special Flood Hazard Areas (SFHA). The National Flood Insurance Reform Act of 1994 prevents federal agencies from providing disaster assistance in SFHA to communities that have not joined the NFIP (American Institute for Research, 2005). Insurance regulations in the USA are structured around several main functions, including corporate licensing, producer licensing, product regulation, market behavior, financial regulation, and consumer services.

## 2. Japan

The natural disaster management system in Japan is an example of an effective and organized emergency preparedness system due to years of experience and lessons learned that illustrate and confirm its global relevance. Earthquake insurance for households and SMEs has been prepared by simplifying claims assessment so that insurance payments are made quickly for disaster victims. After the Great East Japan Earthquake, insurance payments in Japan reached 1 trillion yen paid out in 3 months (GFDRR, 2012). Disaster insurance regulations in Japan are regulated in the Earthquake Insurance Act of 1966 which stipulates the Japanese Earthquake Reinsurance Co. (JER) as the only earthquake reinsurance company for the private insurance market. The Japanese government works as a de facto reinsurer, because after insurance companies pay claims for earthquake losses, they will be compensated by the government through JER. The maximum liability of the Japanese government, JER, and the private insurance company is 87 percent, 10 percent, and 3 percent, respectively

(GIROJ, 2014). This implies as a comprehensive insurance funding scheme in which Indonesia can look up to.

### 3. Mexico

The Mexican government established the Natural Disaster Fund (FONDEN) in 1996 as a mechanism to support post-disaster reconstruction of damaged public infrastructure. The FONDEN program becomes the operator center for disaster risk financing and the government's insurance strategy, which combines several financial instruments for various sources of funding, depending on the time and amount of funding needed as well as how to get the funds. Article 37 of the Mexican Federal Budget Act requires the Secretariat of Finance and Public Loans to undertake an annual percentage, not less than 0.4% of its annual federal budget for FONDEN. FONDEN finances its operations using the federal budget, insurance market and CAT bonds which were supported by the World Bank since 2005. FONDEN has issued the world's first CAT bonds of USD160 million which were combined with a parametric reinsurance scheme of USD290 million for earthquake coverage totaling USD450 million (USD150 million for each zone) and mature in three years (World Bank, 2012). During the FONDEN program, the Mexican government received approximately USD280 million from the traditional reinsurance program and an additional USD200 million from the issuance of CAT Bonds, for a total recovery of nearly half a billion dollars. CAT Bonds have successfully attracted investors globally, ranging from specialty bond funds, asset management, pension funds, hedge funds, and reinsurance companies.

### 4. The Philippines

The Philippines developed the PCIDP (Philippines City Insurance Disaster Pool) program which funds cities in the early recovery phase after earthquakes and typhoons that are not covered by existing local resources. PCIDP was developed under the guidance of the Ministry of Finance as part of the 2015 Disaster Risk Financing and Insurance Strategy. This program uses a parametric insurance structure that bases payments on earthquakes and typhoons according to physical damage, rather than actual losses (Asian Development Bank, 2018). The World Bank has been working with the Philippines over the past nine years to strengthen its resilience to natural disasters through CAT bonds which provides protection against earthquakes and tropical storms in 25 provinces. In 2019, the World Bank issued a two-phase disaster-related bond to provide the Philippines with financial protection of up to USD75 million against losses from earthquakes

and USD150 million against losses from tropical cyclones over three years (World Bank, 2019). In 2010, the National Disaster Coordinating Council issued Republic Act No. 10121. The regulation focuses on four thematic areas, namely prevention and mitigation, preparedness, response, recovery, and rehabilitation. The Philippines is currently designing a microinsurance program aimed at MSMEs which are fast and accessible so they can start rebuilding after a natural disaster.

## 5. Thailand

Due to a massive flood in 2011 which was declared as one of the biggest insurance losses with the country's economic loss at THB1.4 trillion (USD47 billion), the government decided to develop a natural disaster insurance program. The program involved a pool of funds with an initial size of 50 billion baht (about USD1.57 billion). The fund provided protection for floods, windstorms, and earthquakes. Most insurance companies have a coverage limit of THB100,000 with an annual premium of 0.5% for household damage. For damages suffered by the SME sector, there is a sub-limit of up to 30% of the insured building value with 1% annual premium. Coverage will be available for households, businesses and industrial factory complexes that are affected by the flood event (Willis Thailand, 2012).

The public insurance program in the United States, Japan and Thailand which was firstly initiated by the government and collaborated with private insurance companies could become an initiative for Indonesia to compile a standardized natural disaster insurance program for the MSME sector with a pool-based funding mechanism. Pool of funds has the purpose to offer affordable premium prices and as a reserved fund when a major disaster strikes in which insurers are unable to pay claims. The Philippines and Mexico are aware of the limited funding from the government in dealing with the damage caused by frequent natural disasters. The implementation of CAT bond-based funding system supported by the World Bank enables them to obtain funding from a wider scope of investors. These countries have also published disaster management regulations that can serve as a reference for private insurance companies to design disaster insurance products.

## B. Insurance Industry Performance in Indonesia

### 1. General performance

During 2016-2019, the insurance industry in Indonesia experienced a growth. The total insurers assets increased by 40.47% or an average of 13.49%. This was supported by an increase in investment, an increase of 46.41% or an average of 15.47% per year. Meanwhile, total liabilities also increased by 47.69% or an average of 15.90%. The premiums collected also increased by 40.88% or an average of 13.63%. On the other hand, the number of claims also increased by 72.12% or an average of 24.04% (BPPDAN, 2019). The increase in claims had been higher than the increase in premium which reduced the profitability of the insurance business to a lesser extent. If the premium spread on claims was IDR132 Trillion (USD9.3 billion) in 2016, it would be only IDR121 Trillion (USD8.6 billion) in 2019 (OJK, 2020). The slowdown in the growth of the insurance industry is still in line with national economic growth in the same period which has not moved from 5%. The Risk Based Capital (RBC) of general insurance companies in 2019 was recorded at 345%, which is greater than the minimum RBC determined under Financial Services Authority (OJK) regulations (120%) (OJK, 2020). This reflects the capital adequacy of the overall Indonesia insurance market for market expansion towards MSMEs natural disaster insurance.

