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IMPACT OF NATURAL DISASTERS ON HOME PRICES AND AVAILABILITY OF INSURANCE

The increased frequency of severe natural disasters has led to concern regarding the availability and affordability of property insurance in high-risk areas of the United States. In response, there have been increasing calls for the federal government to address the problem. Because of market failures, home prices and insurance rates have been severely affected.

Housing Prices Have Declined Following Recent Disasters

The limited research available indicates that home prices tend to decline following major disasters. The most extensive investigations have followed home prices in the San Francisco Bay Area following the Loma Prieta earthquake. A study by Murdoch, Singh and Thayer found that the Loma Prieta earthquake led to a 2 percent decline in home prices in the Bay Area.[1] A hedonic model was used to separate price movements due to the earthquake from economic conditions and characteristics of the housing units such as location and size. The model found an average decline of \$6,100 per house in the Bay Area, or about 2 percent of the average home price at the time. The study also found that Bay Area homes located outside state defined Special Study (higher earthquake risk) Zones (SSZ) were valued 3.7 percent higher than similar homes located in a SSZ. Homes built on marginally safer soil were priced about 2.5 percent higher than homes built on less stable soil.

These results are consistent with analysis conducted by the California Association of Realtors® (CAR), following the Northridge earthquake.[2] The CAR estimated a 5.5 percent decline in the Los Angeles Area's median home price. Unlike the study by Murdoch, *et. al*, the CAR study does not isolate the price effect of the earthquake from other factors. The earthquake hit as the California economy entered a recession. Thus some of the decline is clearly attributable to other economic factors. Sales activity also dropped dramatically, falling by 28.8 percent between October 1989 and December 1990. The opposite impact occurred following the smaller Whittier earthquake in October 1987. There, the housing market was entering a boom period, so activity remained strong and prices were soft only for a few months.

No analyses have been published estimating the impact of Hurricane Andrew on the South Florida real estate market. However, NAR median home price statistics for the Miami metro area indicate a decline of roughly 3.5 percent in the third quarter of 1992 -- when Andrew hit Miami. The following quarter saw a huge jump in home prices -- 11.6 percent -- probably reflecting the scarcity of habitable housing. Median home prices settled back to the pre-hurricane trend price within a year of the hurricane.

Changes in home prices following natural disasters lead to an inquiry as to whether disaster risks are capitalized into market prices. The study by Murdoch *et. al* found that soil type and presence in a SSZ was capitalized into the home price. Similar results were also found in relation to floods in a paper by Skantz and Strickland.[3] The authors looked at two Houston subdivisions: one where some homes suffered flood damage during a "hundred year" flood in 1979, and a second subdivision that did not suffer flood damage. The study found the home prices in the subdivision that suffered flood damage were slightly lower than home prices in the control subdivision prior to the flood. These results were expected because part of the flooded subdivision was located in the 100 year floodplain, and because of the existence of federally

subsidized flood insurance. Since the flood merely confirmed what everyone already knew, home prices in the flooded subdivision did not drop significantly after the flood. However, the study found that home prices in the flooded subdivision did drop by a statistically significant amount when flood insurance prices increased by 400 percent approximately one year after the flood. This capitalization of insurable risk implies that a lack of affordable disaster insurance may have a negative impact on home prices.

Homeowners Insurance is Generally Available

Based on conversations with staff at the California and Florida state Realtor® associations, it appears that homeowners insurance is currently available in those states. State disaster insurance pools in California and Florida have alleviated severe problems with the availability of homeowners insurance following recent natural disasters. However, California and Florida are not the only states with exposure to disaster risk. The same insurance availability problems are likely to occur if and when a hurricane hits a large city along the Gulf or Atlantic Coasts, or when an earthquake hits the New Madrid fault in Missouri. The creation of a federal disaster reinsurance program today will help to prevent future interruptions in the availability of homeowners insurance.

A recent NAR survey[4] questioned Realtors® about the availability of homeowners insurance and disaster insurance in their markets, based on 1997 transactions. The preliminary results of the survey show that homeowners and disaster insurance are generally available, but that there are still some problems. The preliminary findings of the survey are as follows.

Homebuyers With Problems In Obtaining Homeowner's Insurance

- Nationwide, 40 percent of respondents reported that some of their residential homebuyers had trouble or needed assistance in obtaining homeowners insurance.
- In California, the percentage of agents reporting that some of their homebuyers needed assistance was 57 percent.
- In Florida, 77 percent of respondents reported that some of their clients needed assistance.

Share of Respondent's Clients Having Trouble or Needing Assistance in Obtaining Homeowner's Insurance

% of Clients	Nationwide	California	Florida
None	61	43	23
Less than 5%	18	24	23
5% to 10%	7	11	6
11% to 20%	4	6	14
More than 20%	10	16	34

- Respondents reported spending a median of 30 minutes assisting those homebuyers having trouble obtaining homeowners insurance.
- In California and Florida, the median time spent assisting clients was the same -- 30 minutes.

Transactions Falling Through Due to Unavailability of Disaster Insurance

- Nationwide, an estimated 2,450 transactions fell-through because of problems obtaining disaster insurance.
- In California, an estimated 825 transactions failed to close due to problems in obtaining disaster insurance.
- In Florida, an estimated 925 transactions failed to close due to problems in obtaining disaster insurance.

Reasons for Transactions Falling Through

- Nationwide, 17 percent reported that transactions fell through because disaster insurance was unavailable at any price, while 75 percent reported that insurance was available but only at too high a price. An additional 13 percent of respondents reported that transactions failed to close for some other reason. The numbers add to more than 100 percent because some respondents had more than one transaction fail to close for different reasons.

