

CHAPTER 3
PAYING THE COST OF RESIDENTIAL SEISMIC SAFETY
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Introduction

Though no home can be made 100% earthquake proof, methods do exist to reduce the seismic hazards in buildings dramatically. Who pays the cost of implementing seismic safety measures? Everyone in society benefits from a reduction in the loss of life, property damage and disruption of social and economic functioning of a community, which can occur in a major earthquake. To prepare for the uncertain future disaster of a major earthquake, societies must provide incentives so that mitigation actions become socially rewarding rather than individual sacrifices.¹ Involvement of all levels of government and the private sector are required for an effective earthquake hazard mitigation policy.

Adoption and enforcement of building codes for new construction and steps to reduce the hazard in existing buildings can greatly improve life and safety and reduce property loss during earthquakes. For new buildings the increased costs of adequate seismic standards are usually between 1-5% of total costs.¹⁶ Existing buildings present the greatest hazard to life and property. The cost to bring these buildings up to the level of resistance required in new buildings is often very high. Suitable incentives are needed to encourage owners to strengthen their buildings and bear the cost of seismic safety measures.

Historically inaction--or "bearing the loss"--has been the most common response to seismic hazards.⁹ "It reflects the general attitude of disbelief and 'saturation' towards an event that seems potentially too large to be forced and too remote in the past to be remembered" (p. 45).¹⁰ In recent years renewed interest in the threat to life and safety posed by earthquakes has led to an increase in demand on the part of both private and public sectors for control of and protection from these natural hazards.

The Earthquake Hazards Reduction Act, P.L. 95-124, passed by Congress in 1977, calls for the establishment of a national earthquake hazards reduction program. The legislation declares that "Federal, State, local and private research, planning, decisionmaking and contributions would reduce the risk of such loss, destruction and disruption in seismic areas by an amount far greater than the cost of such a program."⁴ One objective of the program is to be the development of technologically and economically feasible design and construction methods to make new and existing structures earthquake resistant. The act also provides for the examination of alternative

provisions and requirements for reducing earthquake hazards through federal and federally funded construction, loans, loan guarantees and licenses.

In 1978, the President submitted a proposal for the National Earthquake Hazards Reduction Program to Congress. Federal grants, loans, tax credits, tax deductions and depreciation allowances were mentioned as possible methods for the Federal government to pay part of the cost of preparing state and local seismic safety plans.⁵ Federal grant activity has been essentially limited to supporting basic and applied programs of the National Science Foundation and the US Geological Survey. At this time the Presidential programs contain no proposals for grants to prepare for or rectify earthquake hazardous conditions.¹⁵

Background

Within the last twenty years several major earthquakes have demonstrated their destructive effects on our modern society. A study of the San Fernando Earthquake of 1971 revealed some startling facts. The total dollar loss to single family dwellings was greater than dollar losses to any other building category in the private sector. Statistics showed 20,500 damaged single family dwellings, of which 730 were demolished or required major rehabilitation. Total losses to single family dwellings was estimated at about 114.4 million dollars.⁷

The city of Berkeley is located in the midst of a high seismic risk area, with the hills and campus straddling the Hayward fault. According to 1970 Census statistics, at least 60% of the housing stock in Berkeley was built prior to any seismic design standards in Uniform Building Codes. Thus, a large number of the residences in Berkeley could be subject to varying degrees of damage should an earthquake occur. Recognizing this, Berkeley's Seismic Safety Element states, "in a city as fully developed as Berkeley, a very important aspect of seismic safety is the mitigation of property damage and injury in existing structures that can be caused by seismically induced hazards" (p. 24).²

Costs of Hazard Reduction

From a community viewpoint seismic safety in existing buildings is desirable, but this may not be economically feasible for the individual. To increase the general welfare, save lives and reduce property damage individual owners must be encouraged to strengthen their buildings.