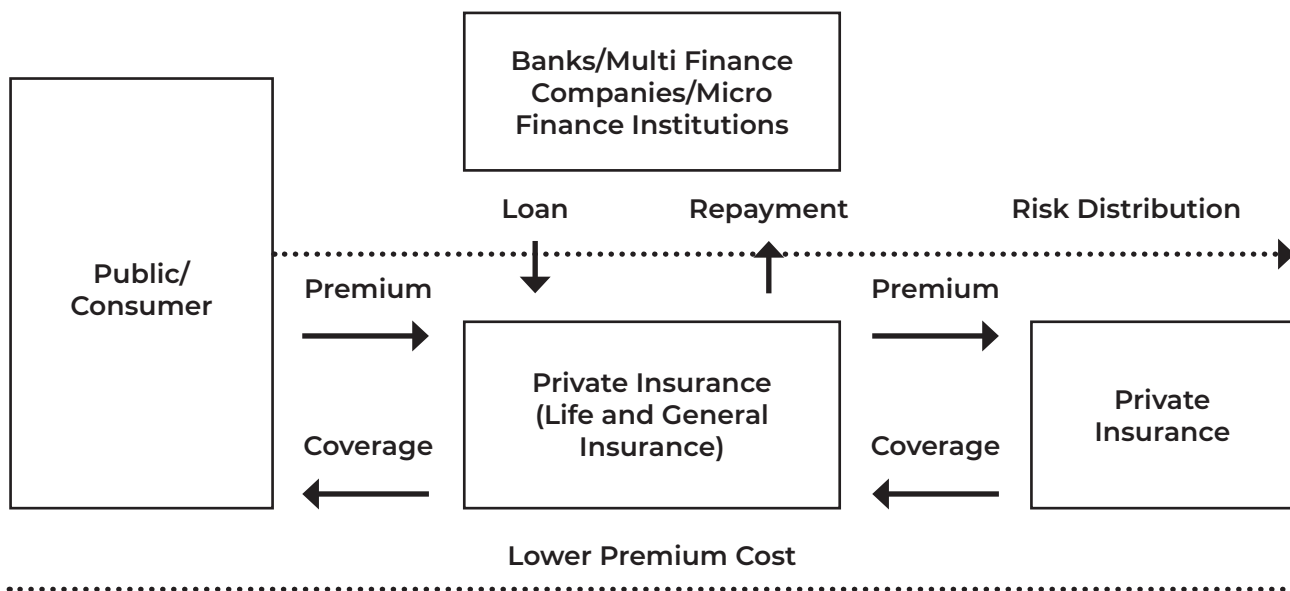
Currently, many insurance companies have issued several household natural disaster insurance products which are marketed as stand-alone products. Based on BPPDAN's annual reports for the last five years regarding disaster insurance policies, Java Island has the largest number of policyholders in Indonesia. This is due to higher public awareness around natural disasters than in other regions. However, other provinces with a high level of disaster risk do not have many policyholders, resulting in a gap between demand and supply of disaster insurance products in Indonesia. Despite the low insurance penetration, some MSMEs have been exposed to microinsurance where it is intended for low incomes entities hence, the insurance imposes lower premiums and insurance policies that are simpler than conventional insurance. OJK in collaboration with Indonesian General Insurance Association (AAUI), Indonesia Life Insurance Association (AAJI), and Indonesia Sharia Insurance Association (AASI) has formulated several microinsurance products, which include: (a) Micro Loss Insurance by AAUI (*Asuransi Mikro Warisanku*), *Rumahku Micro Insurance*, *Volcanic Eruption Microinsurance (Stop Usaha Erupsi)*, *Earthquake Micro Insurance (Stop Usaha Gempa Bumi)*; (b) Life Micro Insurance by AAJI (*Si Peci*); and (c) Sharia Micro Insurance by AASI.

## 2. Financing Gaps for National Insurance Program

As of 2019, only 2.96% of 64 million MSMEs in Indonesia have disaster insurance policies. The small percentage of insurance ownership raises questions about whether the current disaster insurance scheme is suitable for their needs as there may be overarching obstacles for MSMEs to purchase insurance. On the supply side, the formulation of natural disaster insurance for MSMEs is highly reliant on the profitability of the product, the potential market share from MSMEs, marketing approach and the adequacy of current government regulation.

Currently, Indonesia's state budget support is not yet sufficient to cover natural disasters and its economic loss. On average, between 2000 and 2017 there was a 75% gap between government disaster recovery budget and the total loss. This situation poses a risk for post-disaster economic recovery in the impacted region. It also creates a variety of risks to the financial institutions owning assets and loans. Indonesia needs a comprehensive high-level financing mechanism to address several challenges in financing disaster insurance. It needs to have the right scale to create an impact, reduces and distributes the risks in the financial sector, and finally be able to make it affordable for the consumers.

FIGURE 1 shows the current funding mechanism is mostly led by private insurance companies and private reinsurance companies. The insurance company can choose to obtain a bank loan to increase its equity. In this case, private insurance companies can freely manage the design of their products according to their financial capabilities and liquidity ratio. However, in the event of a major catastrophic event, the insurance company may not be able to obtain funds to settle customer claims, increasing the risk of insurance loss. This alternative also runs the risk of a higher premium price, making it less attractive to consumers.



**FIGURE 1**  
Funding Mechanism Based on Insurance Retention Fund

### 3. Regulatory Gaps

Indonesia has a regulation which governs the insurance industry. Law No.40 of 2014 regulates the establishment of an insurance company, the scope and operation of an insurance company which clearly states the position of the OJK as a regulatory and supervisory institution for the financial services sector, one of which is the insurance sector. The law also emphasizes that derivative provisions are needed in the form of Government Regulations related to insurance company legal entities and Financial Services Authority Regulations (POJK) to further regulate insurance products and the implementation of the insurance industry. Article 37 of Law no. 40/2014 explains that the Government and/or the Financial Services Authority, either independently or jointly, can take steps, one of which is to provide facilities for the establishment of an insurance pool or consortium for certain risks, for example the risk of natural disasters. On the other hand, Indonesian Law No.24/2007 on Disaster Management, article 60 of the law states that disaster management funds are a joint responsibility of central government and regional governments and community funding. The government then issued a Government Regulation no. 22 of 2008 on Disaster Aid Funding and Management as a derivative of Article 63 of Law no. 24 of 2007 which states that only funds from the state budget, regional budget and/or the community will fund disaster management costs.



However, both regulations have not clearly stated the existence of an insurance fund as an alternative for disaster management. The addition of the insurance fund clause will have implications in reducing the burden of utilizing the state budget for natural disaster management. Indonesia Fiscal Policy Agency (BKF) stated that the government only allocated an average of IDR3.1 trillion (USD219 million) between 2005 to 2017 of the state budgets as disaster reserve funds. This financing gap caused Indonesia to be exposed to high fiscal risks due to natural disasters. Hence, in 2018, BKF started to prepare financing and insurance schemes against disaster risk which includes the interest to establish a disaster pooling fund to strengthen the state budget.

### **III. Methodology**

#### **A. Data on Policies Numbers (BNPB & BPPDAN)**

The secondary data for this study was obtained from several sources such as the National Insurance Data Center Management Agency (BPPDAN), the National Disaster Management Agency (BNPB), the Indonesian Ministry of Small and Medium Enterprises, the Indonesian General Insurance Association (AAUI), and Financial Services Authority (OJK) publications. The secondary data presented in this paper represents micro and macro level data from 2015 to 2019 in the form of panels and cross sections.

#### **B. Data on MSMEs Preference (Survey Data)**

The primary data is obtained from the results of a survey to MSMEs. The survey was conducted to 503 respondents in 6 disaster-prone provinces: Aceh, West Java, East Java, West Nusa Tenggara, South Sulawesi, and Central Sulawesi<sup>1</sup>. The sample was selected from the list of MSMEs from the 6 provinces, and the number of respondents was further determined using the Slovin method with 5% margin of error.