Purchases from State Disaster Insurance Pools

- Nationwide, 9 percent of respondents reported that some of their clients used a state disaster insurance pool. Of those, roughly 80 percent of the respondents indicated that their clients used the state pool because private insurance was unavailable. Approximately 20 percent of respondents reported that some of their clients used the state disaster insurance program because it was less expensive than private insurance.
- In California, 16 percent of respondents indicated that some of their clients used the state disaster insurance pool. Once again, the most frequently cited reason (69 percent) why clients used the state pool was unavailability of private insurance. The second most frequently cited reason (24 percent) was that private insurance was too expensive.
- In Florida, 23 percent of respondents indicated that some of their clients used the state disaster insurance pool. Once again, the most frequently cited reason (90 percent) why clients used the state pool was unavailability of private insurance. The second most frequently cited reason (19 percent) was that private insurance was too expensive.

Homeowners Insurance is Less Affordable Now Than in the Past

Homeowners insurance rates have increased dramatically in Florida and California as well as in other states. In Florida, the average rate increase for the five largest property insurers in the five years since Hurricane Andrew has been 83 percent. In California, earthquake insurance rates have roughly doubled, while coverage levels have declined. However, the rate increases are not limited to California and Florida. Earthquake premiums in the Missouri portion of the St. Louis metro area are expected to increase by 113 to 266 percent in 1998.[5] Other states reporting insurance affordability problems include Hawaii and North Carolina. To the extent that the higher homeowners insurance rates are capitalized into home prices, this will not effect the housing affordability of higher risk homes relative to the affordability of other homes in the metro area.

Insurance Rates in High-Risk Areas May be Artificially Low

Insurance rates in high-risk areas may be artificially low, but it is impossible to say for sure without knowing the true risk. The fact that insurers are attempting to reduce the number of policies in force in some areas, either by nonrenewal of existing policies or by not issuing new policies, may be evidence that insurance rates are too low; however, it may be due solely to the fact that the insurers feel that they are over-exposed in the market. Even when a risk is priced fairly, there are times when insurance companies will need to reduce their exposure.

To see this example, assume that an insurance company provides coverage for a roll of a pair of dice. If the dice come up hard eight (two fours) the insurance company must pay out. The odds of getting a hard eight are one in 36 or 2.78 percent. Thus, an insurer may charge a \$3 premium for \$100 of coverage against the roll of the dice. If the insurer has hundreds of loan policies that are dependent on hundreds of independent rolls of the dice, the insurer will be able to diversify the risk and will be willing to accept virtually unlimited exposure. This example would be like the risk of homeowner losses due to fires. However, if the insurer has hundreds of policies but they are all dependent on one roll of the dice, the insurer is unable to diversify. This example would be like earthquake risk -- there is one roll of the dice and the insurer either pays nothing or an enormous amount. Thus insurers need to worry about their exposure to disaster losses and must reinsure the risk since they cannot diversify it within their portfolios. The insurance companies have been reevaluating the risks that they face and their exposure. Thus, insurer attempts to reduce the number of policies in force may be due to their inability to diversify and reinsure their risk rather than insurance rates being set artificially low.

State Insurance Regulations May Compound the Problem

Homeowner insurance rates are political battleground and state insurance commissioners may be attempting to keep rates as low as possible for personal political reasons. The Florida State Insurance Commissioner has proposed legislation to limit the "price-gouging of private computer models" by forcing a roll back homeowner insurance rates, and eliminating an independent review panel. The panel recently overturned the Insurance Commissioners denial of a 25.5 percent rate hike for State Farm, and allowed the rate increase.[6] Obviously, insurers will not knowingly set insurance rates at an artificially low price unless subject to some form of regulation. Insurers may underestimate the risk of claims and unknowingly set the insurance rates too low to compensate for the true risk.

State Pools Set Prices Relative to Risk

The California Earthquake Authority (CEA) has attempted to set their rates relative to the risk. The pool uses a ZIP code model which then combines the ZIP codes into 19 rate bands. The rates also depend on the type of structure, with the rates available ranging from a low of \$1 per \$1,000 for structures meeting earthquake safety standards in lower risk areas, to a high of \$11.85 per \$1,000 for mobile homes in high risk areas.[7] Of course, the models may or may not accurately represent true risk, but the CEA is attempting to accurately price the risk. The Florida Hurricane Catastrophe Fund sets its rates using a computer risk model as does the Hawaii Hurricane Relief fund.[8] However, it appears that the Florida Residential Property-Casualty Joint Underwriting Association (JUA) has set rates that subsidize southern coastal counties at the expense of northern counties in Florida.[9]

A Solution to the Affordability Problem

The inability to reinsure catastrophe risks at an actuarially fair rate is one of the causes of the insurance crisis. The ability to put some risk on a superior risk bearer, such as the federal government, would allow the insurance companies to charge lower risk premiums. While government reinsurance would not subsidize the rates of high-risk homeowners, it would lower the cost of reinsuring the risk and allow insurance companies to price homeowner policies closer to the true expected loss. The federal government would be able to better provide reinsurance because it is large enough to absorb the risk and is able to diversify the risk across geography, sectors of the economy and most importantly across time. Most reinsurance contracts and disaster bonds cover one-year periods, while the government is able to balance the risk of disaster over longer periods of time because it does not need to worry about cash flow limitations. The federal budget (including off-budget items) is currently around \$1.5 trillion. In addition, the government has the ability to issue debt at a lower cost than insurance companies. Unlike private insurers, the government has the ability to raise taxes to cover insurance losses, and can compel the purchase of insurance (e.g. Medicare) to eliminate the problems created by adverse selection. In addition, the government can control for some moral hazard problems by prohibiting some actions, such as restricting construction in flood plains due to federal flood insurance. The government could require all homes to be modified to make them less susceptible to hurricane and earthquake damage. Several foreign governments, e.g. New Zealand, Spain, Japan, Norway, France and the Netherlands, currently offer natural disaster reinsurance.

