94

STUDY S-228

THE ALASKAN EARTHQUAKE
A Case Study in the Economics of Disaster

Howard Kunreuther
Elissandra S. Fiore

INSTITUTE FOR DEFENSE ANALYSES
ECONOMIC AND POLITICAL STUDIES DIVISION

February 1966

IDA HQ 65-4142
Copy 155 of 200 Copies

STUDY S-228

THE ALASKAN EARTHQUAKE
A Case Study in the Economics of Disaster

Howard Kunreuther
Elissandra S. Fiore

February 1966

This report has been reviewed in the Office of Civil Defense and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Office of Civil Defense.

CONTRACT OCD-OS-63-134
SUBTASK 4113-C

INSTITUTE FOR DEFENSE ANALYSES
ECONOMIC AND POLITICAL STUDIES DIVISION

FOREWORD

The research effort described in this Study is part of a continuing effort carried on by the Institute for Defense Analyses under Contract No. OCD PS-66-113 with the Office of Civil Defense, Department of the Army. This Study was performed in the Economic and Political Studies Division of IDA under the direction of Mr. W. C. Truppner, leader of the Civil Defense Economics Project.

The Study is an outgrowth of a preliminary IDA Internal Note[1] on the problems of recovery in Alaska following the Good Friday earthquake. Douglas Dacy, a co-author of this earlier paper was extremely helpful in commenting on our work, particularly with regard to parts dealing with the construction industry and SBA activity in Alaska.

The original impetus for this analysis came from an IDA survey[2] based on a trip which several members of the Economic and Political Studies Division staff made to Alaska about one month after the Good Friday earthquake. We benefited greatly from the suggestions by John Hause, principal author of this survey document, who gave freely of his time to discuss ideas with us and made detailed comments on a draft of this report. Our thanks also to Henry Peskin who collected a large amount of statistical material while in Alaska and did some preliminary analysis of the data.

---

1. Douglas Dacy, Howard Kunreuther, Elissandra Fiore, "The Alaskan Earthquake: A Case Study in Disaster," IDA Internal Note N-218, January 1965 (not for external release).

2. Samuel Eastman, John Hause, Henry Peskin, et al, "Preliminary Report on the Alaskan Survey," IDA, August 14, 1964 (unpublished).

We would also like to express our appreciation to William Niskanen, Samuel Eastman and William Truppner who provided detailed and pointed suggestions as to the direction the study should take and the contents of our written work. Dr. Niskanen was particularly instrumental in having us look at policy implications of the study with an emphasis on the role which the Federal government should play in natural disaster recovery. Mr. Truppner helped us to better understand the lessons to be learned from the earthquake for application to Civil Defense planning.

Charles Lerner made a number of valuable editorial comments as well as rephrasing certain sentences so the report would flow more freely than when it initially reached his desk. Finally, we would like to thank Mrs. Bonnie Stotler for her computational and secretarial assistance and Mrs. Nancy Wiley for the fine job she has done in typing both text and tables.

CONTENTS

FIGURES

TABLES

SUMMARY AND CONCLUSIONS

This Study of the Alaskan recovery as well as the analyses of problems facing other stricken communities in the United States and abroad has provided perspective on the economics of disaster. After summarizing the findings of this Study, we will attempt to point out the relevance of natural disaster situations to post-nuclear attack problems.

SUMMARY OF FINDINGS

The Information Problem. One of the basic problems faced by a disaster area during the immediate recuperation period is to obtain and communicate accurate information. Quick action is often necessary to cope with emergencies; however, the physical destruction and the breakdown of normal market mechanisms often slow down the process.

Following the Alaskan earthquake there were incomplete data on the extent of human and physical damage so that certain decisions were made which appeared unreasonable in the light of later information but were actually reasonable when viewed as decisions under uncertainty. The willingness of the Federal government to supply direct aid made it clear that it would be much more costly for the Alaskans to run out of goods than have too much on hand, so that certain unnecessary shipments were made (e.g., hospital units).

Convergence. The lack of complete information following a disaster may also cause private individuals to act in ways which impede recovery operations. The mass movement of messages, supplies and people toward the stricken area are common phenomena which have been grouped under the heading of convergence behavior.

A number of these problems occurred in Anchorage following the quake (e.g., a flood of telegrams, tying up telephone lines with personal inquiries, and excess shipments of clothing). The large crowds gathering at the two "nerve centers" established in town, as well as the overloaded telephone circuits, largely resulted from the residents' concern for the well-being of relatives and friends in the area. A central office in a different location from the nerve centers, where people could register their name and whereabouts, would have greatly reduced the convergence problem.

Housing. Housing problems following a natural disaster are generally minimized due to a willingness of friends and neighbors to offer shelter to displaced families. This concern by residents in the community suffering minimal damage helps to alleviate the immediate pressure on the housing market, thereby reducing the demand more than in the more impersonal market situation. The temporary elimination of the post-disaster surge for quarters in a community where a number of houses are destroyed eases pressure on rents.

In Anchorage, the housing problem was alleviated even more than in normal disaster situations because of the large number of vacancies existing at the time of the quake. Real estate agents were also hesitant to take advantage of homeless victims, particularly as they felt that any increases in rent due to inadequate supply would be temporary. As a result, rents remained at their pre-disaster level during the period following the quake.

Food. Unlike the Anchorage area, almost all domestic disaster regions have been sufficiently close to other food markets so that supply considerations have posed no problems. The only recent case of a potential food shortage was brought about by the December 1964 floods which isolated the small town of Orleans, California from the rest of the state so that supplies had to be carried in by helicopter for almost nine weeks.

During the first few weeks following the Good Friday earthquake there were potential shortages of certain goods in Anchorage despite emergency plane shipments. Large quantities of food were destroyed, while at the same time, certain items experienced unusual demand because of damage to public utilities (e.g., the need for canned juices due to contamination of the water supply).

The public responded to advertisements and public warnings not to hoard necessities and were willing to use substitute products if the store ran out of their initial choices; as a result shortages never developed. Retail stores kept food prices stable and even lowered a few of them during the first month following the quake. It appears that community feeling, as well as the knowledge that any shortage would be temporary, were largely responsible for this action.

Special Demands. It is highly likely that physical damage to an area will trigger an increase in demand for rather specific items. A number of derived disaster demands were caused by the Alaskan earthquake with some resources having to be imported from the continental United States. For example, the destruction of sewer facilities spurred a large order of aluminum piping from the "lower 48." Large sections of this material coupled with garden and fire hosing were laid directly on the ground and provided uncontaminated water to the residents until underground facilities were restored.

Capital/Labor Ratio. Long-term recovery is strongly dependent on the effect that the disaster has on the capital/labor ratio. We have hypothesized that if an area suffers large physical losses (capital) but little in the way of human resources (labor) a rapid recovery will be forthcoming if external funds are made available. This situation should be contrasted to the case where similar destruction is experienced but outside money is difficult to obtain; rebuilding may then be very slow and drawn out as in Skopje, Yugoslavia, following her disastrous earthquake of July 1963.

The earthquake in Alaska resulted in a relatively small loss of lives (115 people) compared to the serious destruction to private and public property. Initial reports following the quake tended to exaggerate the physical losses since certain facilities could be restored with much less effort than was anticipated.

Federal Assistance. In recent years the government has played an increasingly important role in aiding the recovery regions affected by disasters. Immediately after the Good Friday quake, President Johnson declared southcentral Alaska a "disaster area" thus permitting the Federal agencies to supply equipment and undertake emergency repairs. This promise of aid assuaged any doubts by Anchorage residents that their community would be completely rebuilt.

The Corps of Engineers administered the large proportion of repair and restoration work to public structures while the Bureau of Public Roads was in charge of highway restoration projects. Aid to the private sector consisted largely of loans by the Small Business Administration (SBA). Because of the magnitude of the disaster and the vast rebuilding program it necessitated, SBA liberalized its policy over what it had been following in other disasters.

Migration. The labor supply available to aid in reconstruction work is affected by migration into and out of the disaster area. Evidence from other natural catastrophes indicates that individuals leave the area voluntarily only when there are advance announcements warning against possible destruction (e.g., hurricane evacuation bulletins) and even then many individuals remain. Whenever possible families whose homes suffered destruction reside with close friends or relatives in the same community. On the in-migration side, convergence problems are often caused by the large numbers of individuals seeking work or just viewing the disaster damage.

The movements out of Anchorage after the Good Friday quake did not differ significantly from the above pattern. The main stimulus triggering the flow appeared to be the series of rather severe aftershocks which occurred in the area during the first few weeks following

the big quake. Transportation data from the Canadian and Alaskan border stations as well as Anchorage school enrollment statistics lead us to believe that between 1500 and 2000 people left the area. The vast majority were wives and their children who decided to temporarily reside with relatives in the "lower 48." Later in the summer they rejoined their husbands, who had remained in Alaska to aid in the clean-up and reconstruction process.

Problems of convergence occurred in Anchorage following the quake although the composition of arrivals was slightly different from normal. Whereas in other disasters people come from surrounding areas to view the damage, the relative isolation of Alaska eliminated the majority of "sightseers" during the spring months. As would be expected workers did arrive in Anchorage seeking construction jobs despite discouraging announcements by Governor Egan on the possibility of finding employment.

Reconstruction. Despite a rather slow rebuilding of residential dwellings in Anchorage the overall recovery of the community was quite rapid. Within a year following the quake practically all public facilities had been restored; the value of actual construction work fell far below both the damage estimates and eligible funds provided under Public Law 875. One of the reasons why recovery appeared unusually rapid was simply that the initial figures on the required restoration work were far higher than the actual expenditures by the Corps of Engineers.

If building permit data are meaningful measures of construction activity in the private sphere, restoration of commercial structures occurred much faster than for residential dwellings. Within one week following the quake the First National Bank decided to proceed with the construction of their proposed new building and Mr. Walter Hickel, investment builder, announced that construction of the $3 million Captain Cook Hotel would begin very shortly. Both these actions indicated faith on the part of business leaders in the future of Anchorage and may have spurred owners of commercial establishments to restore their facilities as rapidly as possible.