#### **C. Econometrics Model and Methodology**

The analytical tools for this study consisted of statistical and econometric analysis. Statistical analysis is used to measure the performance of the insurance industry in Indonesia which explains the demographics and insurance market distribution. The econometric analysis used the Fixed Effects Panel Model to determine the factors that influence the number of

---

<sup>1</sup> These are 6 provinces deemed as disaster-prone areas by the BNPB.

disaster insurance policies in a province. The results of the analysis are then confirmed with the survey result using the Probit model in the form of MSME preferences for natural disaster insurance products for floods and earthquakes.

## 1. Model 1

The quantitative analysis is conducted using 3 models. The first model is using a Fixed Effects Panel Model to interpret disaster insurance policy in Indonesia and intended to look at factors affecting the number of insurance policies in each province.

$$Policy_{it} = \beta_1 + \beta_2 VarInsurance_{it} + \beta_3 VarDisaster_{it} + \beta_4 VarEconomy_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

Where,

Policy : number of insurance policy available

VarInsurance : number of claims, value of claims, loss ratio, premium, disaster zone characteristic

VarDisaster : *Dummy* variables for flood and earthquake

VarEconomy : year-on-year regional inflation

$\alpha_i + \varepsilon_{it}$  : *Error term*

## 2. Model 2

The second model is conducted using Probit Model assumption and used to look at factors affecting the consumer preferences in purchasing disaster insurance. The dependent variable is run against a set of variables which data is obtained through the survey.

$$Y = \beta_0 + \beta_1 Demographic_i + \beta_2 FinLiteration_i + \beta_3 FinAccess_i + \beta_4 Feature_i + \beta_5 Disaster_i + \beta_6 Incentives_i + \mu \quad (2)$$

Where,

Y : preference probability in purchasing disaster insurance

Demographic : respondents' demographic indicators

FinLiteration : respondents' financial literacy indicators

FinAccess : respondents' financial access indicators

Feature : disaster insurance features

Disaster : *Dummy* variables for flood and earthquake

Incentives : respondents' preferences indicators

$\mu$  : *error term*

### 3. Model 3

The third model is using Probit Model assumption and intended to look at factors affecting the consumers preference in owning disaster insurance in the future versus those customers who have already purchased disaster insurance. It uses the same structure as the second model, with a different dependent variable.

$$Y = \beta_0 + \beta_2 \text{Demographic}_i + \beta_3 \text{FinLiteration}_i + \beta_3 \text{FinAccess}_i + \beta_3 \text{Feature}_i + \beta_3 \text{Disaster}_i + \beta_3 \text{Incentives}_i + \mu \quad (3)$$

Where,

Y	: preference probability in owning disaster insurance
Demographic	: respondents' demographic indicators
LinLiteration	: respondents' financial literacy indicators
FinAccess	: respondents' financial access indicators
Feature	: disaster insurance features
Disaster	: <i>Dummy</i> variables for flood and earthquake
Incentives	: respondents' preferences indicators
$\mu$	: <i>error term</i>

## IV. Result and Discussion

TABLE 1

Model 1 Result: Determinants Factors for the Number of Policies

Number of policies (log)	OLS	FE	FE Robust
Constanta	-0.1962 (0,2190)	1.7244 (0.8672)	1.7244 (1.4754)
Value of premium (log)	0.9615*** (0.0307)	0.7885*** (0.0813)	0.7885*** (0.1371)
Number of claims	- 0,0001*** (0,0001)	0.0001** (0.0001)	0.0001** (0.0001)
Claim incurred (log)	0,0367* (0,0216)	0.0231*** (0.0082)	0.0231** (0.0089)
Loss of ratio (%)	0,0001 (0,0001)	0.0001 (0.0001)	0.0001 (0.0001)
Zona (1 for dangerous zone, 0 for non-dangerous zone)	-0,0557 (0,0577)	-0,0419* (0,0227)	-0,0419** (0,0181)
Inflasi Regional yoy (%)	-0,0005 (0,0161)	0.0010 (0.0058)	0.0010 (0.0036)
Flood	0,0021*** (0,0006)	-0.0004 (0.0003)	-0.0004 (0.0002)
Earthquake	-0.0348*** (0.0095)	0.0053 (0.0045)	0.0053 (0.0041)
Observation	161	161	161
R-squared	0,9730	0,9661	0.9661

Notes: \*, \*\*, \*\*\* indicates a significance level at the 10%, 5% and 1% levels

Our analysis using Model 1 shows that the number of insurance policies supplied or offered is positively affected by premium, number of claims, and value of claims emerged after the disaster occurred. However, natural disaster zoning is negatively affecting the number of insurance policies supplied.

It shows that for every 1 percent increase in premium, there could be an increase in the number of insurance policies by 0.78 percent in the region. This could indicate the willingness of the providers in the supply via more aggressive marketing.

There is a positive relationship between the number of claims and the number of insurance policies. An increase in the number of claims by one percent will increase the number of insurance policies by 0.0001 percent significantly. On the other hand, an increase in the value of claim by one percent will increase the number of insurance policies by 0.02 percent.

Higher number or claims and value of claims could also indicate the consumers' awareness and literacy towards insurance products. These results show that policy insurance holders with higher literacy rates and aware of their risks are most likely already have catastrophe insurance. These results only work at the individual level, but not at the regional level.

Interestingly, disaster zoning negatively affects several policies. This could indicate a high-risk perceived by the insurance providers hinders them from actively marketing the disaster insurance in the region marked as disaster prone. This information is particularly useful for policy makers in addressing the high-risk issue faced by the insurance provider as well as keeping affordability on the consumer side.

**TABLE 2**  
Model 2 Determinant Factors for MSMEs in Purchasing Disaster Insurance

Choose_to_buy	Coefficient	Choose_to_buy	Coefficient
Sex	-0.2277 (0.2298)	Damage_received_flood	6.2619** (2.6038)
Age	-0.0135 (0.0112)	Disaster_intensity_earthquake	-0.0317 (0.0436)
Monthly_income	0.0643 (0.1049)	Damage_received_earthquake	-0.2175 (0.8818)
Years_of_business	-0.0078 (0.0094)	Pref_premi_flood	0.1584 (0.3822)
Dummy_companys_sector	0.2594 (0.2289)	Pref_premi_mechanism	-0.2317 (0.2269)
Dummy_level_MSME	0.4372 (0.3656)	Pref_indemnity_flood	1.5628** (0.7071)

Notes: \*, \*\*, \*\*\* indicates a significance level at the 10%, 5% and 1% levels

Analysis using Model 2 found that disaster intensity, scale of damage, and indemnity preference are positively affecting consumers' probability in purchasing the disaster insurance.