The California and Florida Disaster Pools are Different

The California and Florida disaster pools differ in several ways. The California pool allows insurers to put a cap on their liability. In addition, the California earthquake mini-policy is separate policy. In Florida hurricane coverage is included in the general homeowners insurance policy.

Conclusion

Natural disaster insurance is generally available in the United States today. However, the potential for future disruptions remains. The federal government has the ability to address this problem.

Endnotes

- [1]James C. Murdoch, Harinder Singh and Mark Thayer, "The Impact of Natural Hazards on Housing Values: The Loma Prieta Earthquake," *Journal of the American Real Estate and Urban Economics Association*, Vol. 21:2, pp. 167-184.
- [2]California Association of Realtors®, "Impact of the Northridge Earthquake," *Issues Briefing Paper*, February 1, 1994.
- [3]Skantz, Terrance R. and Thomas H. Strickland, "House Prices and a Flood Event: An Empirical Investigation of Market Efficiency," *The Journal of Real Estate Research*, Vol. 2:2, Winter 1987, pp. 75-83.
- [4] National Association of Realtors®, *1998 Environmental Compliance Cost Survey*, preliminary results, April, 1998.
- [5]Gallagher, Jim, "Earthquake Insurance Premiums Could Triple: Rates Are Changing, but State Plans a Review," *St. Louis Post-Dispatch, Inc.*, Feb. 4, 1998, p. A1.
- [6]See Homeowners' Protection Act <<http://www.doi.state.fl.us/Hot-Topic/hpaexsum.htm>> viewed Mar. 5, 1998.
- [7]Insurance News Network, "California Earthquake Insurance: Seismic-based rates set of shock waves of protest" <<http://www.insure.com/states/ca/home/cea3.html>> viewed Mar. 5, 1998.
- [8]Biondi, Richard S., *Report to Florida House of Representatives: An Analysis of Issues Impacting the Florida Homeowners Insurance Premium Market*, Milliman & Robertson, Inc., January 28, 1998.
- [9]*Id.* at p. 10.

Federal Disaster Reinsurance

The increased frequency of severe natural disasters has led to concern regarding the availability and affordability of property insurance in high-risk areas of the United States. In response, there have been increasing calls for the federal government to address the problem.

The traditional way that insurance companies have managed disaster risk is through reinsurance. The global reinsurance industry has the capacity to cover very large risks; however, after Hurricane Andrew and the Northridge California earthquake, many have begun to doubt the ability of the reinsurance industry to cover major natural disasters. A number of solutions have been proposed. The market based solutions include the sale of disaster bonds, disaster options and swaps. The disaster bond market is developing rapidly, but is still small relative to disaster risks. The hope is that disaster bonds will grow rapidly in the next few years, which will allow them to cover insured losses up to \$50 billion. However, this may prove to be an optimistic prediction.

The other solution is government reinsurance at the state and national levels. The Florida and California state governments have created state insurance pools to address the insurance needs of their residents; however, this is an imperfect solution. The federal government is a superior risk bearer because of its ability to diversify risks across geography, sectors of the economy and most importantly across time. In addition, the government has the ability to issue debt at a lower cost than insurance companies. Unlike private insurers, the government has the ability to raise taxes to cover insurance losses, and can compel the purchase of insurance. Several foreign governments offer natural disaster reinsurance, including New Zealand, Spain, Japan, Norway, France and the Netherlands.

Two bills have been introduced in Congress to provide federal disaster insurance: H.R. 219, the Homeowners Insurance Availability Act of 1997, introduced by Representative Rick Lazio (R-NY) and H.R. 230, the Natural Disaster Protection and Insurance Act of 1997, introduced by Bill McCollum (R-FL). There are significant differences between the bills; however, both bills essentially put the government into the position of a reinsurer, writing excess-of-loss policies.

It is conceivable that the federal disaster insurance program will operate at no cost to taxpayers over the long run. However, there are concerns that a federal disaster insurance program will limit the growth of the disaster insurance bond market. Government-provided disaster insurance also runs the risk of being underpriced. The Congressional Budget Office (CBO) came to this conclusion in its Cost Estimate for the McCollum bill. The CBO was unable to estimate the budget impact of the bill but concluded that, "enacting this bill would likely result in significant net costs . . . possibly [increasing net spending] by billions of dollars, over the 1998 - 2007 period." CBO argues that the insurance is more likely to be priced too low than to be priced too high.

The private sector cannot handle reinsurance for cataclysmic risks -- risks that are so large that a loss can threaten the solvency of the reinsurance market as a whole. To date, securitization of risks of this size has been limited. It is unclear whether the market will ultimately become large enough to support this potential loss. A federal natural disaster insurance program has the potential to address these market imperfections. Properly structured, a federal program would benefit Americans by giving them access to the federal government's superior ability to bear risk. However, the wrong program could wind up harming the developing private capital markets for catastrophe risk and costing American taxpayers a significant sum of money.

National Disaster Reinsurance
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The increased frequency of severe natural disasters has led to concern regarding the availability and affordability of property insurance in high-risk areas of the United States. In response, there have been increasing calls for the federal government to address the problem. The proposals differ widely in terms of what role the government would play in each of the plans and in the costs. In order to understand the often subtle differences in the proposals, it is first necessary to review the concepts behind insurance in general and disaster insurance in particular. Part I discusses major problems associated with insurance -- adverse selection, moral hazard and the principal-agent problem. These discussions should shed some light on why so many difficulties arise in the provision of catastrophic reinsurance. Part II overviews the major characteristics that distinguish disaster insurance from other types of insurance, i.e., the risk is virtually impossible to quantify and the claims are correlated. Part III explores various ways to manage disaster risk including reinsurance, by the private sector and the government, and securitization of these risks using disaster bonds and options.