Rate of Recovery in Anchorage. The surrounding communities in southcentral Alaska did not recover nearly as fast as Anchorage for several reasons. Despite the large dollar value loss in Anchorage, relative damage was less than practically any other community in the southcentral part of the state. Because it is a major headquarter for Alaska's construction industry, manpower and equipment were already in the city to handle much of the rebuilding activity, as contrasted with the outlying areas where residents had to evacuate for periods of weeks.

The destruction in Anchorage involved individual businesses and homes rather than the sinking of an entire section (e.g., Valdez and Kodiak) or the substantial rising of land (Cordova). Once the geological surveys were completed serious reconstruction could begin immediately. The other areas had to develop comprehensive urban renewal plans to redesign or relocate their towns.

Because Anchorage is the largest city in the area, with two military bases, the Federal government was more concerned about its recovery than the outlying towns whose economies are based mainly on fishing and canning.

The Windfalls of Disaster. A disaster may actually be a blessing in disguise, if it permits economic improvements which would not be forthcoming under normal circumstances. By utilizing grants and cheap loans from the government, damaged facilities can be substantially modernized over their pre-disaster condition. At the same time a disaster may break down the old social order, as in the case of Halifax after the explosion in her harbor during World War I, thus permitting the introduction of new ideas and innovations.

The earthquake induced a number of economic improvements in southcentral Alaska. Despite almost total destruction to facilities in Seward, the Federal government allocated funds to modernize and relocate the town dock and to rebuild entirely the Alaskan railroad connecting the port with Anchorage. This action was taken even though there appeared to be duplication between this harbor and the relatively unscathed port facilities at Whittier and Anchorage.

The Alaskan fishing industry experienced the best season in its history during the summer following the earthquake, even though there was some damage to fishing boats and processing facilities. Loans for new replacement of vessels and gear (Bureau of Commercial Fisheries) and for restoration of canneries (SBA) will enable the industry to modernize facilities and expand them over their pre-quake level.

One of the most beneficial economic legacies of the earthquake is the change it may have induced in the length of the Anchorage construction season. Due to the unusual effectiveness of the plastic coverings, which permitted work on urgent projects during the cold weather, contractors now feel it is to their advantage to continue this expansion of winter construction in the future. They would prefer to have a more stable labor force working regular hours throughout the year than to rely quite as much on substantial blocks of overtime from their summer crew.

SBA Loans. The Small Business Administration was largely responsible for the recovery of the private sector by making liberal 3 percent loans to both homeowners and businesses. Applications were processed rapidly and in most cases the money approved approximated the amount requested. By the end of the second quarter (1965) over $78 m million in funds had been distributed.

By extending their disaster policy to include debt retirement, the SBA made it possible for victims to convert their normal 8 percent borrowed funds to 3 percent loans. Although the individual now had a larger obligation than before the disaster, his monthly payments were often less than before the earthquake due to a thirty year mortgage and the low interest rate.

By looking at the difference between loss estimates and the value of an SBA loan for new construction or repair we found that, contrary to expectations, there was a distinct absence of property upgrading. This conclusion, however, is most tenuous because the accuracy of the loss claims is subject to doubt. Information obtained from personal interviews in Anchorage as well as supplementary data given on the

loan forms indicate that there was a consistent exaggeration of losses, more pronounced in Anchorage, but present in all communities.

The large amount of financial assistance received by residents via the SBA not only spurred recovery but also encouraged economic development which may not have been forthcoming under normal circumstances. At the same time the agency's provision for debt retirement helped maintain the credit rating of Alaskans by preventing both personal and commercial bankruptcies.

The Need for Disaster Insurance. In recent years criticisms have been voiced regarding the present system of disaster relief. The absence of private insurance covering certain catastrophes (e.g., floods and water damage from hurricanes) forces individuals to be dependent on the Federal government for relief, in case of damage to their property. Under the present system of disaster relief, income tax payments by individuals residing in safer parts of the country are used to support Federal activities in disaster-prone areas.

One way of alleviating these problems would be to develop a system of comprehensive disaster insurance which will provide protection in a more equitable fashion than under the current system. Several conditions are necessary to develop a feasible and economically meaningful system of private insurance where all natural disasters are combined into a single package. For insurance firms to be interested in any comperhensive disaster plan, there must be enough people participating from different parts of the country to diversify the risk. Premiums should reflect the danger of living in a particular region with fees being highest in areas most likely to receive severe damage from natural disasters. A system of government reinsurance would permit rates to be based on the expected annual loss calculated over a number of years.

We are suggesting a comprehensive system of disaster insurance as part of the extended coverage clause which normally accompanies fire insurance. This proposal appears consistent with the industry's

actions to include other natural and man-made disasters under this policy if they feel it will be profitable to them and in the public interest. The most desirable scheme would be to include other natural disasters on the extended coverage clause and have policies handled by insurance companies on a competitive basis, just as they are today. By instituting a program of disaster insurance to cover private losses and Federal aid to restore public facilities, disaster recovery could be more efficient and equitable than it is today.

LESSONS FOR CIVIL DEFENSE PLANNING

The economic consequences of a natural disaster which is limited in its geographic scope appears to have virtually no application to US civil defense planning for a large-scale nuclear war. One would expect to find little interactions between regions following a widespread nuclear attack since transportation and communication facilities would be drastically curtailed, not to mention the severity of damage to all areas. Consequently, recovery is primarily a result of self-help. The economic problems faced by a natural disaster community, where the supply of resources from the outside is highly elastic, are therefore largely irrelevant to planning for recovery from a full-scale nuclear attack.

Parallels between the economic consequences of natural disasters and limited nuclear attacks are not hard to find. Given the national survival of transportation and communication facilities as well as the basic economic structure of the nation, in both cases, the economics of recovery are not dissimilar. The main differences between the two situations is essentially one of extent of outside aid and its timing. During the first few weeks after a limited nuclear attack the presence of radioactivity would restrict the flow of capital goods and migration of labor from outside areas. Under certain conditions, fear of a repetition of the attack in additional cities could have some effect but it is not believed that this would

be of major proportions. Perhaps more important, but extremely difficult to assess, is the effect on Federal aid of the international environment implied by a limited attack. The attack would have occurred in an international context that might demand a significant portion of Federal money, attention, and energy. The extent to which the needs of the attack communities would be denied because of external events is a question beyond the scope of this Study.

INTRODUCTION

At 5:36 pm on Good Friday, March 27, 1964, the city of Anchorage and the surrounding area experienced a severe earthquake, which destroyed a substantial portion of the capital stock. Because Alaska is isolated from the continental United States, the study of her recovery problems was expected to be valuable to research groups and organizations concerned with recovery from a nuclear attack. Moreover, the high level of property damage and light fatalities involved in the Alaska earthquake compelled some analogies with a counterforce nuclear attack. For these reasons, in April 1964 the Defense Department's Office of Civil Defense accepted a recommendation by the Institute for Defense Analyses that a study team from IDA's civil defense project be sent to the scene. The purpose of the team trip was to explore potential data sources provided by the earthquake that might illuminate the problem of economic recovery of a community, as distinct from the extensively discussed problems of recovery of people in crisis. This Study reflects, in part, the results of that survey.

In some important ways, the Alaskan recovery was not a good model for post-attack recovery. The principal difference was in the extent and immediacy of external support from the continental United States. Within minutes after the quake, communications with the "lower 48"[1] were established and early the next day emergency supplies were flown in. In an all-out nuclear attack, only limited outside aid would be available and not so soon after the disaster. Even in a localized attack (assuming that not just one but several communities were hit) there is likely to be a greater lag in the response to the

1. The Alaskans are fond of referring to the continental United States as the "lower 48."

stricken community. This difference between the Alaskan recovery and post-attack recovery complicates any extrapolation from the Good Friday earthquake to a nuclear attack.

However, a study of the Alaskan quake and other natural calamities may provide some clues as to the expected problems in recovering from a limited nuclear war, following which assistance in the form of labor and capital can be expected. Among the important questions regarding post-attack economics which can be partially answered by looking at natural calamities are:

(1) Immediately following a disaster, are there common human reactions changing the normal economic behavior of the community?

(2) What is the effect of central government action on the speed of local recovery?

(3) Are there alternative means of coping with disaster which will contribute to a more efficient recovery?

Under normal circumstances economic behavior is largely an impersonal phenomenon--the market tends to equate supply and demand through the mechanism of prices. If shortages of certain items occur, there will be a tendency for the price of these goods to rise; excess supply will lower the price. But market actions are modified following a natural disaster when residents of the stricken community are more closely united than beforehand. Although the community at large may feel that better preventive steps could have reduced the resulting damage, a general feeling still exists that man has been a victim of forces beyond his control. Sympathetic reactions from persons within the community may lead to behavior that is unusual under normal conditions. At the same time, outside aid from private sources or the government are not solely a response to economic pressures; the area has received special attention primarily because it has become a victim through no fault of its own.

This study is concerned with the immediate problems of recuperation as well as longer-term economic effects. It emphasizes what happened in Alaska and other disaster areas and why. Only by understanding the peculiar economics of disaster and recovery can one attempt to suggest changes in the government's response to the event.

Although there is a fairly large body of literature on other disasters, it has emphasized sociological and psychological factors; as we will show, both these elements play an important role in shaping economic behavior. In fact, wherever possible we have supplemented our study of the Alaskan experience with observations from other disaster studies. Without this type of evidence, the Alaskan experience might be disregarded as an illustrative case on the ground that the state is so highly dependent on Federal aid in normal times that its recovery cannot be generalized. Although many of the actions taken in the area were rather special and unusual, they do not appear to differ in kind from the response following other disasters.