The modifications required to make a house seismically safe are a function of several factors, including the geologic site and the age and structure of the building. The homeowner must pay the cost of the estimates, material and labor. The seismic reinforcing of a 1910 Berkeley home on the flatlands can be used as a typical case. The woodframe house is one and a half stories tall, with the base floor 1600 square feet and the upper floor 800 square feet.

The building required a straightforward, "no complications" job to reinforce it to withstand a major earthquake. The structural modifications included bolting the frame to the foundation and applying a plywood shear wall. The total cost of bringing the house to the desired level of seismic safety was estimated as less than 1% of the 1979 market value of the property.¹⁴

Though scientific and engineering methods are available to increase the seismic safety of existing buildings, there is no guarantee that property owners will use them.⁸ The difficulty is that the benefits from seismic safety measures are intangible until a destructive earthquake occurs. Reducing the seismic risk in a building may be viewed as an investment enhancing its value, so that the funds spent for modification could be replaced at the time of sale of the house. Yet, property owners have little incentive to bear the cost (even if it is later regained) of modifying their structures to protect them from some uncertain future event.

The Government Role

Implementing earthquake hazard reduction measures is a controversial issue because of the cost to both landowners and taxpayers.¹¹ Yet, the social benefit of efficiently planned seismic risk reduction would far outweigh the cost of such a program. The government, rather than spending great amounts of money rehabilitating areas damaged by earthquakes, should work to save lives and ensure that buildings stand.¹⁶ A means must be found to distribute equitably among all levels of government and the private sector the costs of seismic safety programs.⁶

Local governments are the principle agents for carrying out earthquake hazard reduction policies.³ They have the power to regulate land-use and building practices, which can be adapted to seismic safety needs. California Senator Alfred E. Alquist has recommended changes in the tax structure to modify local taxes which encourage development counter to seismic safety and to develop incentives for construction and land-use practices which reduce earthquake danger.¹⁶ However, local governments suffer the weakness of small size, limited resources and a high vulnerability to political and economic pressures.¹³ As property taxes are the major source of income for local governments, they are inhibited from carrying out earthquake hazard reduction programs which might reduce their tax base. Federal and/or state funds are needed to replace, at least temporarily, the substantial loss of local government income from effective hazard reduction efforts.

The State role is basically to support local programs of seismic safety by providing information, guidelines and finances. One step removed from local pressures this sector is better able to advance overall policy. Within the constraints set-up by statewide standards, local governments would design their own seismic safety programs.

The California State government has a large number of resources, both technical and financial and the legal power to require local building codes to maintain established levels of minimal life and structural safety. At this time the State programs for seismic safety are aimed at critical community facilities, such as schools and hospitals, and regulating new development in highly seismic regions. No study has been made of plans to aid the individual homeowner to reduce the seismic hazard of his building. Seismic safety in one or two family residences is a low priority need among policy-makers due to the limited number of people living in these buildings and the greater hazard in larger buildings.

The Federal government, with the final responsibility for the general welfare, has the greatest resources, and is the principal source of funds for earthquake loss and reconstruction. The Disaster Relief^{Act} of 1974, P.L. 93-288, established a broad program of relief and rehabilitation for disaster-struck communities. Thus a reduction of the impact of earthquakes translates directly into reduced need for federal expenditure for aiding victims and restoring the community.

The ability to provide technical, advisory and economic aid before a major disaster occurs is also in the hands of the Federal government. Federal funding and grants can be powerful tools to advance state and local seismic safety plans. Assistance available in the form of urban development grants to communities can be used in the acquisition of lands, facilities, identification and mapping of local hazards for land-use and planning and retrofitting existing structures.

Methods for Funding

The major funding available at present to individuals for structural modifications of existing buildings is in the form of guaranteed and insured loans. One example is the Community Development Block Grant Program with the objective to develop viable urban communities, including decent housing and a suitable living environment. This program is limited to low-income, overcrowded areas which have been declared "blighted" by community officials. Unless a residence is in one of these areas sited for urban renewal, the homeowner would be unable to obtain Federal guaranteed loans through this program. An alternative for a homeowner wishing to bring his/her building to seismic safety is the Title I Home Improvement Loans. These are federally insured loans obtained through local banks and lending associations. These are available to individuals outside urban renewal areas, but there are only a few lending agencies which will give them out. The difficulty in applying many of these programs to earthquake hazard mitigation is that they have numerous restrictions, usually related to income level, they are not sufficiently publicized, and they do not focus on the earthquake issue.