In particular, the scale of damage from flood has high elasticity against the probability of purchasing insurance. A 1 percent increase in the scale of damage from flood will increase 6.26 percent of probability in purchasing disaster insurance. This is also aligned with finding from Model 1 where a 1 percent increase of preference in risk allocation in the insurance increases the probability of its purchase by 1.56 percent. This can also be interpreted as the disaster insurance which can accommodate higher insured value has higher probability to be purchased by the consumer.

About 53 percent of respondents of MSMEs stated their plan to purchase insurance in the future. The higher the level of MSME turnover value, the higher the percentage of MSMEs planning to purchase disaster insurance in the future. The reluctance of MSMEs to buy disaster insurance products indicates the low level of financial capacity to purchase natural disaster insurance.

The demographic distribution of respondents in terms of gender presents 32% of male respondents plan to buy disaster insurance products and 31% of male respondents do not plan to buy disaster insurance products. Meanwhile, 21% of female respondents choose to buy disaster insurance, while 16% of female respondents do not plan to buy natural disaster insurance. 70% of the survey respondents accounted for the 30-50 years old age range and they have an almost equal distribution of decisions to buy natural disaster insurance in the future. 37.5% of them choose to buy natural disaster insurance products in the future and 32.66% of them choose not to buy natural disaster insurance products in the future.

The business establishment age also determines the decision of the business owner to insure their business asset against natural disaster. Businesses which have been established for more than 2 years tend to choose to ensure their business on disaster insurance products when compared to new UMKM business units (less than 2 years).

In contrast to the findings above, the economic losses borne related to the disaster intensity affects people's preferences in purchasing natural disaster insurance in the future. Using the same data, the current model tries to find out what factors influence the community in having natural disaster insurance products today. From the three models above, it can be concluded

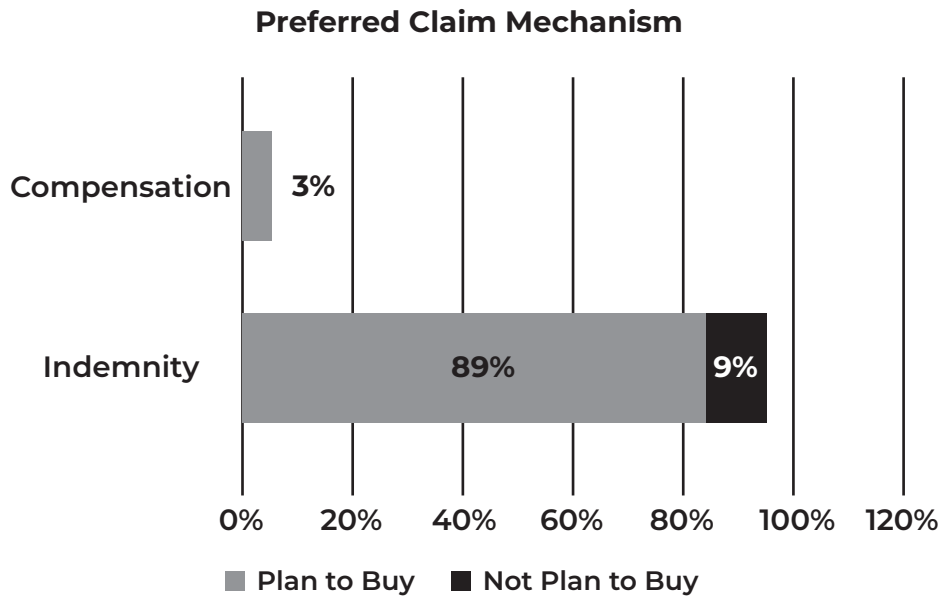
that there are many opportunities to promote and establish natural disaster insurance for low income and vulnerable groups who are willing to purchase natural disaster insurance.

**TABLE 3**  
Model 3 Determinant Factors of Owning and Purchasing Natural Disaster Insurance

Having_disaster_insurance	Coefficient	Having_disaster_insurance	Coefficient
Sex	0.04622** (0.2191)	Disaster_intensity_earthquake	-0.0620 (0.0417)
Age	-0.0142 (0.0104)	Damage_received_earthquake	-0.6963 (1.0233)
Monthly_income	0.1529* (0.0861)	Pref_premi_flood	0.4973 (0.4369)
Years_of_business	-0.0141 (0.0089)	Pref_indemnity_flood	-0.0881 (0.6006)
Dummy_companys_sector	0.4204* (0.2326)	Pref_%premi_flood_KPR	3.3695 (38.4410)
Having_KUR	-0.8200*** (0.3656)	Pref_premi_earthquake	0.2931 (0.4953)
Having_KPR	0.9714*** (0.2307)	Pref_indemnity_earthquake	1.0371* (0.6049)
Disaster_intensity_flood	-0.0447 (0.0818)	Pref_%premi_eathquake_KPR	30.7409 (134.3754))
Damage_received_flood	1.2588 (1.2007)	Constanta	- 16.5004*** (3.2345)

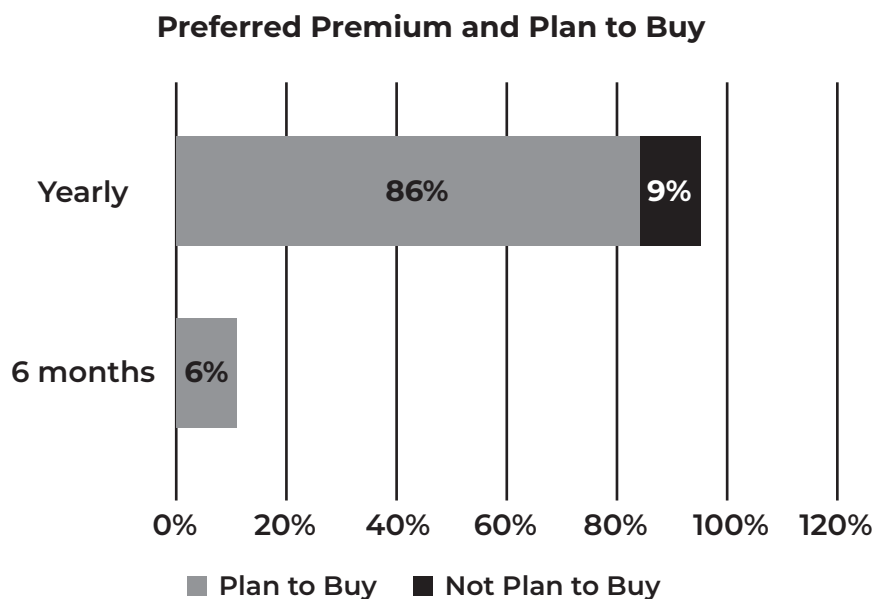
Notes: \*, \*\*, \*\*\* indicates a significance level at the 10%, 5% and 1% levels

From the result shown in Model 3, besides the desire to buy natural disaster insurance products, there are other indicators which influence the public in purchasing natural disaster insurance products, both floods and earthquakes. Those indicators were the types of insurance, insurance premiums, and insured losses. The analysis on model 3 can be interpreted where the access to finance such as income and credit ownership such as mortgage (KPR) and business loan (KUR) have a significant impact on the opportunities for the MSMEs to own natural disaster insurance. However, the intensity of natural disasters, both floods and earthquakes, does not have a significant impact on their preference of owning natural disaster insurance.