The discussion in Part I of the immediate recuperation period will be focused on two basic problems following any serious disaster:

(1) difficulties in obtaining and communicating accurate information, and

(2) problems of supply and demand for goods and the corresponding effect on prices.

After the first few weeks these problems fade in importance and the problems of long-term recovery and reconstruction discussed in Part II become prominent. Not surprisingly, reconstruction in Anchorage was rapid, since labor losses were small and more than enough funds were made available by summertime to restore and even modernize public and private facilities; but in the outlying communities it was slower because the quake shifted the land level and substantive planning was required before reconstruction could begin.

Part III discusses the role which the government should play in disaster operations. We first analyze the actions taken by the Small Business Administration in Alaska to help the private sector get back on its feet. A system of overall private disaster insurance with government backing is then proposed, which should lead to a more efficient and equitable recovery than under the present system of Federal aid.

Part IV presents some lessons for civil defense planning implied by this study. It includes a comparison of post-attack and post-disaster environments and a general evaluation of the results of this study from the civil defense viewpoint.

This report should not be viewed as conclusive. Although as an outline of some of the effects of recovery in Alaska, it is solidly based, most of the ideas on the special economics of disaster rest on limited statistical data, and therefore must be viewed as exploratory.

PART I

IMMEDIATE POST-DISASTER RECUPERATION

1

PROBLEMS OF INFORMATION AND COMMUNICATION

Accurate data and effective communication are fundamental needs of any organization under normal circumstances. Following a disaster, they become even more important, because quick action is often necessary to cope with emergencies; but the difficulties of acquiring and communicating information are often compounded because of physical destruction and the breakdown of normal mechanisms.

This section will discuss in detail some of the problems faced by Anchorage following the Good Friday earthquake. It begins with a description of the post-disaster organization, after which an analogy is drawn between the actions of decision-makers in a firm faced with problems of uncertainty and the behavior of personnel aiding the recovery area. Some examples of decisions based on imperfect information will be used to illustrate these problems. Finally, the problems of "convergence behavior" phenomena and their effects on the communications process will be discussed.

1.1 POST-DISASTER ORGANIZATION

1.1.1 Civil Defense Groups

In contrast to the situation in the "lower 48," there are very few Civil Defense personnel in Anchorage or in any other Alaskan community. However, those who were there played a major role during the first few hours following the quake.

Although Douglas Clure had recently resigned as Anchorage Civil Defense Director, he agreed to resume his old position during the emergency period. Shortly after the quake, Clure reported to the Public Safety Building and informally organized rescue teams to search for dead and injured residents.

Even before this, the state civil defense group had established a "nerve center" in an undamaged Army barracks not far from the downtown area. To aid them in their tasks, RACES[1] ham radio operators parked outside of the building and with the aid of emergency power were able to communicate with fellow personnel in other parts of Alaska and the continental United States.

In another part of Anchorage, city officials (i.e., the mayor, city manager, head of the public works department, and city attorney) set up shop in the relatively unscathed public safety building. Their quarters formed another "nerve center" until the men dispersed to their regular private offices four days after the quake. The Kenai peninsula mobile radio and police department cars surrounded the public safety building, serving as a link in the communications chain between the residents and city officials.

At a 3:00 am meeting Saturday in the Public Safety Building, some official action was taken. First priority was given to providing emergency supplies and the restoration of utility services--electricity, sewer, water, and gas--with Anchorage civil defense personnel forwarding requests for parts and materials to the State CD headquarters in the Army barracks two miles away. The Air Force provided all air transportation for urgently needed goods available in other parts of Alaska or the "lower 48." The secondary phase of the immediate recovery operations entailed debris clearance, demolition of dangerous structures, and some assessment of damage to buildings.

It was obvious from the start that state civil defense was coordinating the recovery action through the specialized groups it had formed. These committees, concerned with supply, food, transportation and the like, collected information as to available needs

---

1. The abbreviation RACES refers to the Radio Amateur Communication Emergency System. It comprises a group of ham operators from around the world who help transmit information to and from points where communication is temporarily impaired.

and then prescribed action to the personnel whom they felt were most capable of carrying out the orders.

1.1.2 Military Units

A major share of the burden during the emergency period fell on US military personnel at Fort Richardson and Elmendorf. Both these bases received limited damage to their facilities and therefore were capable of furnishing men and equipment. In fact, their communication facilities were almost completely intact so that contact with the Federal government in Washington could be established almost immediately after the earthquake.

Two military missions will illustrate the military's role in re-establishing communications between Anchorage and the isolated villages affected by the disaster:

> (1) Speculating that the port of Seward was badly damaged, civil defense requested that the military reach the town as soon as possible. With the highway impassable, an airborne infantry unit was sent on Saturday morning to install a radio-teletype machine. This device was Seward's only communication link with the rest of Alaska until two telephone lines were opened four days later.
>
> (2) Helicopters were sent to Valdez and Whittier to inspect the damage and to re-establish telephone communications between those cities and Anchorage. There undoubtedly would have been a substantial delay in establishing solid contact with these villages if the military hadn't come to the rescue with its mobile equipment.[2]

1.1.3 The Red Cross

The day following the quake, the Red Cross flew a number of disaster specialists from San Francisco to assist the Alaska chapter

---

2. It is true that ham radio operators were attempting to send messages from the stricken towns to Anchorage shortly after the destruction but very little information was received. Only cryptic phrases such as "Valdez is in shambles" came across to the Anchorage Command Post.

volunteers in helping the victims. Because the Anchorage office building had been destroyed, makeshift quarters were established in the YMCA.

Besides providing food and immediate shelter for stricken families, the Red Cross attempted to help individuals get back on their feet financially. Home owners were given washing machines, kitchen utensils, stoves and building materials to repair their home while some self-employed workers and small business operators were provided with the necessary equipment for opening shop again.

1.1.4 Office of Emergency Planning

On the morning following the earthquake, President Johnson declared Alaska a major disaster area, thus permitting the Office of Emergency Planning (OEP) to administer Public Law 875.[3] This legislation permits Federal agencies to supply equipment and undertake emergency repairs to stricken areas. In essence the OEP acts as a coordinating unit, delegating certain roles to different groups and ensuring that specific missions are accomplished.

For example, the Corps of Engineers (Department of the Army, Civil Functions) was assigned responsibility for debris clearance, emergency restoration of public utilities, and the repair or restoration of docks and other public facilities, while the Bureau of Yards and Docks[4] (Department of the Navy) performed similar functions in Kodiak. Other federal agencies were responsible for restoring transportation facilities in the area.[5]

---

3. The OEP was established in 1961. Its responsibilities included assisting the President in coordinating recovery actions immediately following a major disaster in the United States.

4. Now the Naval Facilities Engineering Command.

5. The Federal Aviation Agency handled repairs to damaged state and municipal airports; the Department of Interior was in charge of the Alaskan Railroad (using the Corps of Engineers as construction agent); the Department of Public Roads restored damaged highways outside of the urban areas covered by Corps of Engineers activities.

Initially the President allocated $5 million from his disaster relief funds, for OEP to reimburse the agencies performing the debris clearance, demolition and repair work; an additional allocation of $12 million was made two months later, and further allocations were forthcoming as restoration of facilities progressed.

1.2 EFFECTS OF UNCERTAINTY ON DECISION MAKING

1.2.1 Analogy With a Production Decision

Decisions made by key personnel in a disaster area are critically affected by the uncertainty of information. This problem will be studied by looking at the decision of a production manager, and applying his decision-making framework to specific actions taken in Anchorage after the earthquake.

The term "decision-making" implies a choice between two or more alternatives. In most circumstances the decision-maker is forced to act under conditions of uncertainty, i.e., there is incomplete information about the future. Consider the plight of a manager who must schedule production of a certain item during the coming month.[6] If demand for all future periods is known with certainty, he will always schedule production equal to sales so that inventory at the end of the month will be zero. However, when there is imperfect information regarding sales e will attempt to schedule production in a way that minimizes inventory costs. His decision will be determined by the values he assigns to the cost of storing the item and to the cost of running out of the item as well as the assumptions he makes about the probability distribution of future demand for the product. The higher his ratio of shortage cost to storage cost the more units he will hold in his inventory, thus lowering the chance of running out of the item. Outside cues from the environment, such as market surveys and branch office reports, may influence his behavior because they increase his knowledge about the product. It is important to realize, however,

---

6. To simplify the exposition, assume that costs of changing production or work force from one period to the next do not enter into the manager's expected cost function. He is solely concerned with inventory behavior of the item.

that these environmental factors may be more farmful than helpful if the hints they provide fail to materialize.

The same decision-making framework can be applied to the decisions which must be made immediately following an unexpected disaster:

(1) There is some uncertainty about the state of affairs in the stricken area.

(2) Certain cues filter in from the environment, some of them more rumor than fact.

(3) The actions taken imply that the decision-maker has adopted a certain ratio of shortage cost to storage cost.[7]

To apply this framework to a specific case, consider the situation at Anchorage after the Good Friday earthquake:

(1) Uncertainty. There was uncertainty as to the extent of the damage, the number injured and the number killed in the Anchorage area. The communication channels between Anchorage and the surrounding towns (e.g., Valdez, Kodiak and Seward) were initially cut off except for sketchy ham operator reports. The channels between Anchorage and the "lower 48" were largely undisturbed thanks to the military bases and the RACES operators.

(2) Fragmentary Information. Certain bits of information on damage and injury filtered into the two nerve centers in Anchorage but much of it was later found to be unreliable.

(3) Shortage/Storage Cost Ratio. The Federal government made it clear from the outset that the earthquake produced an "emergency situation" and therefore direct aid would be immediately forthcoming. Knowledge that the resources required would only be a small fraction of the total US wealth obviously reduced the cost of providing too much goods. It would be much more costly to run out of goods than have too much on hand in this situation.

