



# **IMPROVEMENT OF THE JAPANESE EARTHQUAKE INSURANCE SYSTEM ENHANCING EARLY HOUSING RECONSTRUCTION BY COMPENSATING HOME MORTGAGE BALANCE: COMPARISON OF SYSTEM BETWEEN JAPAN, NEW ZEALAND AND TURKEY**

Aya OKUMI<sup>1</sup>, Harumi YASHIRO<sup>2</sup> and Yoshiaki KAWATA<sup>3</sup>

## **ABSTRACT**

Housing reconstruction of disaster damaged people whose houses are collapsed by earthquake disaster and left with home mortgage payment becomes recognized as a serious problem in Japan. Although there are a few support measures for disaster victims' home mortgage problems are implemented by the government such as subsidizing mortgage interest and leniency policy for disaster victims' home mortgage, both of them are not directly related to support fundamental housing reconstruction by the affected households' self-reliant efforts due to the lack of dissemination and financial reliableness. In this study, a new framework of compulsory earthquake insurance system focusing on households with home mortgage payment to enhance early housing reconstruction is proposed.

## **INTRODUCTION**

The occurrence of large-scale earthquakes causes immense damage to life and property and afflict disaster-affected victims, communities and government for years. In the phase of recovery and reconstruction, livelihood rehabilitation and housing reconstruction are the most important and difficult task to achieve. Therefore, prompt and efficient efforts to pursue post-earthquake early housing reconstruction has always been a major issue.

Based on the data on 'Top 10 most important earthquake disasters for the period 1900-2014 sorted by economic damage costs at the country level' by the International Disaster Database (CRED EM-DAT), three out of ten earthquakes occurred in Japan and its economic impact was about US\$338 billion. The rest of countries that had a negative impact on the economy by earthquake disasters are as

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<sup>1</sup> Doctoral student, Graduate School of Safety Science, Kansai University, Osaka, k738178@kansai-u.ac.jp

<sup>2</sup> Professor Ph.D., Dept. of Civil & Environmental Engineering, National Defense Academy, Yokosuka, Kanagawa, hyashiro@nda.ac.jp

<sup>3</sup> Professor Ph.D., Faculty of Safety Science, Kansai University, Osaka, ykawata@kansai-u.ac.jp

follows: China (US\$85 billion), Italy (US\$35.8 billion), USA (US\$30 billion), Chile (US\$30 billion), Turkey (US\$20 billion), and New Zealand (US\$15 billion).

Among the earthquake prone countries including Japan, New Zealand and Turkey established earthquake insurance program to mitigate the possible financial burdens on the government and to promote residents' self-reliant efforts to rebuild houses destroyed in earthquakes. In this study, improvement of the Japanese earthquake insurance system to enhance early housing reconstruction is suggested by comparing other countries' earthquake insurance system.

## COMPARISON OF EARTHQUAKE INSURANCE SYSTEM BETWEEN JAPAN, NEW ZEALAND (EQC) AND TURKEY (TCIP)

As shown in Table 1, earthquake insurance in Japan is not compulsory program whereas the economic impact by earthquakes is higher than any other countries. On the other hand, compulsory earthquake insurance is implemented in New Zealand and Turkey where their economic impact by earthquakes is not as serious as Japan.

Table1. An overview of earthquake insurance system in Japan, New Zealand and Turkey

	Japan	New Zealand	Turkey
Year created	1966	1993-EQC (Replacement of the Earthquake & War Damage Commission-1944)	1999
Responsible entities	- Private non-life insurers - Japan Earthquake Reinsurance - government	-EQC (Earthquake Commission)	-TCIP (Turkish Catastrophe Insurance Pool)
Government involvement & its role	Reinsurance (90% of liability)	Guarantee to EQC	Guarantee to TCIP
Total claims-paying capacity (PML)	US\$71 billion /earthquake (as of 2014)	US\$4 billion (as of 2006)	US\$3.3 billion (as of 2011)
Availability of stand-alone insurance purchase	NO Optional endorsement to fire insurance policies	NO Compulsory endorsement to fire insurance policies	YES Stand-alone product
Compulsory or Voluntary enrolment	<b>Voluntary enrolment</b>	<b>Compulsory</b>	<b>Compulsory for disaster prone areas</b>
Premium rate	0.05%~0.31% & Discount system (long-term contract and seismic resistance diagnosis)	0.15% across the board + GST & Replacement value basis No discount program	0.44~5.50%
Annual premium & ave. amount of insurance	US\$193, US\$86,000 (Homeowner on average)	Maximum payable premium US\$46 (as of 2002)	US\$62 US\$40,000 (as of 2007) (Homeowner on average)
Extent of coverage	30~50% of fire insurance amount with limits	100% (Replacement basis)	-
Insurance pay-out limit	Dwelling : US\$505,000 Household article: US\$101,000	Dwelling : US\$90,000 Household article: US\$18,000 deductible:1% *land: 10% deductible	US\$92,000 per policy *2% deductible (as of Jan. 1 2009)
Ave. pay-out per claim	US\$16,029 (the year of the Great East Japan Earthquake)	US\$8,187 (the year of the 2011 Christchurch Earthquake)	US\$3,340 (the year of the 2011 Christchurch Earthquake)
Penetration	<b>27.1%</b>	<b>90%</b>	<b>23% country-wide</b> <b>40% disaster prone areas</b>