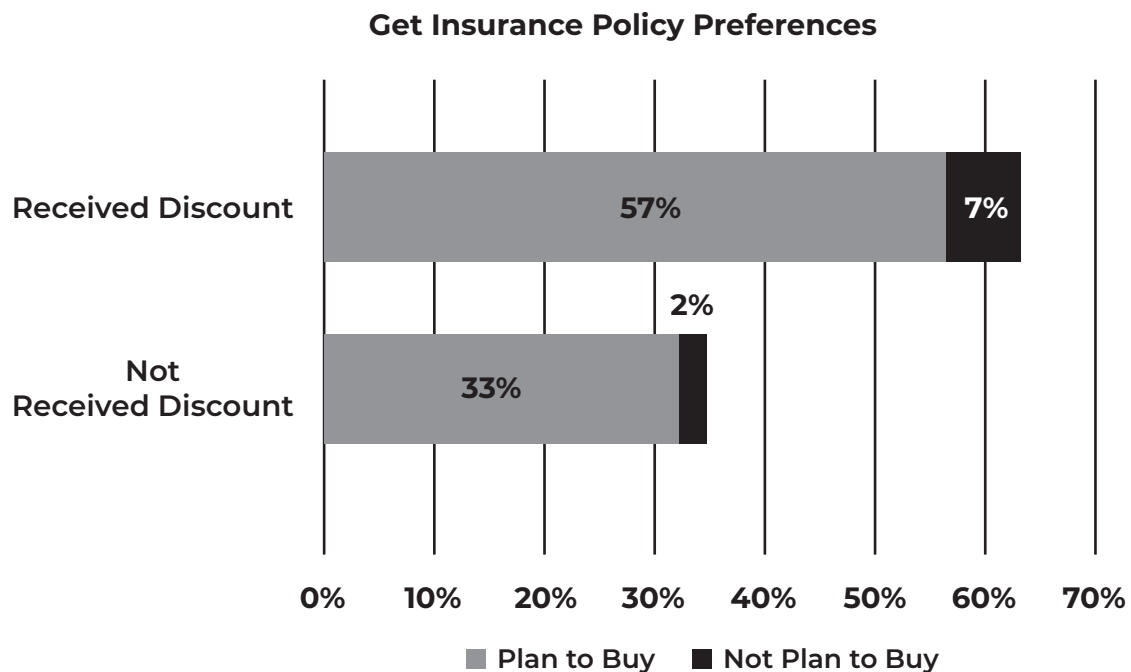
**FIGURE 2**  
Preferred Claim Mechanism

The result from FIGURE 2 shows that 89% of respondents prefer a preference for the type of claim mechanism in the form of indemnity and plan to buy disaster insurance in the future. However, 9% of respondents who choose the indemnity mechanism do not plan to buy disaster insurance in the future and 3% of respondents who choose the compensation claim mechanism entirely choose to buy disaster insurance products in the future.



**FIGURE 3**  
Preferred Premium Payment Mechanism

FIGURE 3 shows that 95% of respondents prefer the annual premium payment mechanism in which 86% of them choose to buy disaster insurance in the future. Additionally, 6% of the total respondents who choose the 6-monthly payment mechanism all plan to buy disaster insurance products in the future. Of the two types of disasters, both floods and earthquakes, most respondents choose disaster insurance premiums at a value of less than IDR500,000 (USD35) per year. This value is followed by the class above it, which is in the range of IDR500,000-IDR1,000,000 (USD35-71).



**FIGURE 4**  
Customers Experience on Insurance Discount Incentives

From the result in FIGURE 4, it is known that receiving an insurance discount will not affect the respondent's decision to purchase natural disaster insurance. This shows that 57% of the total respondents who receive a discount and 33% of the respondents who also do not receive a discount both choose to buy disaster insurance products in the future.

Based on the survey results on micro, small and medium enterprises, it was found that the greater the value of business turnover, the greater the preferred premium price. This can be caused by the increasing value of the insured's assets within the business. Most micro enterprises prefer low premium values over high premium values. However, this preference is the higher the value for small and medium-sized MSMEs. This result has accounted for both flood and earthquake insurance.



The higher the level of risk the customer has, the more likely it is that the customer willingness-to-pay increases in paying premiums (Born and Viscusi, 2006). This is due to the customer's desire to reduce the loss ratio in the event of a future disaster. The findings of Born and Viscusi (2006) are in line with the findings of the survey where the higher the turnover value of the customers, which indicates the higher the value of the insured's assets, the higher the willingness-to-pay of natural disaster insurance customers. By combining the public and private sectors, an insurance product can provide a premium value that is low enough to be reached by a wider community (Dewi and Sulistyani, 2015).

The appropriate marketing strategy also determines the success of the insurance company in marketing disaster insurance products. Insurance companies are also trying to take advantage of advances in information technology as their marketing channel. The result shows that of the total respondents surveyed, as many as 77% of respondents who already have disaster insurance purchase disaster insurance products through telemarketing channels, 13% of respondents buy through Financial Services Institutions (LJK), 8% through websites, and 3% buy through insurance agents. From a total of 77% of respondents who purchase through telemarketing, 72% of them plan to purchase disaster insurance in the future, and 3% do not plan to purchase disaster insurance in the future. As many as 56% of respondents obtain information about natural disaster insurance products through financial service institutions, 22% through print media, 8% through social media, 6% through agents, and followed by e-commerce and television with a percentage of 2% each. With a growing audience in the social media platform, the education about natural disaster insurance products through digital media can be a new approach in the future to be able to attract the younger generation.

## **V. Formulating alternatives for MSMEs Natural Disaster Insurance**

### **A. Insurance Features**

Insurance for MSMEs needs to prioritize in designing special insurance products that can be easily understood and have affordable premium prices. The government can regulate the insurance to be mandatory for all MSMEs which obtain bank loans or business saving accounts. According to a study by Wibowo, Deviana and Sunardjito (n.d.), it is recommended that the determination of insurance premiums be lower than the customer's willingness to pay.

The issuance of insurance products for MSMEs can use several methods. Firstly, partnership methods with banks and other financial institutions where banks and other microfinance providers can directly offer insurance policy from their partnered insurance company to their clients. Secondly, forming partnerships with various agents where insurance companies along with non-governmental organizations, retail partners and e-commerce partners collaboratively distribute natural disaster insurance products. Insurance companies will benefit from these agents by marketing their products through their adequate distribution network. This method can lower distribution costs and thereby increase affordability.