It is in the light of these conditions that we must view the behavior of the Federal government and the civil defense group in Anchorage. Although some of their actions may now appear unreasonable

---

7. By storage costs we mean the expense involved in locating and transporting supplies and equipment which turned out not to be actually needed in the disaster area. The storage expense may also include the opportunity lost of not being able to use these goods elsewhere.

they may have been reasonable to a person making a decision under those conditions. They were clearly made under circumstances analogous to those faced by a production manager when sales are unknown: In retrospect his decision to schedule a certain level of production might be unfortunate if sales fall short of expectation, but it still could have been the correct action to take.

1.2.2 Public Actions Affecting the Private Sector

Several specific decisions made in Alaska very shortly after the earthquake struck can be understood within the decision-making framework outlined above.

The Alaskan Air Command was asked to fly six 36-bed mobile hospitals from Juneau to Anchorage although the number of persons needing medical treatment was not known. The action was taken because the cost of a shortage (needing the hospitals in Anchorage but not having them) was obviously considered much greater than the storage expense (shipping the units unnecessarily). There were actually fewer casualties than anticipated, so the units were flown back to Juneau without ever being used.

Governor William A. Egan of Alaska announced several days after the quake that Anchorage had more than enough construction workers to handle the repair work and erection of new buildings in the area. In making this statement, the governor was aware that a large proportion of summer construction is done by individuals migrating from the "lower 48," and that much more work could be expected than in past years because of the extensive damage to both public and private dwellings. However, construction could not begin until geological tests were made, SBA loans approved, and building permits issued. During this interim period, which could last for as long as three months, there would even be an excess of local construction workers in the area so that the problem of migration would compound the unemployment problem. Assuming that there would be no difficulty in

obtaining workers when they were needed,[8] Governor Egan's warning although misleading, could be justified if the probability of a high storage cost (having unemployed individuals in the area) was considered far greater than the probability of shortage costs (the necessity of raising wages or using other inducements to gain needed construction workers later).[9]

A rationing scheme, limiting each automobile owner to only five gallons of gasoline, was undertaken not because of shortages in petroleum but out of fear that many residents would leave the state by road. At the time the rationing decision was made there was incomplete information on the conditions of the roads; it was later discovered that every highway leading out of Anchorage was impassable. It could be argued that even if the roads were passable and Anchorage officials were not concerned about out-migration, a rationing policy would still be meaningful. If they desired to keep the highways free for critical traffic, then one way of keeping motorists off the road would be to limit their purchase of gasoline.

About six hours after the quake the military ordered four mechanized platoons with accompanying bulldozers to attempt to reach Seward by road. Although several radio reports indicated impassable fissures in the 140-mile Anchorage-Seward Highway, there was no official confirmation of these announcements. At the same time, no definite word had been heard from Seward, but it was feared that the town was severely hit.[10] With planes unable to fly until morning, a relatively high shortage-to-storage cost ratio dictated the mission despite the small probability of its succeeding. When it was discovered that a number of gaps would have to be filled so that it might take quite a

---

8. Immediately following the quake Senator Bartlett's office received numerous letters and phone calls from people who were offering to help Anchorage dig out and rebuild.

9. In actuality construction activity began later in the summer than usual, so it was difficult to obtain qualified workers when they finally were needed.

10. The inability to establish radio or telephone contact with Seward just heightened the suspicion that the town had been badly damaged.

a few days to reach Seward, the platoons were ordered to clear the road so they could evacuate residents from the nearby villages of Girdwood, Alyeska and Portage.[11] Therefore, despite the inability of the military to reach its original destination, the mission still managed to serve a worthwhile purpose. In fact, if knowledge of the plights of these three small hamlets had been known in advance, the same platoons may have been sent along the road even if there was complete certainty that they would never arrive at Seward.

These examples illustrate the difficulties faced by people required to act with incomplete information in their hands. A disaster often implies the need for rapid action even though decisions may only be determined by a combination of guesswork, informed opinion, and intuition.

1.2.3 Convergence Behavior

The lack of complete information following a disaster may also cause private individuals to act, however unwittingly, in ways impeding recovery operations. The mass movement of messages, supplies, and people toward the stricken area is a common phenomenon and has been grouped under the heading "convergence behavior" in the literature.[12] In this section we will describe some of these problems occurring in Anchorage and outline possible means of alleviating them.

1.2.3.1 Problems in Anchorage. An estimated 20,000 telegrams were delivered to Anchorage residents and officials during the first three days after the earthquake. They were immediately brought downtown to the central telegraph section where personnel read them in order to handle emergencies first. The large number of messages

---

11. They had to span two gaps in the road to Portage with Bailey bridges, clear a dozen snow and rock slides, make numerous road fills, deck a railroad bridge for vehicle use, and cross countless fissures before reaching Portage, Tuesday, April 2.

12. Charles E. Fritz and J. H. Mathewson, Convergence Behavior in Disasters (Washington, D.C.: National Academy of Sciences, National Research Council, 1957).

which solely conveyed sympathy to the victims made it difficult to locate those telegrams requesting direct and immediate action.

Despite frequent radio messages urging residents not to use the telephone except for emergency purposes, lines were tied up immediately after the quake with personal inquiries and requests. The city manager thus found it necessary to disconnect all home phones on the Central Exchange for short periods of time because the overload in calls threatened to blow the 400-amp fuse.

One of the side effects of a highly publicised disaster is the sympathetic reaction from outsiders who are vicariously absorbing the details in the comfort of their living rooms. It was therefore not surprising to find a large number of supplies, notably clothing, being shipped into the damaged area. Unfortunately, sorting out the worthwhile articles became a difficult and time-consuming process. In fact, the added burden of sorting or disposing of the worthless goods even made these gifts costly to the community. In Anchorage the problem was compounded by the arrival of packages earmarked for individuals or families who could not be located. Seward, recently named an All-American City, received carloads of household goods and clothing from its sister cities in the "lower 48." For example, Allentown, Pennsylvania shipped trailers full of bedding and linen goods, the large portion of which could not be used immediately.

Complaints were frequently heard in Alaska that if only the "foreigners" would go home "we could get some work done." The comment referred to the many government agencies and private groups visiting the area to study different aspects of the earthquake. Within three weeks after the disaster, more than 700 people had flown into the Anchorage area just for conferences, damage assessment surveys, and other emergency measures. Residents of Alaska might be more sensitive to this type of intrusion than other U.S. citizens, simply because many of them moved away from the "lower 48" just to lead their own lives. However, these individuals must have soon realized the dependence of the Alaskan economy on the Federal

government during normal times, and particularly after a disaster. We are skeptical of the alleged difficulties in the normal recovery process caused by the government groups, since geological evaluations and official damage estimates were needed before loans and grants could be authorized.

Speculating that there would be a need for personnel to care for the sick and injured, all the hospitals were swamped with volunteers from the local communities. In fact, a group of physicians from Fairbanks chartered a plane on their own initiative and flew into Anchorage only to find that their services were not needed. This type of convergence behavior would have been helpful if the number of people hospitalized had been greater than the 92 cases reported in the entire region affected by the quake.

One of the biggest problems faced by state CD headquarters in Anchorage during the first few days after the earthquake was a surplus of volunteer manpower. Over 200 people offered their services but only a few of them could be fruitfully used for emergency duties; it was difficult to convince the others that CD efficiency could be improved if they tried to help elsewhere. In fact, many of these individuals posed as civil defense personnel by wearing the hastily improvised white arm badges used by authorized members. They caused considerable confusion by tampering with emergency materials to which they now had access by virtue of their status.[13]

1.2.3.2 Suggested Remedies. Alaskan officials were aware of the difficulties produced by convergence behavior and therefore took steps to arrest or alleviate the problems, but met with only moderate success. For example, Governor Egan's announcement that Anchorage had more than enough workers was gauged to discourage migration into the state. Yet one week after the quake, over 150 newly-arrived

13. This information was obtained from the Ohio State University Disaster Research Center. Several members of this group arrived in Anchorage shortly after the quake and observed these unauthorized actions while studying civil defense behavior during the immediate recuperation period.

individuals from the "lower 48" were complaining that they were unable to find jobs in the construction field.[14]

One method of discouraging prospective employees from coming to Alaska in time of emergency would be to force them to buy a round-trip plane ticket before leaving the States so they could afford to return it no work was available. This restriction would act as both a monetary and psychological deterrent by providing a tangible warning that man-power needs in Anchorage were very limited.[15]

The Alaskan government attempted to cope with the large bundles of goods received in the earthquake area by forming a state-wide committee to determine where supplies were most needed. Although this action did not alleviate the problem of storing worthless goods, it did simplify the task of distributing such needed items as the 1000 blankets received from sympathetic Japanese citizens.

The large crowds gathering at the two nerve centers as well as the overloaded telephone circuits largely resulted from the residents' concern for the well-being of relatives and friends in the area. By establishing a central office in a different location from the nerve centers, where people could register their names and whereabouts, this convergence problem might have been greatly reduced..

1.3 RECAPITULATION

Imperfect information can cause a number of difficulties during the period immediately following a disaster. Decisions had to be

---

14. When there was still no work after several weeks, most of the unemployed left the area, thus causing a shortage of manpower later in the summer.

15. Under present interstate commerce laws, it would be impossible to implement this round trip stipulation. Congress might consider legislation permitting this action during an emergency period at the discretion of the state Governor. Resentment on the part of "lower 48" residents should be minimal since they would not actually be prevented from entering the area. After other disasters, complaints were raised because police attempted to restrict certain vehicles from entering the stricken area.

made under uncertainty, thus resulting in a misallocation of resources which would have been avoided if more data had been available at the time. Convergence behavior is bound to occur in certain forms following a disaster but may be substantially reduced if communications are centralized and reliable information is transmitted rapidly to quell rumors which are caused by imperfect knowledge.

2

SUPPLY AND DEMAND PROBLEMS

Following a serious disaster, the community is likely to be faced with food and housing shortages. During the first couple of days national organizations, such as the Red Cross, are able to provide mass shelters for the homeless and meals for those without cooking facilities. After this emergency period the market mechanism resumes its function of equating supply and demand, unless destruction is so severe that some other form of rationing is imposed on the disaster area.