In every post-earthquake disaster reconstruction phase, there is a large amount of public funds being poured into public disaster restoration housing that place an enormous financial burden on the government. For example, in the case of the Great Hanshin-Awaji Earthquake (1995), about US\$171 billion was poured to the reconstruction project, of which about US\$8.51 billion (5.05%) was spent on the new public disaster restoration housing (# of 42,911 houses). And in terms psychophysical burden of the disaster-affected households planning to move into the public disaster restoration housing, they need to continue living in a 29.7-square-meter temporary housing for a long period of time so that their daily life will be restricted in many aspects because the earliest move-in day started from 12 months and the latest move-in day ended 48 months after the earthquake. Considering the impact of such burden on the disaster-affected households, institutionalizing nationwide compulsory earthquake insurance program that has great possibilities of leading the affected households to reconstruct the houses by themselves in the early stage is the most appropriate measures to pursue early housing reconstruction like New Zealand.

Similar to Japan, New Zealand lies on a circular line of activity around the Ring of Fire, and the country experiences periodic volcanos and earthquakes over a period of time. As a result, a comprehensive and compulsory disaster insurance scheme for private property has been practiced in New Zealand. However, as long as there are many regions like Chugoku region (the western part of the island of Honshu) and Kyushu region (the southwestern island) where earthquake risk is extremely-low in Japan, it is not possible to institutionalize compulsory earthquake insurance throughout the country because making the insurance system compulsory involves social public aspect. And it is not easy to find national consensus on this like National Health Insurance and compulsory automobile liability insurance.

Therefore, as stated above, since some regions do not have high earthquake risk, partial compulsory insurance program like TCIP (Turkey) limited to (1) dwellings constructed on real estate which are registered at the Land Registry Office and subject to private ownership, (2) independent sections which are situated within building used as workplace and office and (3) dwellings either constructed by the state due to natural disaster or built with the credit provided by the government should be considered and adopted into the improvement of earthquake insurance system to ensure early housing reconstruction. However, the characteristics of earthquake insurance enrollment in Japan is optional endorsement to residential fire insurance and not stand-alone policy like Turkey in the first place. Besides, residential fire insurance is not compulsory in Japan like New Zealand. So, there will be concern over the decline in main policy of residential fire insurance penetration due to the rise of the entire premium (residential fire insurance premium and earthquake insurance premium). Additionally, considering the fact that there is an endless number of undiscovered earthquake faults in Japan, specifying certain district as earthquake hazardous area is not easy task to accomplish in terms of seismic geological features. Therefore, in an effort to improve earthquake insurance system in Japan, it is desirable to institutionalize earthquake insurance compulsory to potentially improvable uninsured households with mortgage payment.

## **NEW FRAMEWORK OF EARTHQUAKE INSURANCE SYTEM FOR ALL HOUSEHOLDS WITH MORTGAGE PAYMENT**

### **(1) Background**

It has been said that the entire Japanese archipelago has entered a period of brisk seismic activity since the Great Hanshin-Awaji Earthquake in 1995. Under the influence, there were 25 earthquakes that cause damage to dwelling houses between 1996 and 2013 including the Great East Japan Earthquake. According to the Seismic Hazard Assessment Long-term Evaluation 2014 issued by the Headquarters for Earthquake Research Promotion in Japan, there are about 14 earthquakes of magnitude 7 (Mj) and above with the occurrence probability of 50% and above within 30 years in Japan including Tokyo Metropolitan Earthquake and Tokai, Tonankai and Nankai Earthquake. Since many of them will occur around urban areas with large capital and population concentration, significant losses and long-lasting adverse impact caused by direct cost for recovery and reconstruction on both social and economic sectors will be easily anticipated.