I. Why Insure?

A. The Buyer's Perspective

The first question in the discussion is why do people insure? To keep the discussion as simple as possible, assume that there is only one risk in life -- that of a roll of the dice. God (or nature or space aliens) rolls a pair of dice, and if God hits a "hard eight" (two fours) you have to pay \$0.36, with any other outcome you pay nothing. The expected loss due to the roll of the dice is 1¢,[1] so a risk neutral person will be indifferent between paying 1¢ for insurance and

accepting the risk of the roll of the dice. A risk adverse person, on the other hand, will be willing to pay more than 1¢ to insure against the roll of the dice. Finally, there are risk lovers, who will not pay 1¢ to insure against the roll of the dice. The risk preference of most people depends on the type of risk involved and the size of the risk. In the example above, we would expect most people to be risk neutral, or even risk lovers. Since the maximum loss is so small in this example, few people would bother to insure. In fact, many people enjoy taking small risks, especially where there is a big payoff -- like the lottery.

Now assume that the probability of loss in the example above is the same, but now the loss when the dice come up "hard eight" is \$1,000. A risk neutral person would now be willing to pay \$27.78 to insure against the risk of a hard eight. Of course, insurance usually is not available at a risk neutral price. The insurance company has to charge more than the risk neutral price to pay its business expenses. Thus, let us assume that the price for "hard eight" insurance is \$30. Under these terms a risk neutral person would not be willing to purchase insurance, because the expected loss from a roll of the dice is less than the cost of the insurance. But will people typically be risk neutral? Probably not, because most people would prefer the certainty of paying \$30 to the risk of losing \$1,000. Economists explain the typical consumer's risk aversion as being due to the fact that, dollar for dollar, you value the money that you lose in a big loss much more than you value money that you lose in a small loss.[2] Put more simply, I would rather give up my lunch money than risk losing my mortgage payment. For some individuals, even the \$1,000 risk of loss will not be sufficient to make them risk adverse; however, at some point this will be true. Perhaps Bill Gates would be willing to play this game for \$1 million per roll; but when the stakes get up to \$1 billion or \$10 billion even he would probably become risk adverse.

B. The Insurer's Perspective

Now that we have a limited understanding of why people buy insurance, we need to look at the issues facing the sellers of insurance. If there is a risk that consumers want to avoid, why should another person want to absorb the risk? The simple answer is that some people or companies are superior risk-bearers. Let's continue with the hard eight example above. The risk of getting a hard eight is the classic example of an insurable risk. The risk has a known probability but an unknown incidence. That is to say, we know that the risk is $1/36$, but we don't know who will suffer the loss. Consumers want to purchase insurance because they don't want to be the one to suffer the loss. This is because the loss could be personally devastating to the consumer. However, the insurer is able to diversify this risk. If the insurer has 36 clients, then on average, he will pay out 1,000, and will collect \$30 in premiums from each of his 36 clients, or \$1,080. Of course, the insurer will need to maintain reserves in case there is a run of hard eights, but on balance, 1 in 36 clients will make a claim for \$1,000.

Most insured risks in the real world are similar to this simple example. There are known risks, such as human mortality, house fires or mortgage defaults. In these cases there is also an unknown incidence, where individuals are risk adverse, but insurers can diversify this risk across clients, and sometime across lines of insurance (you typically don't have drought and flood losses at the same time) and across time.

C. More Complicated Risks

There are several important complications in the real world risks faced by the insurer that are not present in the example of a roll of the dice. The first complication is known as adverse selection, which occurs when there is an information asymmetry between the insured and the insurer. In the hard eight example, everyone faces the same possibility of loss; however, in

reality, some people are more likely to suffer some losses than are others. When the insured (the customers) have information that the insurer does not have, they can purchase insurance at a lower premium than would be required to compensate the insurer for the risk. For example, assume that you own a house in a flood plain. If the insurance company does not have this information, they would be willing to sell you flood insurance at a lower cost than if they knew the true flood risk. This is why insurance companies look at the flood plain maps when issuing insurance. To prevent asymmetries of information and thus adverse selection, insurance companies also require physical examinations for those who would like to purchase life insurance. Much of the documentation required by insurance companies is an attempt to get around adverse selection. Take auto insurance as an example, your driving record is the best information that the insurance company can get to see if you are a safe driver. However, this information is not perfect, perhaps I know that I frequently drive drunk, but I have not been caught. I would have an incentive to purchase a lot of insurance, because I would be paying less for the insurance than my expected loss.

A second problem is referred to as moral hazard. Once a consumer is insured against loss, she might change her level of care. Assume that you have a new car, and that you are fully insured. You have a choice of parking your car in a garage for \$10, or parking on the street in a high crime city where there is high possibility of the car being stolen or a window being broken to steal the contents of the car. Knowing that you are fully insured, you might park your car on the street, because you will be compensated if it is stolen or damaged. Insurance companies try to limit the moral hazard problem through the use of deductibles in the policy. The deductible makes the insured bear some of the costs of her actions.

Insurers are also subject to principal-agent problems. Insurance is typically sold by insurance companies through insurance agents. When insurance agents act to maximize their own income, rather than the income of the parent company, additional problems are created. Assume that agents are compensated solely on the basis of the value of insurance policies that they write. In this instance, the agents will have an incentive to write policies regardless of the risk to the parent company. Assume that the agent knows that a customer is a bad risk, if the agent is compensated only on the value of the policy, the agent will have the incentive to write a big policy even though it will potentially cost the parent a lot in claims. The insurance companies have to structure their agents' compensation to bring their incentives into alignment with the interests of the parent company.