There are a few payment methods which can be adopted by insurance companies to accommodate all customers. First, an offline method where the payment of insurance premiums and receipt of claims can be carried out through insurance company agents, banks through ATMs or retail partners approved by the insurance company. This method can be intended to reach areas that are not yet covered by adequate communication channels. Second, a digital method where the payment of insurance premiums, reporting and receipt of claims is made through online platforms such as insurance company websites, mobile phone applications by insurance companies and through cooperation with e-commerce and e-banking media. This method can be beneficial in densely populated areas.

The claim mechanism for the disaster insurance program may involve cooperation with government agencies such as BNPB to reduce fraud or fraudulent claims by utilizing satellite images in. Satellite imagery can be used to compare and classify building damage in an objective manner based on the level of damage that has occurred previously. The local insurance company will be responsible for paying based on compensation claims to the insured individual based on a damage or loss assessment that refers to satellite image capture and evidence provided by the customers.

Insurance companies are required to develop cost-effective ways to reach their customer base, for example by partnering with local communities for community education programs, microfinance organizations, or other intermediaries and by leveraging technological developments such as increasing cell phone coverage for financial transactions. Insurance for MSMEs is faced with low levels of financial literacy in their target market. Low customer confidence tends to suppress demand significantly, as insurance companies themselves may find it difficult to convince clients that they will be able to make claim payments after a major disaster. The insurance company is responsible for clearly designing the product with simple rules,

affordable premium prices as well as easily accessible claim documentation. According to a study by Wibowo, Deviana and Sunardjito (n.d.), it is recommended that the determination of insurance premiums be lower than the customer's willingness to pay.

The issuance of insurance products for MSMEs can use several methods. Firstly, partnership methods with banks and other financial institutions where banks and other microfinance providers can directly offer insurance policy from their partnered insurance company to their clients. The government can regulate the insurance to be mandatory for all MSMEs which obtain bank loans or business saving accounts. Secondly, forming partnerships with various agents where insurance companies along with non-governmental organizations, retail partners and e-commerce partners collaboratively distribute natural disaster insurance products. Insurance companies will benefit from these agents by marketing their products through their adequate distribution network. This method can lower distribution costs and thereby increase affordability.

There are a few payment methods which can be adopted by insurance companies to accommodate all customers. First, an offline method where the payment of insurance premiums and receipt of claims can be carried out through insurance company agents, banks through ATMs or retail partners approved by the insurance company. This method can be intended to reach areas that are not yet covered by adequate communication channels. Second, a digital method where the payment of insurance premiums, reporting, and receipt of claims is made through online platforms such as insurance company websites, mobile phone applications by insurance companies and through cooperation with e-commerce and e-banking. This method can be beneficial in densely populated areas.

The claim mechanism for the disaster insurance program may involve cooperation with government agencies such as BNPB to reduce fraud or fraudulent claims by utilizing satellite images in. Satellite imagery can be used to compare and classify building damage in an objective manner based on the level of damage that has occurred previously. The local insurance company will be responsible for paying based on compensation claims to the insured individual based on a damage or loss assessment that refers to satellite image capture and evidence provided by the customers.

Insurance companies are required to develop cost-effective ways to reach their customer base, for example by partnering with local communities for community education programs, microfinance organizations, or other intermediaries and by leveraging technological developments such as

increasing cell phone coverage for financial transactions. Insurance for MSMEs is faced with low levels of financial literacy in their target market. Low customer confidence tends to suppress demand significantly, as insurance companies themselves may find it difficult to convince clients that they will be able to make claim payments after a major disaster. The insurance company is responsible for clearly designing the product with simple rules, as well as easily accessible claim documentation.

---

## MICRO ENTERPRISES

---

### PREMIUM :

- Monthly payment term due to irregular income flow
- Premiums can be paid in cash or deducted from your KUR/KPR or saving account
- The premium amount can range from IDR 20,00 - IDR 50,000 per year

### SCOPE :

- Limited to certain damage to carts & stalls
- Has a certain period or coverage

### COMPENSATION PAYMENT :

- Immediately
- Requires a little documentation
- Compensation can range from IDR 2,500,000 - IDR 5,000,000

### POLICY DOCUMENTATION :

- Simple and easy to understand

### PRODUCT DESIGN & CLAIM MECHANISM :

- Simple technical design
- Leveraging collaboration between technology and traditional claims payment methods to reach all layers
- Type of product : standalone or complement to other products or combinations such as bancassurance

### DISTRIBUTION CHANNEL :

- Non-traditional distribution channels to reduce transaction costs, such as through banking/microfinance/branchless banking, e-commerce and retail
  - Marketing : optimizing social media
- 

## FIGURE 5

### Framework Design for MSMEs Natural Disaster Insurance Features

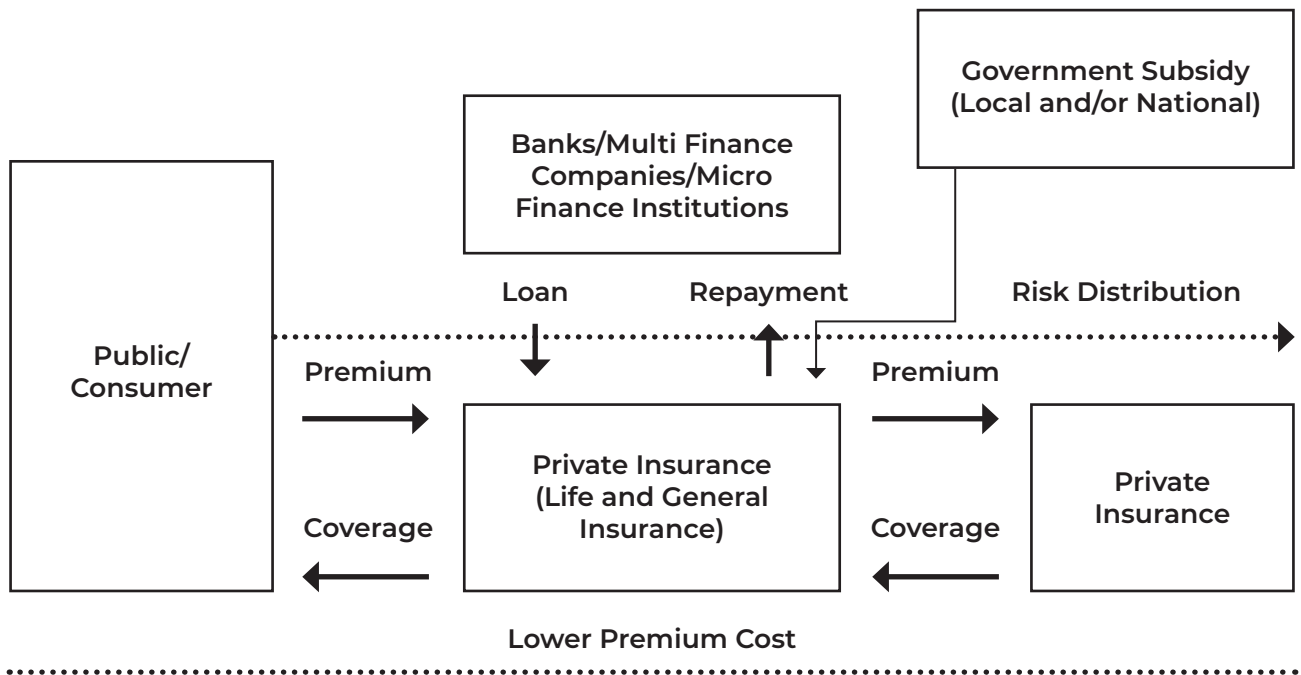
\*) Premium design and coverage values are obtained through a reference to Financial Services Authority Circular Letter Number 6 /SEOJK.05/2017 on Determination of Premium Rates or Contributions in Property and Motor Vehicle Insurance Business Lines 2017.