In the phase of recovery and reconstruction, livelihood rehabilitation and housing reconstruction for disaster victims are the most crucial and difficult task to achieve. Therefore, prompt and efficient efforts to pursue early housing reconstruction always become a major issue. However, progression of housing reconstruction has been slowed after each huge earthquake disasters occurred. The delay in housing reconstruction arises from various reasons such as (1) difficulties in procuring acres of public disaster restoration housings' site in a short period, (2) difficulties in securing sudden demand for building materials and human resources and (3) difficulties in supporting the increased number of disaster-affected people who are unable to achieve housing reconstruction by themselves due to insufficient capital (elderly households and households with mortgage payments on their collapsed houses) in densely inhabited earthquake hazardous urban area. The problems of procuring public disaster restoration housings' site and securing building materials and human resources can be greatly improved by reducing the number of disaster victims' moving-into public disaster restoration housings.

In here, with a perspective of achieving post-earthquake early housing reconstruction, means of strengthening self-reliant efforts of potentially improvable uninsured households with mortgage payment to rebuild their houses in preparation against a future possible earthquake disaster is discussed. And as a practical proposition, possibility of improving vulnerability against earthquake disaster and post-earthquake housing reconstruction by self-reliant efforts of uninsured households with mortgage payment is made.

## (2) Cost of housing reconstruction and the current post-earthquake supporting system in Japan

In Japan today, up to a maximum of US\$30,300 will be paid to disaster-affected households whose houses are completely collapsed by the Disaster Victims Livelihood Recovery Support System under the Act on Support for Livelihood Recovery of Disaster Victims enacted in 1998. Besides the government aid, some additional support from charitable organizations like Japanese Red Cross Society and Central Community Chest of Japan can be expected. However, the support from charitable organizations is not always stable and it is not desirable to place greater reliance on it. For example, about US\$4,000 in a time of the Great Hanshin-Awaji Earthquake and US\$21,000 in a time of the Niigataken Chuetsu-oki Earthquake were paid to each household. Usually, the bigger the impact of earthquake disaster is, the lesser amount of charity support each affected household can receive. According to Japan Finance Housing Agency, the average floor area of house in Japan is about 138.2m<sup>2</sup> and its building cost is about US\$250,000. Therefore, as the current system shows, the total amount of these support is far short of the average cost of rebuilding housing.

In consideration of various supports extended to the affected households by the government and charitable organizations and the average amount of available savings for housing reconstruction (US\$20,200 ~ US\$50,500) in a time of the Great East Japan Earthquake, about US\$82,000 ~ US\$112,000 will be on the affected households' hand. However, the amount only covers about 25% ~ 50% of the average housing reconstruction cost. This burden can be drastically alleviated if each household purchases some kind of insurance with earthquake coverage.

Table 2. Comparison of total amount of support, insurance and available savings for reconstruction  
(Case of completely collapsed house in Sendai City in a time of the Great East Japan Earthquake)

Earthquake Insurance	with coverage	without coverage
Average house:		
Size & building cost	138.2m <sup>2</sup> / US\$1,809 (per m <sup>2</sup> ) → US\$250,000	
Public and charitable support and available savings for rebuilding:		
Disaster Victims Livelihood Recovery Support System	US\$30,300 at most	
Housing Reconstruction Support System	US\$20,200 at most	
Charitable support	US\$11,000	
Average available savings for rebuilding	US\$20,200 ~ US\$50,500	
Earthquake Insurance:		
	with coverage	without coverage
Average amount of insurance payout	US\$91,000	¥0
<b>TOTAL</b>	<b>US\$172,000 ~ US\$202,000</b>	<b>US\$82,000 ~ US\$112,000</b>

As shown in Table 2, housing reconstruction is greatly influenced by the presence or absence of earthquake insurance. Being insured, more choices like when and where to rebuild a house will be given to the affected households while living in temporary housing. Furthermore, taking the average amount of housing debt in each households (US\$159,000) into consideration, earthquake insurance is indispensable tool for uninsured households with mortgage payment to avoid double- or multiple-debts.

Besides the grant support, there are a few indirect relief support measures for the affected households such as subsidizing mortgage interest implemented in a time of the Great Hanshin-Awaji Earthquake in 1995 and leniency policy for disaster victims' mortgage and subsidizing mortgage interest implemented in a time of the Great East Japan Earthquake in 2011 by the government. After the Great Hanshin-Awaji Earthquake, the support of subsidizing mortgage interest becomes standard support. However, since there are many affected households who need to meet a mortgage payment of collapsed house and take out further loan for housing reconstruction, the limited support like subsidizing mortgage interest does not lead to a fundamental solution. Based on the weakness of the support, debt-relief guideline of leniency policy for disaster victims' mortgage were implemented. This support is to facilitate the process of debt workout for individual households who cannot repay existing mortgage. By utilizing this support, the affected households can keep up to US\$505,000 in addition to the total amount of post-earthquake related support from the government and charitable organizations. However, the number of applicant remained small due to (1) a lack of dissemination, (2) its strict eligibility criteria and may not always be available, (3) concern about possibility of ruining a long-held relationship with local financial institutions by applying the system and (4) interim measures limited for the Great East Japan Earthquake victims. Based on these causes, both of them cannot be considered as a permanent fundamental housing reconstruction support that strengthen the self-reliant efforts of the affected households.