II. How is Disaster Insurance Different from Other Insurance?

This brings us to the topic at hand, natural disaster insurance. Why is natural disaster insurance different from the other types of insurance? The answers are several. First, remember that insurable risks are ones that have a known risk and an unknown incidence. With regard to natural disasters, there is still an unknown incidence but the risk is much harder to quantify. This is largely due to the infrequency of disasters, and the resulting lack of data for use in estimating risk. Contrast this situation with life insurance, where insurers know, with a great deal of certainty, how many of their policyholder will die in a year.

Second, natural disaster insurance claims are very highly correlated. If you are an insurer and a customer makes a claim for a loss due to a kitchen electrical fire, this claim will not be correlated with other claims. In other words, that fact that there was a claim for a kitchen electrical fire does not imply that there will be other kitchen electrical fire claims at the same time. On the other hand, if an insurer gets an earthquake claim, it is almost certain that the

insurer will get hundreds of other earthquake claims all at once. This correlation of claims limits the insurer's ability to diversify the risk. In other words, the insurer is now in the position of the consumer in the "hard eight" example. If a natural disaster strikes, the insurer is faced with substantial losses. Earthquakes or hurricanes may be too risky for the insurer. This is compounded by the geographic concentration of disaster hazards. Small insurance companies may be licensed in only one or two states. Thus, the small insurance company can't diversify the risk geographically. But even nationwide insurance companies have trouble diversifying disaster risk because the policies are typically purchased only in disaster prone areas. Thus, most of the earthquake insurance sold in the US is sold in California, while most of the hurricane insurance sold in the US is sold in the South. Thus, there are not enough policies in force to diversify the risk.

III. How Can Disaster Risk be Managed?

A. Reinsurance

i. Advantages

Insurance companies are managing disaster risk using several market procedures, and state governments are also entering the insurance business. The traditional way that insurance companies have managed disaster risk is through reinsurance. A reinsurer is basically an insurance company for insurance companies. The reinsurer diversifies risk across many insurance companies and products, and typically offers a standard excess-of-loss policy to cover insurance companies for aggregate claims over a certain dollar amount up to a maximum coverage amount. For example, Joe's Insurance Inc. might purchase a reinsurance contract to cover aggregate insured losses in excess of \$100 million, up to a maximum of \$400 million. If Joe's Insurance Inc. has claims of less than \$100 million, Joe's Insurance Inc. would not collect

from the reinsurer. If Joe's Insurance Inc. had claims between \$100 million and \$400 million, the Joe's Insurance would be liable for the first \$100 million and the reinsurer would cover the remaining amount. If Joe's Insurance Inc. had claims greater than \$400 million, the reinsurer's obligations would be capped at \$300 million.

ii. Limitations of Reinsurance

The global reinsurance industry has the capacity to cover very large risks; however, after Hurricane Andrew and the Northridge California earthquake, many have begun to doubt the ability of the reinsurance industry to cover major natural disasters. Prior to Hurricane Hugo in September 1989, there had never been a disaster that caused \$1 billion in insured losses. Since Hugo, there have been 8 natural disasters that have caused \$1 billion or more in insured losses, not counting the Loma Prieta (San Francisco) earthquake in October 1989 that caused \$960 million in insured losses. Part of this increase is due to inflation, but it is also due to increased development in California and the Atlantic and Caribbean coasts as well as an increase in Hurricane activity. These factors have all combined to lead to a perception that the traditional reinsurance industry is not capable of covering the damage from a major disaster. Hurricane Andrew was the most expensive disaster in the history of the US, at \$15.5 billion; however, if Andrew had hit downtown Miami, instead of the less densely populated area south of Miami, the losses would have been three times as large. Similarly, if the Northridge earthquake, the second most expensive disaster, at \$12.5 billion, had occurred on a fault line closer to downtown Los Angeles, the losses could have been much higher. Projections of insured losses from anticipated natural disasters make the losses from Andrew and the Northridge quake seem small. Projections of the insured loss from 7.8 magnitude earthquake in San Francisco exceed \$65 billion. An 8.5 magnitude earthquake on the New Madrid fault near St. Louis could cause over

\$100 billion in insured losses. The worldwide worst-case scenario, which is relevant because the reinsurance market is international, would be a major earthquake in Tokyo, where losses could approach \$1 trillion -- over 60 times the losses from Andrew.

Normally, when a new risk appears, or when a risk appears to be greater than was previously anticipated, insurers and reinsurers simply raise their premiums. For example, if the size jury awards in lawsuits for injuries sustained in auto accidents increase, insurers will charge more for auto liability insurance. However, this traditional solution has not worked in response to disaster risks for two reasons. First, state insurance commissions have either explicitly or implicitly prevented insurers from raising their rates to the new equilibrium price. Hurricane insurance rates, from the top five insurers in Florida, have increased by over 83 percent since Hurricane Andrew; however, if the insurer's perceived risk of loss has increased by more than that amount, the insurer will still seek to reduce exposure to the risk, by refusing to write new policies and canceling existing policies. After Hurricane Andrew, Florida enacted legislation limiting the ability of insurers to non-renew existing homeowner policies. California requires all insurers doing business in the state to offer earthquake insurance to homeowners. Second, consider the "hard eight" example in part I, where more people become more risk averse as the potential amount of loss increases. When insurers perceive the risk to be open-ended, they often withdraw from the market rather than offer insurance with premiums high enough to justify the risk because this would make the insurance unmarketable.[3]