Our interest in this section is on the problems of resource allocation which follow a disaster. During the first few weeks it appears that actions in the community are more personalized than in normal times, and this is reflected in the stability of prices despite some shortages in supply. In other words, behavior is somewhat governed by a sympathetic concern for others so that individuals appear to be moved more by altruism than by economics.

Although long-run profit considerations may be partly responsible for the absence of short-run price increases, the different frame of reference affecting post-disaster actions during the immediate recuperation period is worth stressing.

The bulk of this section deals with the housing and food problems in Anchorage following the quake with some references to other disasters. The section ends with a discussion of the derived disaster demands caused by the Alaskan earthquake, indicating whether the resources were available in the Anchorage area or had to be imported from outside regions. The reader may then be in a better position to appreciate the advantages of stockpiling items to handle emergency problems.

2.1 HOUSING PROBLEMS

2.1.1 General Concepts

Assume that just preceding the disaster the going rents yield an equilibrium between supply and demand. A disaster is likely to inflict a certain amount of damage to housing facilities, thus decreasing the supply available for rent. Unless everyone whose homes were destroyed left the area immediately, the demand for shelter generally would be greater than the supply at the pre-disaster rent levels[1] and it would then be reasonable to assume that home rentals would rise.

Consider a community that has satisfied the demand for housing but has no vacancies available. Following a disaster in which a large number of dwellings were destroyed, shelter for the homeless must be found. Although public buildings such as schools and churches could serve as temporary quarters, the discomforts of living there for more than a few nights would be enough to make people seek other facilities. If there were no vacant units, the homeless could either migrate to an outlying area where vacant units would be available or use part of another family's dwellings either within or without the disaster zone.

Residents with undamaged property could either free some of their facilities by crowding the family into fewer bedrooms or continue to use their whole residence. In the first case they would then be in a position to rent or donate their extra room to the homeless. From an "impersonal market" point of view owners of undamaged homes would not be expected to crowd their families just to make rent-free quarters available to others. It would be reasonable for them to either keep their facilities to themselves or charge rent for their empty rooms.

---

1. With little destruction, no out-migration, and few fatalities it would still be possible for housing demand to be less than supply at pre-disaster equilibrium levels, if people's income fell sufficiently as a result of the disaster. The necessary decline in income for this situation to exist would depend upon the number of homes destroyed and the elasticity of demand with respect to income.

But by their nature, disasters create a different frame of reference, at least in the short run, so that it is not surprising to find families going out of their way to aid those who are stricken and homeless. Of course, even these actions can be viewed in an economic context by claiming that there is a psychic reward which compensates people for such sacrifices. Nonetheless, the important point stands: Normal market mechanisms do not always operate during the immediate aftermath of disaster.

2.1.2 Other Disasters

Studies of the housing problems following other natural disasters have concentrated primarily on the problem of providing sufficient temporary shelter for all victims. Data from a number of these reports indicate the following pattern of behavior:

(1) Use of mass public shelter is strongly resisted and is resorted to only when no other alternative is available.

(2) Victims prefer to reside with families or friends but will choose to stay with complete strangers before going to a public shelter.

(3) Large numbers of people, unaffected by the disaster, are willing to take in homeless strangers.

(4) A majority of victims in most disasters can find shelter on their own, even for the first night following impact.

Worcester Tornado (1952). On June 9, 1952, an unusually severe tornado swept across the northeast section of Worcester, Massachusetts leaving in its wake over $32 million damage and almost 2000 families homeless.[2] Since the tornado struck Worcester about 5:00 pm, officials believed that many of the homeless would require mass shelter for at least the first night until they were able to make other arrangements. Although the exact number that actually did stay in these public shelters is not known, studies estimate that it was only between

---

2. Anthony F.C. Wallace, Tornado in Worcester, (Washington: Committee on Disaster Studies, National Academy of Sciences, National Research Council, 1956).

one and four percent of those displaced. The vast majority of victims were able to find their own accommodations with friends, relatives, or complete strangers who opened their homes to victims. Of the few who did remain in shelters during the first night, almost all left on the following day to stay in more pleasant surroundings.[3]

London Bombings (1940). A similar experience was noted by authorities studying the extensive bombing raids on London during the Second World War[4] which left approximately 1.4 million persons homeless. Although the government had provided substantial shelter facilities for these persons, records indicate that only about 200,000 used the available facilities. The others preferred to make their own arrangements, most staying with relatives or friends.

Dutch Floods (1953). The floods affecting the Holland coastal regions throughout the spring of 1953 required a gradual evacuation of over 72,000 persons.[5] It was not unusual for victims to have neither friends nor relatives with whom they could stay outside the affected area. Nevertheless, within one or two days, evacuees were able to find shelter with one of the thousands of Dutch citizens volunteering to house flood victims. In many communities, more homes were made available than there were victims to fill them. The number of people wanting to house displaced families is especially significant since it was known that the arrangement would last for at least a few weeks and perhaps even months; in fact, over 5000 victims could not return home for over one year.

---

3. Red Cross figures show that, after the first night, only 2.5 percent of all homeless persons stayed in the public shelters at any time during the subsequent two months (Ibid., p. 95).

4. Fred C. Ikle and others, Withdrawal Behavior in Disasters: Escape, Flight, and Evacuation Movements, Committee on Disaster Studies, National Academy of Sciences: National Research Council, Washington, D.C., April 1957.

5. Instituut Voor Sociaal Onderzoek Van Het Nederlandse Volk, Amsterdam, (project compilers and editors). Committee on Disaster Studies, National Academy of Sciences: National Research Council, Washington, D.C., 1955.

2.1.3 Anchorage Experience

2.1.3.1 Vacancies Prior to the Quake. In contrast to the other disaster areas where few vacancies appeared to exist before the community was damaged, Anchorage had a large number of unsold units at the time of the quake. According to a survey taken by the FHA at the beginning of 1964, the city had a six-month supply of new housing units on hand; of the 311 units put in place only 4 were sold prior to construction, and 118 still remained unsold after they had been completed.[6]

A sample survey representing approximately 25 percent of the number of housing units in the Anchorage area happened to be taken two weeks before the quake. The results shown below in Table 1 indicate that almost 1 in every 7 units was unoccupied as of that date.

Table 1

VACANCY IN SELECTED RENTAL PROJECTS IN ANCHORAGE[a]
(March 1964, Before Quake)

Type of Project	Total Units	Vacant Units	
		Number	Percent
FHA-Insured	2152	407	18.9
Conventionally financed	400	17	4.3
Alaska State Housing Authority	472	1	0.2
Total	3024	425	14.1

a. Source: Charles Ball, Economic Consultant to Alaska State Housing Authority.

This figure is deceiving, however, because it does not distinguish vacancies by type. According to Elmer Gagnon, Director of the FHA in Anchorage, there have been very few two-, three-, and

6. The FHA bases its estimate of oversupply on the percentage of unsold speculative houses. For example, if only 10 percent remained on the market this would represent a one-month supply of housing; 24 percent is a 3-month supply and 38 percent is equivalent to a 6-month supply. The 118 unsold units of the 307 which were constructed on speculation represent 38 percent of the total.

four-bedroom apartments vacant during the last few years. Since 1952, most multi-family housing has been in the form of efficiencies and one-bedroom apartments. Because Anchorage has been a growing area with a larger average family size that any other community in the United States, such a building program has yielded a great over-abundance of small units and not enough larger ones.

In Anchorage, where the rents on apartments are considerably higher than in the "lower 48,"[7] the bulk of the vacancies are in relatively low-rent classes; this suggests that the dwellings are rather unsatisfactory for living. For example, the walls may be so this that heating is a problem,[8] so that the actual rent during the winter would be considerably higher than the list price. For these reasons, a high vacancy rate might not necessarily have satisfied all the demand after the quake.

On the other hand, in addition to the listed vacancies there were several apartment houses within one-month of completion at the time of the quake. These buildings, located in the western part of Anchorage, were unaffected by the disaster and therefore proved to be an extra source of supply. A number of these units were rented out to quake victims searching for new facilities.

2.1.3.2 Damage to Houses. Damage to houses was confined primarily to areas within the Anchorage city limits. Following the quake a block-by-block external inspection was undertaken by the city in order to gain a picture of future needs. Table 2 details the results of this survey by grouping dwelling units into classes based on the extent of the damage. All units needing 60 percent or more repair are considered either totally destroyed, economically unfeasible for restoration, or unfit for occupancy within a two year period.

---

7. According to the Census of Housing, the median monthly rent for Anchorage in 1960 was $146 compared to $71 for the continental United States.

8. Thin walls may also increase the noise factor; however, this problem would be minimized if many of the neighboring units were vacant.

Although units with less damage may have remained vacant for some period of time after the quake, they were considered to be restorable within one year.

Table 2

EARTHQUAKE DAMAGE TO ANCHORAGE HOUSING STOCK[a]

No. of Units[b]	Percent Damaged
921	80 - 100
50	60 - 80
26	40 - 60
35	20 - 40
11,715	0 - 20
12,747	

a. Source: Land use maps, Anchorage City Planning Commission.
b. Includes 518 trailers, only 5 of which were severely damaged.

Of the 971 units classified as heavily damaged, almost half of them (480) were in apartment houses with more than 40 units. The 219 private homes destroyed were mainly located in the Turnagain Area, the high-rent district of Anchorage, so it is not surprising to find that over three-quarters of them were worth more than $30,000 as shown in Table 3.

Table 3

DISTRIBUTION BY VALUE OF PRIVATE HOMES DESTROYED IN ANCHORAGE[a]

Value of Home, $[b]	Percent of all Homes Destroyed
Under 15,000	2.3
15,000 - 19,999	3.8
20,000 - 24,999	5.0
25,000 - 29,999	12.3
30,000 - 34,999	58.6
35,000 - 39,999	13.8
40,000 and over	4.2
	100.0

a. Source: Federal Housing Administration.
b. Based on 1960 Census figures.