Finally, other than direct (grant) and indirect (relief system) support, in-kind support of post-earthquake public disaster restoration housings from the government is implemented for the affected households who cannot achieve housing reconstruction by themselves. In the case of the Great Hanshin-Awaji Earthquake, about 42,911 new public disaster restoration housings were provided, and its move-in day started from 12 months at the earliest and 48 months at the latest after the earthquake. All the affected households planning to move into the public disaster restoration housings need to continue living in a temporary housing for a long period of time. Considering the physiological burden, it is advisable for those who have slight possibility like uninsured households with mortgage payment to reconstruct their houses by purchasing earthquake insurance policy in order to secure an alternative to plan their housing reconstruction. Furthermore, assuming that all households with mortgage payment obtained earthquake insurance and managed to reconstruct their houses by themselves without depending on the public disaster restoration housings during the Great Hanshin-Awaji Earthquake for instance, approximately US\$330 million would not have been poured into the public disaster restoration housings construction project.

Based on these measures taken by the only prefecture that experienced large-scale urban-type earthquake disaster after the Great Kanto Earthquake of 1923, preparation against earthquake disaster by purchasing insurance policy with earthquake coverage is crucial in order to achieve early housing reconstruction. However, about 70 % of households are still uninsured and may create a significant fiscal burden for the government when a large-scale earthquake strikes. When it comes to households with mortgage payment, about 40% of them are not insured and have a high possibility to possess double- or multiple-debt problem. Furthermore, the vulnerability and importance of uninsured households also can be explained in terms of the outstanding balance of home mortgage in Japan. The total amount of outstanding housing loan in Japan is about US\$1.8 trillion, of which US\$71 billion are uninsured and vulnerable to preventable earthquake risk. Therefore, from the standpoint of improving early housing reconstruction of uninsured households and protecting uninsured outstanding housing loan, some countermeasures against uninsured households should be considered not only by financial institutions but also administrative authorities.

### (3) The current trends and issues of earthquake insurance in Japan

Even after the Great East Japan Earthquake in 2011, penetration of earthquake insurance does not dramatically-improved. The national average penetration rate is 27.1%. Since earthquake

insurance is managed by both government and the non-life insurance companies, the insurance claim total payment limit to be paid due to a single earthquake has carefully-reviewed, and the limit has been set at US\$71 billion at the end of May 2014 in consideration of the imminent risk of large-scale earthquakes like Tokyo Metropolitan Earthquake and Tokai, Tonankai and Nankai Earthquake. Therefore, as far as households take out earthquake insurance policy, contractual payouts should be secured unless unexpected large-scale earthquake strikes. Soon after the Great East Japan Earthquake, earthquake insurance has paid approximately US\$12.5 billion for approximately 760,000 policies in an effort of encouraging the affected policyholders' early housing reconstruction. As shown in table 2, the average amount of earthquake insurance payout for completely collapsed house is about US\$91,000, and the contributory effect of earthquake insurance on housing reconstruction of self-reliant efforts of the affected policyholders has been adequately-proven. Thus, institutionalizing earthquake insurance compulsory to all households nationwide seems to be the most appropriate measures. However, as mentioned in the previous chapter, it is not possible to involve social public aspect into it due to structural geological features of Japan. Therefore, in order to achieve more insured households, improvement of earthquake insurance system is necessary.

Unlike earthquake insurance, penetration rate of fire insurance is about 60%. This is due to the different conventional practice when applying for a mortgage between fire and earthquake insurance. Purchasing fire insurance is not enforced by law, but it has been a de-facto compulsory rule set by financial institutions. The probability of being affected by fire is 1.9% in 30 years whereas the probability of earthquake of the Japanese seismic intensity of 6 occurrence is about 60~70% (Tonankai Earthquake), 70% (Tokyo Metropolitan Earthquake) and 50~60% (Nankai Earthquake). Compulsory fire insurance when applying for home mortgage is simply because a fire can occur anywhere and the number of occurrence is constant every year so that all households comply without question. This indicates that the theoretical event probability does not affect the judgment of compulsory fire insurance. In other words, no regard is given to the objective earthquake-hazard cognition for both financial institutions and households. Or both of them might be misinterpreted that houses constructed after the amendment of Building Standard Act in 1981 are seismic resistant structure and have resistance to seismic shaking. Those houses may have strong resistance to horizontally-shake, however, they may not have the same strong resistance to vertical-shake and brunt of tsunami. Since the imminent threat of large-scale earthquake occurrence is forecasted within 30 years, efforts in disseminating the correct information about earthquake-hazard and its impact on houses should be even more encouraged in order to increase more insured households with mortgage payment. Or considering all the various means to improve earthquake insurance penetration such as institutionalizing compulsory earthquake insurance for all households with mortgage payment should be given.