B. Market-based Solutions

i. Disaster Bonds

If it is true that the reinsurance industry cannot handle the risk of a major natural disaster, the question becomes, how can this risk be managed? A number of solutions have been

proposed. The market-based solutions include the sale of disaster bonds (also called catastrophe or CAT bonds), disaster options and swaps. Disaster bonds would be sold just like any other corporate debt instrument. If there were no disaster during the holding period (generally one year) that caused losses above the prearranged limit, e.g. \$1 billion, the bond holders would be compensated with a high rate of interest; however, the interest and, depending on the bond, the principal, would be at risk if the damage was greater than the threshold. The advantage of disaster bonds is that they allow insurance companies to diversify the risk in a much larger market. The property-casualty insurance industry is a \$300 billion per-year industry; but this pales in comparison to the value of stocks traded on the New York Stock Exchange, which total roughly \$6 trillion. The value of assets in all US capital markets exceeds \$10 trillion. Thus, major natural disaster could be absorbed more easily in the capital markets than in the reinsurance markets. The market is developing rapidly, but is still small relative to disaster risks. Roughly \$900 million in catastrophe bonds were sold between mid-December 1996 and mid-January 1998.[4] While this is a large sum of money, it is no where near enough money to cover a \$50 billion disaster. The hope is that CAT bonds will grow rapidly in the next few years, which will allow them to cover insured losses up to \$50 billion.

ii. Disaster Options

Similar to disaster bonds are disaster options currently traded on the Chicago Board of Trade (CBOT). The CBOT options work like a traditional call option, where the seller offers to sell a commodity at a preset "strike price". For example, the seller could offer to sell a contract for 1 million bushels of soybeans for August delivery for \$1 per bushel. If the spot (market) price exceeds the strike price (\$1 per bushel) the buyer of the call option can exercise the option and purchase the soybeans at \$1 per bushel, and resell them at the higher spot price. If the spot

price stays below the strike price, the purchaser of the option does not exercise the option. In the disaster option, a reinsurer can buy a call option that pays off if the losses exceed a given level, e.g. \$5 billion (the strike price), based on a pre-agreed formula that would be directly proportional to the losses above \$5 billion.

iii. Risk Swaps

The final market solution is that of risk swaps. In this example, an insurance company with excess exposure for one type of risk can trade that risk to another insurer. For example an insurer with excess hurricane risk could swap some of their hurricane risk with an insurer in the Midwest in exchange for assuming some of the Midwest insurer's tornado risk, or with a California insurer with excess earthquake risk.

The prospects for securitization of disaster risk are unclear. Securities markets often take a long time to develop. For example, the mortgage-backed securities (MBS) market did not become commercially viable for several years. As of today, there has been limited securitization of natural disaster risks. The disaster options are not traded as heavily as are other options on CBOT, and disaster bonds are also infrequently traded. The limited activity in these securities lowers their liquidity (the ability to convert the securities to cash at the market price). Because of the lower liquidity, investors are probably demanding a higher rate of return than they would in a more liquid investment.[5] The market for disaster securities may eventually grow to the point where liquidity will increase and the rate of return on the bonds will fall; but in the near term, market-based solutions will not be able to absorb the risk of a major natural disaster.

C. The Government

i. State Governments

The other solution to the problem is government at the state and national levels. The Florida and California state governments have created state insurance pools to address the insurance needs of their residents. The Florida pools cover Hurricane and wind storm risks while the California pool covers earthquake risk. The state pools suffer heavily from the correlation problem. Since the pools are written on a state basis and insure only one type of risk, there is limited diversification of the risk. *address undercapitalization issue*

ii. The Federal Government

a. Advantages

The federal government is a superior risk bearer. The federal government is large enough to absorb the risk and is able to diversify the risk across geography, sectors of the economy and most importantly across time. Most reinsurance contracts and disaster bonds cover one-year periods, while the government is able to balance the risk of disaster over longer periods of time because it does not need to worry about cash flow limitations. The federal budget (including off-budget items) is currently around \$1.5 trillion. In addition, the government has the ability to issue debt at a lower cost than insurance companies. Unlike private insurers, the government has the ability to raise taxes to cover insurance losses, and can compel the purchase of insurance (e.g. Medicare) to eliminate the problems created by adverse selection. In addition, the government can control for some moral hazard problems by prohibiting some actions, such as restricting construction in flood plains due to federal flood insurance. The government could require all homes to be modified to make them less susceptible to hurricane and earthquake damage.

Several foreign governments, e.g. New Zealand, Spain, Japan, Norway, France and the Netherlands, currently offer natural disaster reinsurance.

b. Current Proposals

Is government intervention the solution, or will it create new problems? Two bills have been introduced in Congress to provide federal disaster insurance: H.R. 219, the Homeowners Insurance Availability Act of 1997, introduced by Representative Rick Lazio (R-NY) and H.R. 230, the Natural Disaster Protection and Insurance Act of 1997, introduced by Bill McCollum (R-FL). There are significant differences between the bills; however, both bills essentially put the government into the position of a reinsurer, writing excess-of-loss policies. The Lazio bill would cover residential properties against hurricanes, earthquakes, fires and tidal waves resulting from earthquakes. The coverage would only be available to state insurance pools. The McCollum bill would cover residential and commercial properties against hurricane, earthquake, tidal wave and volcano losses, and coverage would be available to state insurance pools and private insurers. In addition, the McCollum bill requires states to develop disaster mitigation plans. Both bills limit annual payouts to \$25 billion, with the McCollum bill covering single event losses in excess of \$10 billion, up to \$35 billion, and the Lazio bill covering state pool losses between \$2 and \$10 billion.

c. Potential Problems

While these arguments all point to the desirability of federal disaster insurance, there are also strong arguments against government involvement. First, creation of a federal disaster insurance program may limit the growth of private capital markets for disaster insurance. A federal government disaster insurance program could under price the currently developing private market and force it out of business. If private capital markets have the potential to grow

to the point where they will be able to insure risks up to \$50 billion, and this market is precluded by a federal government program with a capacity of \$25 billion, then, in the long run, there will be a lower level of catastrophic risk insurance available to American insurers.