In fact, these figures are undoubtedly underestimated since they are based on 1960 census calculations for blocks most severely affected by the quake. During the last few years houses built in the Turnagain area, and subsequently destroyed by the earth slides, were even higher priced than in 1960.

From this brief survey we can draw the following conclusions regarding potential housing problems:

(1) There were substantial vacancies at the time of the quake but the majority of them were not suitable for most families searching for new quarters.

(2) Although a large portion of the damage was to apartment houses there were still over 200 private dwellings destroyed, most of them belonging to well-to-do families.

2.1.3.3 Relocation of Residents. Most of those who were homeless stayed with friends for several days while deciding what to do. Those vacating apartments were able to resettle themselves fairly easily since they did not have mortgage problems. Homeowners had a more difficult problem for they were confused on the government's disaster policy regarding old unpaid mortgages and new ones. They therefore remained with friends for several weeks until the Federal groups clarified their actions. A few typical examples will illustrate some of the problems faced by residents who lost their homes as a result of the quake.[9]

One family moved four times before they finally resettled in the Anchorage area again. After staying at their local church for several days, they spent a week in an empty house which was still waiting to be rented. During the next several months they used the homes of vacationing friends, and then in the early fall they obtained an SBA loan to build their own home. By October they had moved into the completed basement and were able to remain during the

9. Anchorage Daily Times (March 26, 1965), pp. 41-42. This issue of the newspaper, entitled "The Incredible Year," described the state of recovery in Anchorage and the surrounding area one year following the Good Friday earthquake.

winter, thanks to the help of friends who closed in their garage and loaned them a portable stove so their pipes wouldn't freeze. After a year of make-shift living, this family was able to move into the upstairs portion of their new dwelling.

Another family had worked for seven years on their home while living in the basement and were all set to move upstairs during April 1964 when the earthquake changed their plans. After living with friends in a nearby section of town for several weeks, they were able to find an apartment which satisfied their needs temporarily. A large portion of their old home could still be salvaged and was relocated on property declared geologically sound. By October the family could move into their newly restored home which had a 30-year mortgage instead of the earlier 5-year one.

A third family spent the first five days with friends and then moved in with relatives for about one month. During this time they searched for new quarters and were able to locate a small house in town where they lived until Christmas. They then moved to a place in the area where they used to live intending to stay there until they could rebuild their own house.

These incidents illustrate the importance of friends and relatives in alleviating housing difficulties following the quake. Practically all residents faced with shelter problems utilized private homes until they could calmly decide on a future course of action.

2.1.3.4 Changes in Rents. A survey of post-quake rents by the FHA and real-estate dealers indicated that rents changed slightly, if at all, during the recovery period.[10] Several explanations can be adduced for this constancy of rents:

---

10. These surveys were of an informal rather than an official nature. Real-estate agents claimed that in many cases the rents decreased after the quake, though they also noted several examples of slight increases. The FHA in their analysis claimed that no change in rents took place after the disaster.

(1) The large vacancy rate prior to the quake,

(2) the possibility of staying with friends and relatives until adequate housing was found, and

(3) the reluctance of realtors and contractors to take advantage of those hurt in a natural disaster.

We have pointed out that, although vacancies existed, the units were generally of inferior quality and not in great demand after the quake. On the other hand a need for larger units of better quality existed but few of these were available. Under normal circumstances, such an increase in demand when supply was tight would increase rents on the better dwellings, thus inducing some tenants to leave them and move into the smaller or inferior units. But this did not happen in Anchorage partly because most stranded residents temporarily stayed with friends and relatives while deciding on a future course of action. Immediate pressure on rents from displaced home-owners--those most likely to demand large units--was thus kept to a minimum. At the same time real-estate offices were generally reluctant to list any property or units showing substantial increase over pre-disaster prices. In fact, immediately following the disaster the local realtors spontaneously pooled sources of information on available space where people could relocate. They attempted to keep the lid on prices both because they did not want to exploit unfortunate residents and because they felt that any shortage in housing would be rather short-lived.

2.1.3.5 Conclusions from the Short-Term Housing Experience in Anchorage. If the price elasticity of demand for housing is approximately -1, then the serious damage to 7½ percent of the dwellings in the Anchorage area should have led to a similar percentage increase in prices immediately following the quake if other things are equal.[11] However, several factors helped maintain rents at their disaster level:

---

11. In an empirical study by Richard F. Muth, "The Demand for Durable Goods" (Chicago: Univ. of Chicago Press, 1960), he found a price elasticity of demand of -.904 and an income elasticity of .879.

(1) There were many vacancies at the time of the quake, although this factor along may have had only a marginal effect in keeping rents stable since most of the available units were not suitable for the large families in the area who were displaced by the quake.

(2) Many victims preferred and arranged to stay at the homes of friends and relatives for several weeks or even months following the disaster, thus removing a large source of potential demand.

(3) The real income of the victims decreased. This factor may have been of some importance during the immediate post-disaster period when Federal policies were not determined; residents were uncertain as to what portion of their losses would be recovered. Given the pre-quake structure of rents, it is therefore likely that the demand for housing would fall because of this income effect.

(4) Real estate agents refused to exploit homeless victims, particularly since they felt that any increases in rents due to inadequate supply would be temporary. Several apartment houses were nearing completion toward the end of April not to mention the new homes which would eventually be constructed with SBA money after loans were approved. In the long run, new construction tends to depress rents. On the other hand, an influx of new residents in the area could counteract this influence to some extent by increasing the demand for housing. Of course, during the first few weeks of recovery, the prime concern was cleaning up Anchorage, so there was little speculation on the area's possible future growth. Real estate agents did feel, however, that the supply of housing in the ensuing months would be adequate to meet future demands.

2.2 FOOD PROBLEMS

2.2.1 Other Disasters

Existing literature on other disasters has generally not dealt with food problems arising during the emergency period except for brief references to Red Cross and civil defense rations offered to hungry residents. In part this lack of discussion reflects the psychological and sociological orientation of the studies which precludes much interest in food prices. At the same time, however, we find that, in contrast to Alaska, almost all domestic disaster areas have been sufficiently close to other food markets so that supply

considerations have posed no problem. In fact, the Red Cross claims that in its entire history of disaster experience it has rarely faced a problem of actual food shortages in this country and in fact has noted only one recent case of a serious potential food shortage (that in California in 1964).

California Floods (1964). In December 1964, the small town of Orleans, California (pop. 500) was threatened by a potentially serious food shortage when floods isolated it from the rest of the state. As a result of the flooding, the access highway to Orleans was severed at both ends of town and all supplies had to be carried in by helicopter for almost nine weeks. The Red Cross handled the distribution of good supplies for this entire period, because the sole local merchant was unwilling to go back into business even with Red Cross help. An actual food shortage never did develop but serious potential threats occurred whenever bad weather prohibited the use of helicopters. Food was issued by means of rationing coupons (the normal Red Cross means of issuing food in an orderly manner to those in need) so that prices did not operate to equilibrate supply and demand.

Hurricane Audrey (1957). Normally, disaster in this country does not produce actual food shortages, although potential scarcities do exist. The experience of Cameron, Louisiana following Hurricane Audrey is interesting in this regard since all the stores in the town were actually blown down. Until electricity was restored to the area (9 weeks later) there was no refrigeration in homes or restaurants, so it was necessary for the Army and Air Force to set up mass feeding centers. Local store owners still continued to order food from their normal suppliers (50 miles away) though, in fact, they didn't actually handle the goods. Instead, the Red Cross acted as a middleman by reimbursing the local merchants and distributing the items to the feeding centers. In this way the owners

remained in business despite the unusual disruption of their market and the physical destruction to their stores.[12]

San Francisco Earthquake (1906). Even following the severe San Francisco earthquake and fire in April 1960, food shortages never occurred. In this case San Francisco was also isolated from nearby communities but due more to the absence than the disruption of transportation facilities. The city had very little food on hand as it normally received supplies on a daily basis; any available stocks were destroyed during the fire, which burned the entire wholesale-retail section of the city. Despite over 300,000 homeless residents in need of food, the Citizens' Relief Committee and the Army jointly were able to round up enough vehicles to meet all needs.

2.2.2 Anchorage Experience

2.2.2.1 Market Structure. Transportation considerations are much more vital to the Anchorage economy than of any city in the continental United States because the distance between its nearest source of supply (Seattle) is over 1500 miles. Because there is little backhaul revenue (i.e., freight carriers return from Anchorage practically empty) prices generally range from 20 percent to 100 percent higher than in the "lower 48," depending on the weight of the item carried and means of shipment. Table 4 compares pre-quake food prices (March 1964) in Anchorage Seattle, and the United States (as an average) for a representative list of food items. The figures were obtained from the Bureau of Labor Statistics sample used to calculate the Consumer Price Index.

Price differentials between Seattle and Anchorage were even higher prior to 1960 when the Alaskan community was served solely by small grocery stores with rather high margins.[13] It was therefore

---

12. The merchants' margin was their normal mark-up on wholesale prices.

13. According to surveys by the Bureau of Labor Statistics, food prices in Anchorage rose only 1.3% between March 1959 and March 1965 compared to a 5.0% increase for the nation as a whole during this same period.

Table 4

RETAIL PRICES IN ANCHORAGE, SEATTLE, AND THE UNITED STATES[a]

Food Item	Unit	1964 Prices, $		
		Anchorage	Seattle	US
Bread	1½ lb	0.47	0.25	0.22
Round steak	1 lb	1.36	1.11	1.02
Pork chops	1 lb	1.19	0.93	0.84
Milk, fresh	1 qt	0.45	0.25	0.24
Eggs, large A	1 doz	0.79	0.55	0.54
Apples	1 lb	0.30	0.15	0.16
Orange juice	46 oz can	0.92	0.69	0.65
Fruit cocktail	#303 can	0.38	0.27	0.28
Peas	#303 can	0.34	0.23	0.23
Tomato soup	11 oz can	0.16	0.13	0.12
Coffee	1 lb	0.80	0.77	0.79
Sugar	10 lb	1.69	1.38	1.45

a. Source: Bureau of Labor Statistics

not surprising to find Safeway moving into the area during that year despite the geographic isolation of Alaska from the continental United States.