There are other reasons why the penetration rate of earthquake insurance policy does not improve. According to the previous survey or opinion polls about attitude toward earthquake insurance conducted by the Cabinet Office and General Insurance Rating Organization of Japan, there are two main reasons preventing households from taking out earthquake insurance. The first reason is its high premium. The second reason is its inadequate insurance coverage for complete housing reconstruction. However, the premium rate of earthquake insurance will be raised by 15.5% at average all around in Japan from July, 2014, and this measures may cause further shift away from earthquake insurance.

#### (4) Intention survey on earthquake insurance

For the purpose of initiating a drastic proposal of improving earthquake insurance system and achieving higher penetration rate, a deeper understanding of real-life problems in earthquake insurance is essential. As a means of exploring the main reasons (high premium and insufficient insurance coverage) of preventing households from purchasing earthquake insurance policy, further intention survey to propose a new earthquake insurance framework was conducted among the graduates of Kansai University (See Table 3). By selecting the graduates of Kansai University who are considered to have relatively-high disaster consciousness and cognitional capacity regarding the further institutional improvement of earthquake insurance system, more practical question such as 'institutionalizing earthquake insurance compulsory to all households with mortgage payment' to confirm the intention of questionee could be successfully made. However, in terms of some survey

results, due to the academic background of the questionees, there is undeniable sense that the results may be biased. Therefore, since many of the disaster affected households who have difficulties in rebuilding houses by themselves are concentrated in elderly citizens and low income class households, the results relating to insurance premium should be interpreted downwardly.

Table 3. Intention survey on earthquake insurance (n=244)

	Insured	Uninsured
Factors affecting dissatisfaction	Insufficient coverage	High Premium
Current insurance premium for US\$101,000 coverage	US\$202 (0.2%)	-
Preferred coverage	100% Replacement cost	100% Replacement Cost
Preferred insurance premium for US\$101,000 coverage	US\$202 (0.20%)	US\$101 (0.10%)
In favor of institutionalizing earthquake insurance compulsory for all households with mortgage payment	31.97%	29.92%
	<b>TOTAL: 61.89%</b>	

As shown in Table 3, different intention appears between insured/uninsured households. Main factor of dissatisfaction among insured households is its insufficient coverage, whereas high premium is the main factor of preventing households from purchasing earthquake insurance policy. Under the current system, the coverage is available at policy limits of 30%~50% of fire insurance limit, with maximum limits of US\$505,000 per dwelling and US\$101,000 for personal property. However, both insured and uninsured households prefer its coverage to be 100% replacement cost. And their preferred maximum limits of premium compensating 100% replacement cost is US\$202/year for US\$101,000 coverage for insured households, whereas US\$101/year for uninsured households.

As stipulated in the Act for Earthquake Insurance, earthquake insurance is aiming to contribute for rebuilding the disaster victims' stability of a life. Thus, exploring the possibilities of improving the current coverage is difficult. Furthermore, assuming that the amendment of the Act is enacted to allow the coverage enhancement, it is still not easy to achieve the coverage improvement due to the current premium rate. The earthquake insurance premium is set between US\$66/year ~ US\$329/year for US\$101,000 coverage. Since the actual average premium of each policyholder is not disclosed by General Insurance Rating Organization of Japan, provisional calculations of average premium on each policyholder was made as follows:

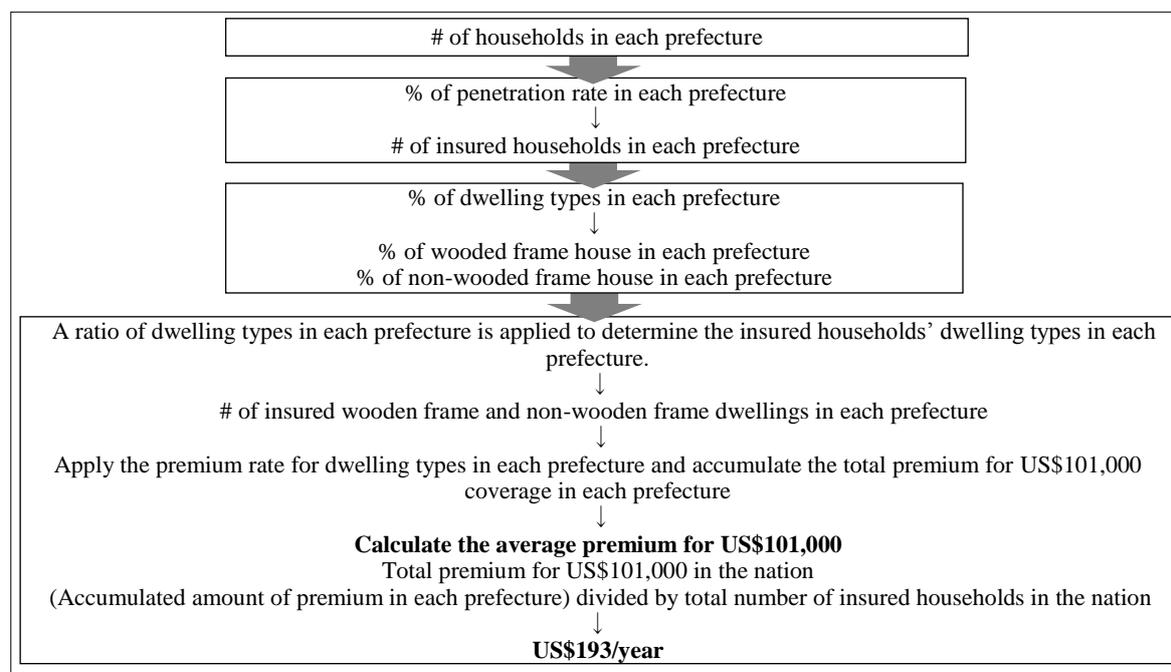


Figure 1. Calculation flow of average earthquake insurance premium for US\$101,000 coverage by using the current earthquake premium rate and penetration rate **by actual average premium of each policyholder**

Based on the calculation, the earthquake insurance average premium is US\$193/year (see Figure1 ) for US\$101,000 coverage, whereas the questionee’ preferred premium is US\$101~US\$202. This indicates that expanding insurance coverage is not achievable with the current premium rate unless the entire premium rate to be reviewed in more risk-based segmentalized approach.

Finally, with respect to institutionalize earthquake insurance compulsory for all households with mortgage payment, about two thirds of questionee are in favor of a suggestion. The most meaningful aspect of this tendency is that uninsured households take the same stance on the importance of enhancing vulnerability on households with mortgage payment. In response to the result of making earthquake insurance compulsory for all households with mortgage payment, the provisional calculations to explore a possibility of lowering earthquake insurance premium was made in the following section.

The premium rate for earthquake insurance is calculated by General Insurance Rating Organization of Japan. “The basic rate consists of a risk premium rate applicable to or appropriate for the future payment of insurance claims and a loading premium rate applicable to or appropriate for non-life insurance company expenses and agency commissions. The risk premium rate is calculated based on the latest revised damage projection method to cover all earthquake (number of epicenter: about 730,000 epicenter model) used in the preparation of maps that are assumed to have the potential to cause damage in the future. The premium rate actually applied is calculated by multiplying the basic rate of the insurance premium that is set according to the structure of the residential building and the residential accommodate personal property that are subject to insurance and building location, by a discount rate set according to the earthquake resistance capability.” (Annual Report 2013 Introduction to Earthquake Reinsurance in Japan. 2013. P.14)

Unfortunately, similar to the average earthquake insurance premium (homeowners on average) case, detailed data for premium rate calculation is not available. Therefore, by using the same calculation method and all the available earthquake damage assessment in each prefecture, provisional calculations of examining the lowering effect of premium by making earthquake insurance compulsory to all households with mortgage payment was made. As a result, the premium will not be reduced significantly while the penetration rate is increased to 69% at the most. However, the reductable premium is only US\$23. This results indicates that many of households with home mortgage payment live in earthquake-hazardous or urban areas. Therefore, only by institutionalizing earthquake insurance compulsory for all households with mortgage payment dose not resolve the dissatisfaction factors of high premium. In other words, more efficient insurance system with more broad-based penetration in moderate premium should be developed in order to make earthquake insurance compulsory for all households with mortgage payment.