Government-provided disaster insurance also runs the risk of being underpriced. The Congressional Budget Office (CBO) came to this conclusion in its Cost Estimate for the McCollum bill. The CBO was unable to estimate the budget impact of the bill because it calls for the Treasury Department to specify many of the insurance contract terms. Without this information, CBO could not determine the cost of the program to the government, but CBO concluded that, "enacting this bill would likely result in significant net costs . . . possibly [increasing net spending] by billions of dollars, over the 1998 - 2007 period." [6]

The McCollum bill calls for the excess-of-loss contracts to be auctioned by the Treasury Department subject to a minimum bid. The minimum bid would be based on three elements: the risk-based price, based on expected losses; a cost-of-capital adjustment; and the cost of operating the insurance program and mitigation fund. CBO argues that the risk-based price is more likely to be set too low than to be set too high because the private insurance industry has consistently underestimated catastrophe losses, and there is no reason to assume that the federal government will outperform the private market. In addition, the impacts on the fund from overpricing and under pricing are not symmetrical. If the government overprices the insurance, few insurance contracts will be sold, and the government will not benefit; however, if the government under prices the contracts, more contracts will be sold and the government will acquire contingent liabilities that will not be adequately funded. Because the government generally offers relief to victims of major natural disasters, some have argued that underpriced disaster insurance is not a problem, because the government would pay out this money in any case, and with disaster

insurance, at least the government collects some premiums. However, the CBO concluded that, "other federal disaster assistance would not be reduced significantly as a result of enacting H.R. 230."

What the CBO does not say is that there are many reasons to assume that the federal government will under perform the private market in setting the risk price. One of the major theories is that Congress will encourage the insurance to be intentionally underpriced to provide a subsidy to voters. Others argue that government employees will under perform the private market because they are not subject to a profit motive. More cynical theories argue that the government employees will under price the insurance to maximize the program's revenues and provide the most perquisites, such as a larger staff, nicer furniture, etc. Others point to the fact that the program may start with noble intentions and good management, but that it may eventually be "captured" by insurance industry. The employees setting the risk estimates are likely to come from the insurance industry and they may under price the insurance to curry favor with the insurers that they hope to work for in the future.

Conclusion

The private sector cannot handle reinsurance for cataclysmic risks -- risks that are so large that a loss can threaten the solvency of reinsurance market as a whole. For example, the Insurance Services Office estimates that a cataclysm on the order of \$50 billion to \$100 billion could bankrupt one-third of all insurers. To date, securitization of risks of this size has been limited. It is unclear whether the market will ultimately become large enough to support this potential loss. Undoubtedly, there is a role for the government in the reinsurance business. The government is a natural reinsurer because it is often called in to cover cataclysmic losses after they have occurred, whether it has contracted for them or not. In the recent past, the government

has bailed out many savings and loan institutions. The government also runs insolvency funds that bail out policyholders when their insurance company goes bankrupt. And when hurricanes or floods occur, the government often provides disaster aid. Without the government as a reinsurer, in a situation where a fair share of insurance companies are bankrupted by a cataclysm, unreimbursed citizens will lose, and the government will almost certainly incur high costs in reconstructing public facilities, offering disaster aid to uncompensated victims, and suffering losses in tax revenues.

A federal natural disaster insurance program has the potential to address these market imperfections. Properly structured, a federal program would benefit Americans by giving them access to the federal government's superior ability to bear risk. However, the wrong program could wind up harming the developing private capital markets for catastrophe risk and costing American taxpayers a significant sum of money.

Endnotes

[1] Expected Value = (Probability_{hard eight} * Loss_{hard eight}) + (Probability_{other} * Loss_{other})
 $((1/36) * \$.36) + ((5/36) * 0) = 1¢$

[2] This is a drastic oversimplification. More technically, it is due to the diminishing marginal utility of money. Insurance payments are assumed to be paid out of the last dollar of income; therefore, the money paid out in the case of a loss (beyond the amount of the insurance premium) must be of greater marginal utility. Thus, even though the expected value of loss is less than the cost of the insurance, the utility of the expected value (the insured outcome) is greater than the expected value of the consumer's utility.

[3] Cutler, David M. and Richard J. Zeckhauser, *Reinsurance for Catastrophes and Cataclysms*, National Bureau of Economic Research, Inc. Working Paper 5913, February, 1997, p.6.

[4] *The CATs are out of the Bag: Catastrophe bonds cushion insurers -- and alarm reinsurers*, *Business Week*, January 26, 1998, p. 78.

[5] Cutlet and Zeckhauser, supra note 4, at p. 29.

[6] Congressional Budget Office Cost Estimate, H.R. 230 Natural Disaster Protection and Insurance Act of 1997: As introduced on January 7, 1997, October 8, 1997.

STATEMENT OF
THE NATIONAL ASSOCIATION OF REALTORS®
BEFORE THE HOUSE BANKING
AND FINANCIAL SERVICES COMMITTEE
ON
H.R. 219, THE HOMEOWNERS' INSURANCE
AVAILABILITY ACT

April 23, 1998

INTRODUCTION

Thank you for the opportunity to present the views of the NATIONAL ASSOCIATION OF REALTORS® (NAR) on H.R. 219, the Homeowners' Insurance Availability Act.

My name is Catherine Whatley. I am a REALTOR® from Jacksonville, Florida, and I am the 1998 NAR Regional Vice President for Region V, which is comprised of several Southeastern states as well as the Virgin Islands and Puerto Rico.

The deterioration in the availability and affordability of homeowners' insurance in disaster-prone areas is an issue of very real concern to the NATIONAL ASSOCIATION OF REALTORS®. Our members are involved in all aspects of the real estate industry, but they specialize primarily in the business of assisting sellers and buyers in residential sales transactions. It is this business focus that motivates NAR's primary interest in the resolution of this situation: promoting the availability of affordable homeowners' insurance to homebuyers throughout the nation.