## B. Funding Alternatives

To minimize the financing gap of this program, there are 2 funding alternatives which could be implemented.

Under the mechanism shown in Figure 6, the government will initiate and lead a premium subsidy program for insurance companies. Subsidies

may only be channeled to private insurance companies that provide coverage for natural disasters. This funding mechanism can encourage the insurance industry to increase its disaster insurance portfolio (risk sharing and insurance company liquidity). Customers may benefit from a premium that is more affordable than the insurance company self-financing scheme. To streamline this funding mechanism, the government needs to allocate subsidies for natural disasters in the state budget (APBN).

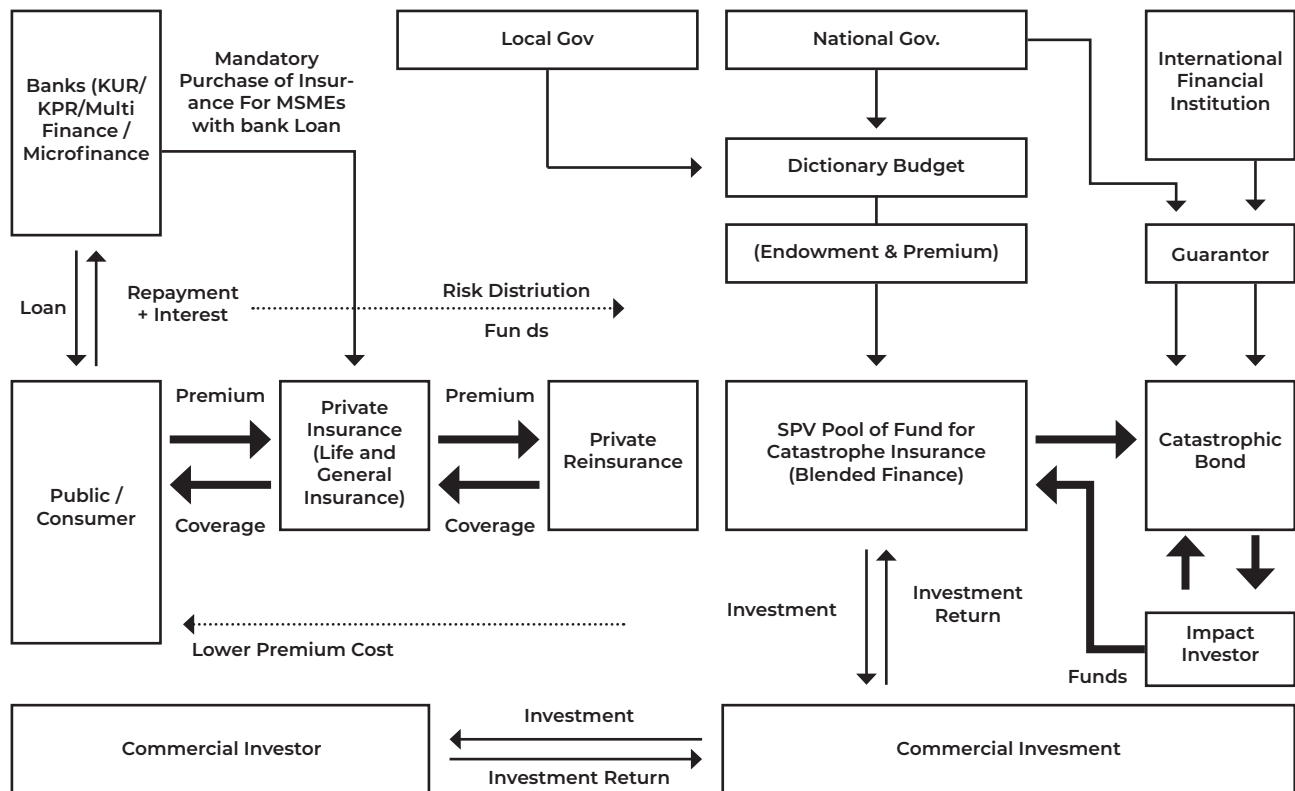


**FIGURE 6**  
Funding Mechanism through Insurance Retention and Government Subsidy

FIGURE 7 below presents a scheme where Indonesia's disaster insurance program could be in a form of cooperation between government and business entities through a Public Private Partnership (PPP) to assist its financing plan. Within the PPP, there are several components such as CAT bonds, subsidies, and public financing institutions as well as stakeholders such as reinsurance companies, commercial investors, and bond investors which need to be included to form a comprehensive funding scheme. In this alternative, an establishment for special purpose vehicles (SPV) will enable insurance companies and reinsurance to transfer risks and liability for compensation due to natural disaster to a capital market.

Within this scheme, the central and local governments will act as guarantors. Thus, a strong legal umbrella from the government is needed to regulate the management of funds in SPV and a means to increase the outreach and achieving the scale of funding. Moreover, if the government

decides to release CAT bonds within its budget plan, a modification towards Indonesia's fiscal regulation is needed to allow the issuance of CAT bonds in the domestic and international sphere (Arham and Firmansyah, 2019). The success in managing CAT Bonds shows that the government has proactively taken financial protection measures to manage natural disaster risks.



**FIGURE 7**  
Comprehensive Insurance Funding Mechanism

### C. Conclusion

From the research and analysis, it can be concluded that MSMEs are projected as a potential insurance market which has not been optimally explored. Even though there are financial limitations within MSMEs, there is an interest in buying a disaster insurance policy. The government can formulate a financial access mechanism which enables MSMEs to purchase disaster insurance with affordable premiums. In terms of the willingness to pay, while most respondents prefer premiums of up to IDR500,000 (USD35) per year (approximately IDR25,000-IDR50,000 (USD1.8-USD3.5) per month). There are respondents who are willing to pay more in line with the size of their assets. Factors which influence the preferences in purchasing disaster insurance includes financial capacity, the amount of premium, access to finance, preference for disaster risk compensation (claim value) and external

factors such as disaster intensity and impact of disaster damage. MSMEs which have access to bank loans (KUR) and mortgage (KPR), have a preference to purchase natural disaster insurance. In the effort to improve the demand of natural disaster insurance, insurance companies are currently still utilizing traditional marketing strategies such as direct marketing and collaboration with other financial service institutions. They have only just stepped into using marketing media that take advantage of advances in digital technology including e-commerce and the use of social media.