Government officials would probably support some form of low-interest Federal loan program for earthquake hazard reduction. Federal money could be used to augment local loan programs to provide

funds for individuals paying the costs of structural modifications. Financial assistance could be provided through the direct lending of federal monies for a specific period of time at low or no-interest rates. Also, the government can guarantee or insure loans made by the private sector, arranging to indemnify a lender against part or all of any defaults by those responsible for repayment. Many existing loan programs could be altered slightly to make them available to individuals attempting to increase the seismic safety of their homes. The California State Community and Redevelopment Act could be amended so that geologic and seismic hazards would be considered blighting conditions to make an area eligible for redevelopment.⁶ Important to any loan program developed would be public information, making sure all individuals who may need or desire funds for residential modifications know of and how to obtain a loan as discussed above.

In 1978 the President recommended that "individual building owners should be encouraged to reinforce their buildings through devices such as tax incentives at the Federal, State and local level of government."⁴ How this should be implemented he did not say. To create economic incentives for earthquake hazard reduction measures, reforms to the present property and income tax structures could be carried out.

In San Francisco, of all the seismic safety incentives discussed with professionals, property tax relief was the most salient. With some variations to the existing tax structure a tax deduction could repay a property owner for fixing his buildings to appropriate seismic standards.⁸ A tax deduction would allow individuals to subtract the cost of repair from the value of the property before the tax was computed. However, this would erode the property tax base, and given the current unhappiness throughout the state over property taxes, it is doubtful that the state legislature would agree to such tax reductions.

Another possible tax incentive for earthquake hazard mitigation would be through a tax credit to homeowners on Federal and/or State income taxes. The Solar Tax Credit, now allowed individuals who install or modify their buildings to enhance the use of solar heating, could act as a model on which to develop a Seismic Safety Tax Credit. The Solar Tax Credit returns to the individual fifty percent of the cost of modifications through a reduction of income taxes by this amount. A tax credit for seismic safety could serve as an economic incentive to property owners, spreading the cost of reduction methods to the State or nation as a whole rather than placing the burden solely on the individual.

Conclusion

New advances in the study of earthquakes and engineering make the lack of preventative actions now both irresponsible and costly. Earthquakes cost the community, both through the direct loss of life, injury and property damage, and through the losses incurred in the operation of disaster relief and rehabilitation. The individual and community suffer burdensome economic

and social loss after a major disaster.

Several areas of the country are subject to high seismic risk. Berkeley is in such an area. Action must be taken now to increase the seismic safety of existing structures, residential, community and industrial, if the costs of a major earthquake are not to be astronomical. The estimated damage to the Bay Area from an earthquake today the size of the 1906 San Francisco earthquake is 30 billion dollars. If structural modifications were made this loss could be reduced by 50%.¹²

The most effective incentive for property owners to reduce the earthquake hazard in their homes would be through the use of a Seismic Safety Tax Credit. Given the present shortage of property tax funds in the state of California, and as California is not the only state in the country subject to earthquake risk, the tax credit should be a part of Federal income taxes. Since the nation must bear the cost of rehabilitation and disaster relief after an earthquake, it would make sense for the federal government to help provide for the reduction of potential damage costs.

At present the emphasis of earthquake hazard reduction policy is on increasing the understanding of earthquakes and how to deal with them. The use of this knowledge must be made economically feasible. The implementation of seismic safety measures would benefit both the individual and community through reduced risk to life and structure. Any implementation plan must include not only methods to fund seismic safety measures, but also increasing efforts to educate the public as to the potential catastrophic effects of earthquakes and how they, as individuals, can mitigate this threat to life, home and family.

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