Although I am testifying today on behalf of the real estate industry, I cannot emphasize enough that the ultimate victim of the homeowners' insurance crisis is the consumer who is frustrated in his or her attempt to realize the American Dream of homeownership. And when a young family is precluded from owning a home because homeowners' insurance is too difficult to obtain or too costly to afford, we all suffer the consequences.

IMPACT OF RECENT DISASTERS ON THE INSURANCE INDUSTRY

In the wake of the devastating 1994 Northridge earthquake in California, insurers accounting for over 90 percent of the market stopped selling new homeowners' insurance policies or imposed strict limits on the policies they issued. After paying out \$12.5 billion in claims to Northridge victims - more than three times the amount of earthquake premiums they had collected in the 25 years prior to Northridge, insurers feared that they wouldn't have the financial resources to cover damages from another major earthquake. Earthquake insurance rates have roughly doubled, while coverage levels have declined.

The experience in my home state of Florida has been similar. Hurricane Andrew in 1992 caused the insolvency of seven property and casualty insurers, and others were financially impaired. After paying out more than \$16 billion in claims after Andrew - more than their total profits of the prior 25 years, insurers began re-evaluating the risks of doing business in Florida. In the five years since Andrew, the five largest property insurers have raised their homeowners' insurance rates an average of 83 percent. Insurance deductibles have also been raised, which spells disaster for a property owner faced with the obligation of covering the deductible out of his or her own pocket if a hurricane strikes.

This problem is by no means limited to Florida and California. Insurers are limiting their homeowners' insurance business in disaster-prone areas of Louisiana, Georgia, North Carolina, South Carolina, New Jersey and New York. In Missouri and other states in the vicinity of the New Madrid Fault, insurers are reducing their exposure to earthquake loss by raising earthquake insurance deductibles and premiums. Considering the number of states that are prone to natural disasters, this is truly an issue of national importance.

CONSEQUENCES FOR THE REAL ESTATE INDUSTRY

The inability to obtain affordable homeowners' insurance is a serious threat to the residential real estate market. Not only does it imperil the market for single family detached homes, but the condominium, co-op and rental markets are affected as well. New home purchases, resale transactions and housing affordability are negatively impacted in the following ways:

- ✓ **Homeowners' insurance is a necessary component in securing a mortgage and buying or selling a home.** As prospective home buyers find it increasingly difficult to obtain the homeowners' insurance required by lenders to complete their home purchases, closings are delayed. If a potential homebuyer is ultimately unable to obtain the required insurance, because the insurance is either unavailable or unaffordable, the sale will not be completed. As a result, creditworthy potential homebuyers are priced out of the market. In a recent NAR survey, respondents reported that an estimated 2,450 transactions fell through because of difficulties in obtaining disaster insurance. Seventy-five percent of respondents cited unaffordability as the reason.
- ✓ **Homeowners' insurance is tied directly to the cost of owning a home.** If a homeowner is unable to maintain insurance required by a mortgage lender, the mortgage is in default. If insurance coverage is optional, as is the case with earthquake insurance in California, potential buyers may choose not to purchase a home simply because the insurance they consider essential is too expensive. Existing homeowners who are of like mind may be unwilling to continue to own their homes without the protection of earthquake insurance. Others may choose to go unprotected.
- ✓ **Insurance costs impact rent levels.** Insurance costs incurred by landlords are ultimately passed on to tenants. Consequently, increased insurance costs result in higher rents.

NATIONAL ASSOCIATION OF REALTORS® POSITION

The NATIONAL ASSOCIATION OF REALTORS® supports legislation that facilitates a solution to the disaster insurance crisis. We support H.R. 219 for the following reasons:

- ✓ **It protects against mega-catastrophes.** State programs that have been created to address the problem, such as the California Earthquake Authority (CEA) and the Florida Residential Property and Casualty Joint Underwriting Association (JUA), are well-intentioned first steps. They have addressed the situation in the short-term, and homeowners' insurance is currently available in these states. However, neither state disaster programs nor the private insurance industry have the capacity to cover the risk presented by mega-catastrophes. Depending on where the event occurs, it is estimated that a mega-catastrophe costing the industry \$50-\$100 billion or more could result in the insolvency of up to 36 percent of all insurers.

Considering expert predictions of more severe hurricanes and earthquakes in the near future, as well as the increasing population density in high-risk areas such as Florida, California and Texas, the occurrence of such an event is not a matter of *if*, but *when*. The creation of a federal disaster reinsurance program today will help to prevent future interruptions in the availability of homeowners' insurance.

- ✓ **It promotes fiscal responsibility.** By establishing a program which promotes insurance coverage for those at risk of property losses from a natural disaster, H.R. 219 will minimize future unforeseen disaster assistance expenditures and keep us on course to balance the federal budget. It is time to begin planning for disasters we all know will occur and to put the responsibility for shouldering the cost of disaster preparedness and response on those who are at risk.

As previously stated, NAR's primary concern is the availability of affordable homeowners' insurance. Any federal program that is created must be designed to achieve that goal. To that end, we urge that H.R. 219 be amended to require an agency study evaluating the availability and affordability of insurance and the extent to which states and private insurers have responded to the availability/affordability problem.

CONCLUSION

A strong housing market is a linchpin of a healthy economy. Real estate generates jobs, wages, tax revenues and a demand for goods and services. When the unavailability of affordable homeowners' insurance in disaster-prone areas threatens the real estate market, local and regional economies suffer. In order to maintain a strong economic climate, we must safeguard the vitality of residential real estate.

But more importantly, we must safeguard the cornerstone of the American Dream. The NATIONAL ASSOCIATION OF REALTORS® supports a federal response to the disaster insurance crisis which helps to make the dream of homeownership a reality for more and more Americans. We urge the Banking and Financial Services Committee to take action this year on this very important issue.

Thank you again for the opportunity to present the views of the NATIONAL ASSOCIATION OF REALTORS®. I am happy to answer any questions.