Insurance regulations in Indonesia have not fully encouraged the development of disaster insurance for MSMEs. Current regulations allow for disaster insurance products and disaster insurance products to exist but not in a uniform manner. OJK, insurance associations and the government have initiated the development of micro-disaster insurance, but it has not been properly implemented. The contributing factors include low claim value, relatively difficult and long claim procedures, and low public literacy.

There is the need for a Natural Disaster Insurance Act reformation as this is a multi-stakeholder program which requires large funding. To develop a comprehensive and adequate insurance program there is the need to establish a Disaster Insurance Pooling Funds. One of the additional funding components which can be explored by Indonesia is Catastrophe Bond. Catastrophe bonds are also an alternative financial investment.

To further increase the demand from MSMEs, this research provides several recommendations in terms of funding to make the insurance product affordable for MSMEs. One of the recommendations requires this program to be developed under PPP which involves government agencies, insurance companies, reinsurance companies, and donor agencies for a more adequate and affordable risk transfer. This is because the disaster insurance market requires major investments in infrastructure such as disaster risk models, disaster databases, product pricing designs, and regulations. Thus, a comprehensive disaster insurance funding scheme will be necessary where the government can act as an initiator, establish regulations, and form an SPV Pooling Fund. SPV targets to collect sufficient funds through commercial, non-commercial funds (grants, soft loans), global investors and philanthropists. Therefore, the premium price paid by MSMEs becomes more affordable and insurance companies can provide adequate claim value and increase the insurance market share for MSMEs.

Natural disaster insurance for MSMEs requires insurance policies which are easily understood and can be used as references for the insurance industry. It is necessary to create a disaster insurance policy that suits the needs and capabilities of MSMEs. Insurance features should provide the scope of the disaster, the amount of premium and the value of the claim, which is adjusted for the types of micro, small and medium business groups. This insurance policy standard is to be established by the OJK through involving the associations and the government in the process of its preparation.

There are several mechanisms to increase the demand for natural disaster insurance. Firstly, to reach higher customer coverage, insurance companies are increasingly using digital information technology including e-commerce and social media as part of their marketing strategy. Secondly, OJK, insurance associations and the government are recommended to use digital information technology to educate MSMEs about the purpose and the benefit of natural disaster insurance. Lastly, the government may resort to setting a mandatory requirement for MSMEs to purchase natural disaster insurance through bank loans or savings accounts.

Apart from the aforementioned efforts, this study also recommends conducting a pilot project before the proposed program is implemented nationally. Further study is also needed to be extended into evaluating demands of other types of disasters such as pandemics.



## REFERENCES

- American Institutes for Research. (2005). *A Chronology of Major Events Affecting the National Flood Insurance Program*. American Institutes for Research.
- Arham, A., and Firmansyah, A. (2019). Catastrophe Bond Sebagai Instrumen Pembiayaan Pemerintah Dalam Penanggulangan Bencana Alam Di Indonesia. *Indonesian Treasury Review Jurnal Perbendaharaan Keuangan Negara Dan Kebijakan Publik*, 4(4), 339-349. <https://doi.org/10.33105/itrev.v4i4.145>
- Asian Development Bank. (2018). *Philippine City Disaster Insurance Pool*. Metro Manila: Asian Development Bank.
- Badan Nasional Penanggulangan Bencana (BNPB). (2016). *Risiko Bencana Indonesia*. Badan Nasional Penanggulangan Bencana (BNPB). [http://inarisk.bnpb.go.id/pdf/Buku%20RBI\\_Final\\_low.pdf](http://inarisk.bnpb.go.id/pdf/Buku%20RBI_Final_low.pdf)
- Badan Pengelola Pusat Data Asuransi Nasional (BPPDAN). (2019). *Statistik Asuransi Kebakaran Indonesia*. Badan Pengelola Pusat Data Asuransi Nasional (BPPDAN).
- Born, P., and Viscusi, W. (2006). The catastrophic effects of natural disasters on insurance markets. *Journal of Risk and Uncertainty*, 33(1-2), 55-72. <https://doi.org/10.1007/s11166-006-0171-z>
- Dewi, M., and Sulistyani, D. (2015). Perbandingan Premi Asuransi Kesehatan Peserta Bpjs Badan Usaha Dengan Asuransi Kesehatan Swasta. *Jurnal Aakuntansi dan Pajak*, 16(01), 33-47. <https://doi.org/10.29040/jap.v16i01.20>
- General Insurance Rating Organization of Japan (GIROJ). (2014). *Earthquake Insurance in Japan*. General Insurance Rating Organization of Japan (GIROJ).
- Global Facility for Disaster Reduction and Recovery (GFDRR). (2012). *Knowledge Note 6-2 Cluster 6: The Economics of Disaster Risk, Risk Management, And Risk Financing. Earthquake Risk Insurance*. Global Facility for Disaster Reduction and Recovery (GFDRR).
- He, Q., and Faure, M. (2017). Regulation by Catastrophe Insurance for Climate Risks: A Comparative Study. *SSRN Electronic Journal*, 24(2), 189-243. <https://doi.org/10.2139/ssrn.3089498>
- Otoritas Jasa Keuangan (OJK). (2020). *Statistik Asuransi Desember 2019*. Retrieved from—<https://www.ojk.go.id/id/kanal/iknb/data-dan-statistik/asuransi/Pages/Statistik-Asuransi-Desember-2019.aspx>
- Otoritas Jasa Keuangan (OJK). (2020). *Statistik Perasuransian (Insurance Statistics) 2019*. <https://www.ojk.go.id/id/kanal/iknb/data-dan-statistik/asuransi/Documents/Pages/Statistik-Perasuransian-2019/Statistik%20Perasuransian%20Indonesia%20Tahun%202019.pdf>

- Wibowo, A., and Deviana, F. (n.d). *Estimasi Kesiediaan Membayar Premi Asuransi Gempa Mikro: Survei Contingent Valuation*. 3, 63-74. [https://www.academia.edu/2019388/Estimating\\_Willingness\\_to\\_Pay\\_EQ\\_Microinsurance\\_Premium\\_Contingent\\_Valuation\\_Approach\\_in\\_Bahasa\\_Indonesia](https://www.academia.edu/2019388/Estimating_Willingness_to_Pay_EQ_Microinsurance_Premium_Contingent_Valuation_Approach_in_Bahasa_Indonesia)
- Willis Thailand. (2012). Thailand's New Government Insurance Responds to Flood Loss. *Willis International Alert*, (58).
- World Bank. (2006). *Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters*. <https://openknowledge.worldbank.org/handle/10986/7001>
- World Bank. (2012). *Mexico's Natural Disaster Fund – A Review*.
- World Bank. (2019). *The Philippines: Transferring the Cost of Severe Natural Disasters to Capital Markets*



Copyright (c) 2023 The International Journal of Financial Systems. This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License (<https://creativecommons.org/licenses/by-nc/4.0/>). IJFS article's license is CC-BY-NC. Authors grant the journal/publisher publishing rights with the work simultaneously licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.