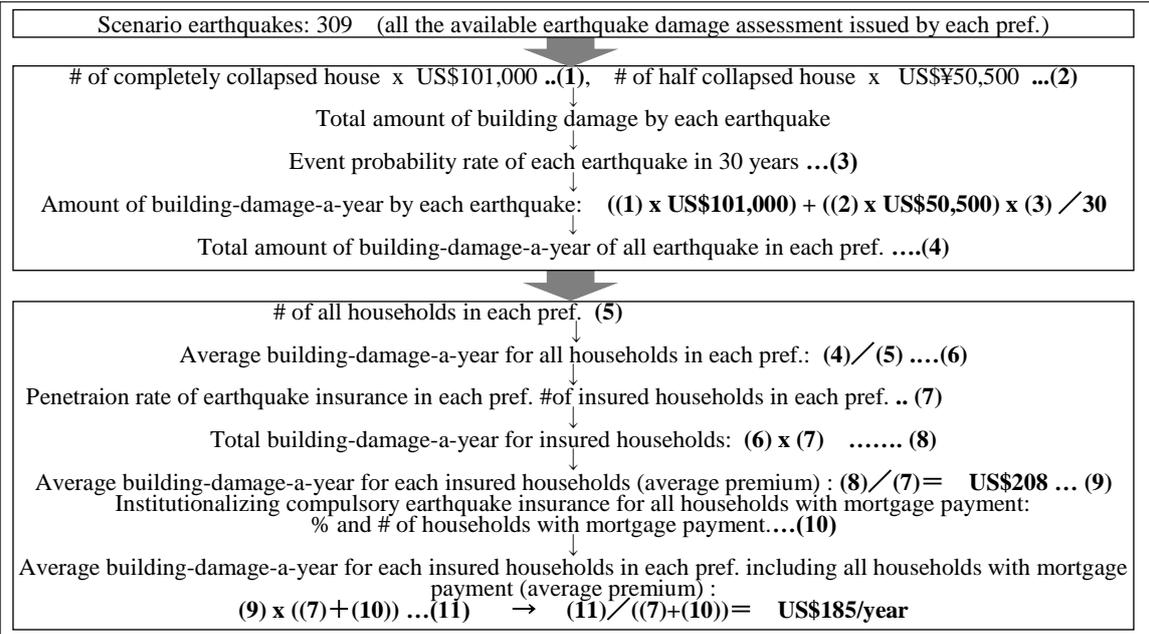


Figure 2. Calculation flow and comparison of provisional average earthquake insurance premium for US\$101,000 coverage **by cost of building damage** (By using earthquake damage assessments available in each prefecture)

## (5) New framework of earthquake insurance system for all households with mortgage payment

On the basis of the intention survey and provisional calculations results, institutionalizing compulsory earthquake insurance for all households with mortgage payment with more efficient insurance in moderate premium is the most appropriate concessions in order to achieve early housing reconstruction by self-reliant efforts of the affected households. Thus, a new model of compensating home mortgage balance for building-part for all households with mortgage payment is developed as follows.

Terms and conditions of a new model:

Since this new system complements existing earthquake insurance policy, the same insurance premium rate is utilized. The coverage is set based on the average amount of building-part mortgage balance and the premium is calculated accordingly to the balance of building-part housing loans.

Table 4. Terms and condition of proposed earthquake insurance

Terms and Condition	Details
Average balance of home mortgage:	US\$159,000 (land & building) → US\$48,000 for building part
Anticipated amount of coverage (building part home mortgage)	-Independent housing: US\$64,000 -Condominium bldg.: US\$32,000
Average payback period	20 years
Basic premium	US\$193for US\$101,000 coverage - Independent housing rate: 0.60 - Condominium bldg. rate : 0.31
Discount factor	Premium rate of a long-term contract using earthquake insurance discount factor is applied → 4.5 every 5 year

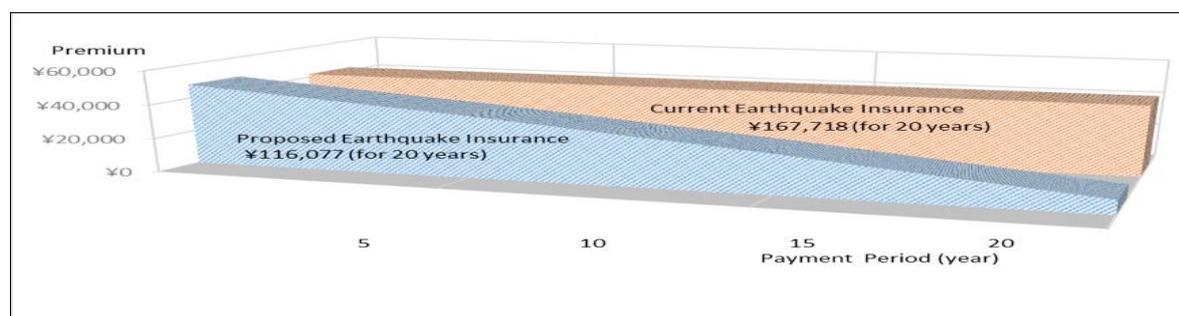


Figure 3. Comparison of premium - Independent housing with long-term discount factor (4.5 every five-year) model-