Before the quake, practically all non-perishable items were carried by boat to the port of Seward, unloaded, and brought by the Alaskan Railroad into Anchorage (160 miles away). Perishable items such as fresh vegetables and meat were generally brought up by truck or plane; items in short supply were also often rushed by one of these faster carriers.[14]

14. It usually takes 8 days from Seattle to Anchorage by ship, 4 days by truck, and 3 hours by jet aircraft.

For the first few weeks following the quake, the bulk of food shipments to Alaska were transported either by truck or plane. Not only was speed essential to minimize shortages but water transportation facilities had been damaged. Seward's facilities were totally destroyed and broken sections of the Alaskan Railroad prevented the ice-free port of Whittier from being used during the first three weeks of April, even though its harbor was unscathed. The Port of Anchorage could still handle a limited number of vessels after the ice was broken, despite some damage to facilities.

Safeway reports that during the first seven weeks after the quake all produce, cheese, eggs, butter, and margerine were carried over the highway rather than by water. Shipments of frozen food and ice cream were sent by truck rather than ship during the first two weeks of April and then normal water shipments were made. The same pattern appears to be true for the smaller Anchorage stores having goods sent from Seattle.

2.2.2.2 Shortages after the Quake. Only one of the two wholesale grocers survived serious damage after the quake so that he was, effectively, the only supplier of dry and canned goods to the area. The other firm was able to salvage some of its dry stock, such as baby food and frozen food, which it stored in several empty refrigerated trucks that had just made deliveries to Anchorage stores.

Despite a number of emergency plane shipments carrying groceries, potential shortages still existed in the area. This phenomenon was due both to the destruction of large quantities of goods as well as unusual demand for certain items. However, the community responded positively to advertisements and verbal warnings not to hoard necessities[15] but rather to purchase the minimum quantity they

15. Cigarettes were apparently not considered a necessity (in the survival sense of the word) since individuals did not hesitate to stock up on their favorite brand, thus creating a temporary shortage during the immediate post-quake period.

would need.[16] Since families were content with substitute products (e.g., apple juice instead of orange juice) when the store ran out of their initial choice, supplies on hand proved adequate. Table 5 lists certain groups of items which experienced unusual demand following the quake and were consequently in short supply.

2.2.2.3 Changes in Prices. During normal times an increase in demand for an item accompanied by a decrease in supply would lead to some increase in the product price. It is therefore interesting to observe that prices remained stable following the earthquake despite the apparent existence of these two conditions.[17] Several factors may have been responsible for producing this stability:

(1) Knowledge on the part of the stores that any shortages in goods would be temporary.

The Federal government was prepared to fly emergency supplies by military or commercial air transport and the Alcan highway and its extension to Anchorage was only slightly damaged so there would be little difficulty in hauling goods up by truck. It would, therefore, be senseless to create ill-will among the residents by temporary price increases for the first few weeks.

(2) A feeling on the part of store owners that any price increase would tend to accelerate migration from Anchorage.

---

16. The Anchorage newspapers played an important role in helping to prevent shortages by running full page advertisements for Safeway urging the residents not to hoard goods, claiming there would be more than enough on hand.

17. In theory it is impossible for prices to remain stable if demand increases and supply declines, unless some form of rationing is instituted. In effect, this is exactly what occurred after the quake but on a voluntary basis. As we have seen, people only bought the minimal quantity needed and were willing to purchase substitute products when the desired one was not available. Both of these actions had the effect of shifting demand far enough to the left so that prices did not rise. It is important to note that this behavior did not cause prices to remain stable; it represented the consumers' reaction to a decision by the stores not to raise them.

Table 5

FOOD ITEMS IN HIGH DEMAND AFTER THE EARTHQUAKE[a]

Food Item	Reason for Increased Demand
Main meals: Beef stew Corned beef hash Canned spaghetti Canned luncheon meats (e.g., Treat, Spam) Vienna sausage Pork and beans	Limited cooking facilities were available after the quake and these dishes could, if necessary, be eaten cold.
Canned juices: Orange juice Grapefruit juice Apple juice Blend Pineapple juice Hawaiian juice	Contamination of water supply necessitated drinking substitutes.
Pre-sweetened dry cereals: Frosted flakes Sugar flakes	Easy to prepare--no sugar needed.
Cold water "ALL"	Hot water shortage--"ALL" is the only detergent that advertises that it can clean clothes in cold water.
Bleaches: Clorox Purex	Decontaminates the water supply and makes it potable.
Flashlights and batteries	Substitute for electric lights.
Paper items: Plates, cups, forks, spoons	No washing facilities for dishes.
Charcoal	Utilized for cooking since stoves could not be used.
Cigarettes	Possible fear that shortages would result after several days. Some hoarding.
Snack items: Cookies, candies, crackers	No preparation needed--satisfies hunger pains
Electric light bulbs	Needed four to five weeks after the quake when electric power was restored.

a. Source: J. B. Gottstein and Company (wholesale grocers).

People in the area suffering extensive damage to home and business were in no position to accept higher food bills with equanimity, particularly since they were uncertain as to what role the Federal government would play in helping them to recoup their losses. From a long-run point of view the stores would want to keep as many Anchorage customers in town as they could.

(3) The establishment of a committee on economic stabilization under the Office of Emergency Planning to monitor wage and price changes.

Surveys were made of pre- and post-quake differences in food prices to determine whether any inflationary trend had developed because of shortages. Stores may have feared that government controls would be slapped on them if they permitted food prices to get outside normal lines.

(4) A community feeling following the quake that everyone had to make some sacrifices in order to help Anchorage rebuild.

The natural disaster brought individuals closer together than they had ever been before so that normal impersonal market phenomena were colored by personal feelings.

Although the first three factors undoubtedly influenced price behavior, we would argue that the fourth reason was largely responsible for the non-inflationary trend particularly during the first few weeks in April. Studies on other disasters indicate that during the immediate recovery period, community feelings largely dominate individual actions. Store owners with largely undamaged stocks realized they were more fortunate than others and therefore were willing to sacrifice some profit by helping those who suffered losses.

Evidence on this point was gleaned from talking with a Safeway manager in Anchorage who was given the authority to change prices as he saw fit. On some items where there was great demand following the quake and a potential shortage he even lowered prices rather than raising them as economic logic would dictate. For example, a can of orange juice normally selling for $.55 was reduced to $.34 during

the first two weeks of April. No ads announced these reductions; the housewife just saw the new price on the item as she took it from the shelf. In normal times the consumer would have purchased large quantities of the goods knowing that this low price would be temporary. Hoarding never did occur, however, despite the absence of direct controls, because of a concern for other people's needs.

At the same time the trucking companies in Seattle cooperated by lowering their freight rates during the first two months so that they were the same as water charges. These reductions only took place on items which could not be shipped by boat because of space limitations or the need for rapid delivery.

Table 6 presents the Safeway prices of items in high post-quake demand and some of the normal market basket goods used by the Bureau of Labor Statistics in computing the food component for the Consumer Price Index. Prices are listed for the Monday preceding the quake, the two consecutive Mondays following it, and for bi-weekly periods thereafter through the middle of June.[18]

During the month of April Safeway refrained from raising Anchorage prices when normal market advances[19] were suggested; by May they decided that the city was no longer in an emergency state so that increases were put into effect on these items.

2.2.2.4 Conclusions from Short-Term Food Experience in Anchorage. Several conclusions can be drawn from this study of food problems in the Anchorage area after the Good Friday earthquake:

(1) Despite emergency plane shipments, the threat of shortages of certain goods existed in the area during the first few

---

18. The Bureau of Labor Statistics and the Agricultural Experiment Station undertook a series of surveys on food prices in five Alaskan cities (Seward, Kodiak, Valdez, Anchorage and Fairbanks) from April through September 1964. They found that prices remained relativel stable except in the outlying towns of Seward and Kodiak where higher transportation costs led to increases for some items during the immediate post-quake period.

19. A market advance represents an increase in price due to a decrease in the supply of the item throughout the country. Market declines (i.e., lower prices) reflecting increases in the supply of certain products were never discontinued after the quake.