Table 5. Comparison of insurance coverage

Independent housing:			
	Details of home mortgage		
	Land-part	Building-part	
Current Earthquake Insurance	depending on contractual condition	depending on contractual condition	
Proposed Earthquake Insurance	not covered	covered	
Condominium building:			
	Details of home mortgage		
	Land-part	Building-part	
		Joint ownership space	Individual ownership space
Current Earthquake Insurance	Depending on contractual condition	Not covered → separate contract by condo association board	Depending on contractual condition
Proposed Earthquake Insurance	Not covered	Covered	Covered

(6) Expected effects from the new system and future prospects

By implementing this system, all households with mortgage payment stand to save about US\$520 premium on average in 20 years (see Figure 3), and the entire penetration rate of earthquake insurance will increase from 27.1% to 69% at the most. The rate will be improved to 47.7% in Nagasaki Pref. and Okinawa Pref. at the lowest and 69.1% in Miyagi Pref. at the most. Since this system is compensating only the balance of building-part home mortgage with moderate premium, the policyholders can apply for a new mortgage to rebuild houses so that it can prevent all households with mortgage payment to carry a great burden like double- or multiple-debts. Furthermore, it also resolves the problem of separate insurance contract of joint and individual ownership space which often causes a serious delay in repairing condominium building under the present earthquake insurance system (see Table 5).

From the perspective of achieving post-earthquake early housing reconstruction, institutionalizing earthquake insurance compulsory to all households with mortgage payment that have a high potential degree for achieving housing reconstruction by self-reliant efforts is suggested. A new framework improves the existing earthquake insurance not only by institutionalizing compulsory earthquake insurance for all households with mortgage payment but also by reflecting the dissatisfaction factors pointed out in the intention survey since the new framework is forcing extra spending for uninsured households with mortgage payment. By offering insurance with minimum coverage for moderate premium, it is certain that uninsured households with mortgage payment can accept the new framework meaningful safeguard for their post-disaster housing reconstruction like fire insurance.

In this study, exploring ways to enhance the current earthquake insurance more acceptable among the elderly households who have no home mortgage, but with vulnerable houses to earthquake disaster were not accomplished. Therefore, continuing exploration of further improvement of earthquake insurance framework of making elderly and low-income households involved needs to be achieved. And initiation of a drastic review on the current premium rate (more risk-based segmentalized premium) to ensure more affordable premium and the discount rate by community resilience level to encourage preparation against earthquake disaster among neighborhood and community will be needed to that end.

## CONCLUSION

From the aspect of enhancing the current earthquake insurance system in Japan, comparison of insurance system, especially the ways of policy enrolment including compulsory system in New Zealand and partial compulsory system in Turkey was made. And based on the concept of implementing the compulsory system, a specific proposal on institutionalizing compulsory earthquake insurance system of compensating home mortgage balance was presented.

There was a number of preparatory survey and provisional calculations including (1) intention survey to identify the problems of earthquake insurance in Japan and (2) provisional calculations of average annual premium on each policyholder and the lowering effect of premium by making earthquake insurance compulsory to all households with mortgage payment.

The results indicates that (1) the premium will not be reduced significantly by just institutionalizing compulsory earthquake for all households with mortgage payment (\*the reductable premium is only US\$23/year) unless the entire premium rate to be reviewed in more risk-based segmentalized approach, (2) the preferred premium from the intention survey was US\$101/year~US\$202/year for US\$101,000 coverage whereas the average premium for each policyholder is US\$193/year, (3) more than 60% of questionee are in favor of institutionalizing compulsory earthquake insurance for all households with mortgage payment.

From the results of the preparation process, institutionalizing compulsory earthquake insurance for all households with mortgage payment with more efficient insurance in moderate premium was considered as the most appropriate concessions in order to achieve early housing reconstruction by self-reliant efforts of the affected households. With this system, all households with mortgage payment stand to save about US\$520 premiums in 20 years and it can prevent them to carry

a great burden like double- or multiple-debt and contribute to rebuild their houses by themselves while living in temporary housings. Furthermore, the entire penetration rate of earthquake insurance will increase from 27.1% to 69% at the most so that it will alleviate the heavy financial burdens on the government for the cost of post-earthquake public restoration housings.

Finally, there are still some issues remaining to improve the Japanese earthquake insurance system such as (1) reviewing the current premium rate to ensure more affordable premium and (2) setting up more variety of discount rate/factor by community resilience basis to encourage preparation against earthquake disaster among neighborhood and community in view of encouraging elderly and low-income households' involvement.

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