Table 6

PRE- AND POST-EARTHQUAKE RETAIL FOOD PRICES IN ANCHORAGE FOR SELECTED ITEMS[a] (March 23 - June 15)

Food Item	Unit	Price, $[b]							
		March 23[c]	March 30[d]	April 6[d]	April 20	May 4	May 18	June 1	June 15
Normal Market-basket Goods:									
Bread, Mrs. Wrights White Std Lge Loaf	22½ oz	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Round Steak, Bone-in, US Choice	1 lb	1.39	1.39	1.39	1.39	1.29	1.29	1.29	1.29
Pork Chops, Loin, Center Cut	1 lb	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Milk, Fresh, Lucerne	qt	0.45	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Eggs, large, Grade AA, Cream of the Crop	doz	0.77	0.77	0.75	0.75	0.75	0.75	0.75	0.74
Fruit cocktail, Townhouse	#303 can	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Peas, sweet, Townhouse	#303 can	2/0.49	2/0.49	2/0.49	2/0.49	2/0.49	2/0.49	2/0.49	2/0.49
Tomato soup, Campbells	10½ or 11 oz	2/0.31	2/0.31	2/0.31	2/0.31	2/0.31	2/0.31	2/0.31	2/0.31
Coffee, Edwards	lb	0.83	0.83	0.83	0.83	0.83	0.87	0.87	0.87
Sugar, paper bag, cane, Candi Cane	10 lb	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65

Table 6
(Continued)

Food Item	Unit	Price, ¢[b] March 23[c]	March 30[d]	April 6[d]	April 20	May 4	May 18	June 1	June 15
High-demand goods:									
Canned beef stew	24 oz	0.65	0.65	0.65	0.65	0.65	0.69	0.69	0.69
Canned corned beef hash	24 oz	0.79	0.79	0.79	0.79	0.79	0.79	0.85	0.85
Canned luncheon meat, Spam	12 oz	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Fream	7 oz	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Orange juice, Townhouse	46 oz can	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Grapefruit juice, Townhouse	46 oz can	0.63	0.63	0.63	0.63	0.69	0.69	0.69	0.69
Apple juice, Townhouse	46 oz can	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Clorox	½ gal	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Flashlight, Eveready		0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Flashlight batteries, Eveready		2/0.39	2/0.39	2/0.39	2/0.39	2/0.39	2/0.39	2/0.39	2/0.39
Paper plates	35's Dixie 9"	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Charcoal briquets	10 lb	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Cigarettes	Carton - all brands & sizes	2.79	2.79	2.79	2.79	2.79	2.79	2.79	2.79
Cookies	2 lb	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49

a. Source: Safeway stores
b. Underscored numbers indicate price changes
c. Monday preceding quake
d. Successive Mondays following quake

weeks following the disaster. Large quantities of food were destroyed while at the same time certain items experienced unusual demand because of damage to public utilities (e.g., the need for canned juice due to contamination of the water supply).

(2) The public responded to advertisements and public warnings not to hoard necessities and were willing to use substitute products if the store ran out of their initial choices; as a result, shortages never materialized.

(3) Retail stores kept food prices stable and even lowered a few of them during the first month following the quake. Community feeling and the knowledge that any shortage would be temporary appear to be largely responsible for this action.

2.3 DEMAND FOR SPECIFIC ITEMS IN ANCHORAGE

It is highly likely that physical damage to an area will trigger an increase in demand for rather specific items. These demands, the so-called derived disaster demands caused by the Alaskan earthquake, are discussed in this section with particular attention to whether the resources were available in the Anchorage area or had to be imported from regions outside the disaster zone.

Auxiliary generators. Destruction of power lines in many parts of Anchorage necessitated the use of emergency generators at several of the local hospitals. Elmendorf Air Force Base used over forty auxiliary power units to restore electricity and light despite crumbled masonry, shattered light fixtures, and broken glass. In practically all the outlying towns electric power was either completely cut off or drastically curtailed during the first few days after the quake.[20] For example, on Easter Sunday nine 30-kilowatt generators were flown into Seward to provide emergency power for its hospital, and two smaller 1½-kilowatt generators were furnished for the airfield control facilities.

Flashlight batteries. Since the sun set within an hour after the quake, flashlights and extra batteries were needed almost

20. The one major exception was the port of Whittier, where electricity was restored in six hours and water was running in ten.

immediately. One Anchorage resident volunteered 2000 batteries which he was able to salvage from his store, but an order for more still had to be placed to Seattle.

Heat. With many houses badly damaged, heat became a rather scarce commodity in most areas. Therefore, it is not surprising that a number of space heaters were ordered from the "lower 48." The Navy and Red Cross also flew over 1000 blankets from Seattle to Kodiak the day following the quake.

Bulldozers. Highway destruction spurred the demand for bulldozers and snow cats to clear the debris and make the roads passable. We have already seen that the most immediate need for this equipment was on the Anchorage-Seward highway where the military was attempting to reach Seward by road six hours after the quake.

Water. In almost all areas sewer facilities were severely damaged, thus contaminating the water supply. In Anchorage there were as many as 33 water trailers at hospitals, in school yards, and at major public buildings to provide water for the residents.[21] Similar trailers and purification units were also flown from Anchorage to the out-lying villages.

Typhoid protection and water purification. Fear of contamination from the damaged sewers necessitated typhoid shots to 24,000 Anchorage residents, with the serum and injection needles shipped from Fairbanks. An increase in the demand for halezone and other purification tablets also resulted from this need to safeguard the drinking water.

Pipe. Serious damage to underground sewerage facilities in the Anchorage area triggered a large order of aluminum piping from the "lower 48." To provide water to the residents, large sections of this piping (9 miles) coupled with garden and fire hosing (12½ miles) were laid directly on the ground. Although the system served its purpose well during the summer, it was necessary to restore the

---

21. This equipment was obtained from the Fort Richardson water purification plant.

underground facilities by September to prevent freezing of the pipes when winter set in.

Toilet facilities. Damaged toilet facilities necessitated an emergency order of 1000 folding camp-style stools and 100,000 plastic refuse bags. To many people, these two items became the symbol of post-quake Anchorage since there were so many of these portable outhouses around the town.

The availability of military supplies (e.g., generators, water-trailers, bulldozers) greatly facilitated emergency operations during the immediate recovery period. However, the localized nature of the disaster did not make it difficult to import demanded items which were not available, although there was some delay between the recognition of the need for certain resources and their actual arrival.

2.4 RECAPITULATION

Most supply and demand problems facing an area hit by a natural disaster are generally short-run in nature because of the aid forthcoming from outside regions. Even when the threat of shortages does exist the concern of residents in the community for the plight of others helps to minimize serious problems during the emergency period.

From the economic point of view it is important to note that post-disaster behavior by individuals helps to eliminate a source of demand for some commodities, thereby tending to keep prices lower than they would be if the same conditions of scarcity arose in a more normal, impersonal market situation. For example, if people remain with friends and relatives, a large demand for housing is temporarily taken off the market, thus minimizing any pressure on rents. Possible food shortages are avoided for the same reason--residents respond to urgings not to hoard and are easily satisfied with substitute products when their first choice is out of stock. Realtors and store owners are also hesitant to raise rents or food

prices during the emergency period; in fact, selective reductions are often put into effect temporarily.

Naturally, the restraining actions on the part of both consumers and merchants are affected by future expectations. Because the availability of outside aid tends to make supply very elastic, shortages of resources are felt to be short-lived. Of course, this promise of support by non-affected regions is just another element in the pattern of disaster response indicating that economic behavior during the recuperation period is influenced by sociological and psychological factors.

PART II

LONG-TERM ECONOMIC RECOVERY

3

FRAMEWORK FOR THE ANALYSIS OF LONG-TERM ECONOMIC RECOVERY

The framework for this analysis of the long-term economic implications of a disaster is the effect of the event on the capital/labor ratio in the stricken area. It is important to distinguish two types of damage in the capital/labor ratio: a change caused solely by the disaster itself, and changes resulting from a flow of money, resources, and people over time.

Thus, for example, at 5:35 pm, just before the Good Friday earthquake, the Anchorage area had 83,000 inhabitants and capital stock (in its most general form) of approximately $1 billion--a ratio of about $12,000 per person. As a direct result of the quake the population was reduced by 115 people while the loss in capital was estimated to be over $165 million--the new ratio was reduced to $10,000 per person. Over time this ratio may change due to the flows mentioned above: aid from the Federal government for reconstruction would change the capital component and movements of people into and out of the area would affect the labor component.

Our general thesis can be stated very simply: If a disaster lowers the capital/labor ratio--i.e., results in large physical losses but few losses of human resources--recovery will be rapid if external funds are made available. If external funds are limited or difficult to obtain, recovery from similar destruction will be slow. The disastrous Skopje earthquake of July 1963 is a case of severe reduction in capital/labor ratio when limited external funds were available. Some of her reconstruction problems will be discussed in Section 4.

In the Alaskan recovery, the large amount of external aid and a sufficient labor force promised a very speedy recovery but there

were counteracting forces. The need for soil tests and geological evaluations and the lengthy debates on the kinds of facilities to rebuild often delayed reconstruction, particularly in the smaller communities where entire sections had to be moved.

A Presidential commission, headed by Senator Clinton Anderson (New Mexico), was in charge of directing recovery operations. This group and other Federal agencies were responsible for compiling damage estimates and revising them over time. These figures are presented in Section 5.1 along with tables on the sources of funds for recovery. The adequacy of the labor force was influenced in part by migration patterns normally occurring after a disaster. The post-quake movements into and out of Anchorage are analyzed in Section 5.2 in order to determine whether a sufficient number of men were available for reconstruction work. After studying the sources and uses of capital and labor we are able to better understand the reasons for the rapid recovery of Anchorage and the slower rebuilding process in the outlying communities. The progress of reconstruction activity is detailed in Section 6; several reasons for the differential rates of reconstruction are also advanced.

Long term economic recovery from a disaster usually produces some economic improvements. It is obvious, for example, that in the long run southcentral Alaska will benefit greatly from the Good Friday earthquake. To provide some perspective on Alaska we will detail the social and economic changes resulting from the Halifax port explosion in 1917. The long-term improvements in Alaska discussed in Section 7 are the rebuilding of Seward, the modernization of the fishing industry, and the apparent lengthening of the construction season.

4

THE RECOVERY OF SKOPJE[1]

The sympathetic reactions of outsiders to a stricken area generally are of short duration so that long-term recovery solutions are not much affected by aid from other countries. This is illustrated by the recovery of Skopje, Yugoslavia from a violent earthquake on July 26, 1963, which took over one thousand lives and caused approximately $1 billion worth of damage.

Just one week after the disaster, Yugoslavia's inner circle held a conference on the island of Brioni and issued an appeal urging the entire nation to participate in a five-year reconstruction plan. The program called for accommodations to be provided for 125,000 people by the end of the year--50,000 in repaired buildings and 75,000 in new prefabricated houses. A moratorium would be declared on all debts in Skopje and new credit would be extended. To pay part of the cost of reconstruction a national loan would be floated, and the assistance of other countries would be sought for the remaining funds.

There was no difficulty in obtaining the necessary labor supply for the proposed recovery work, even though a mass emigration of population occurred immediately following the quake. Out of a normal population of 200,000, approximately 120,000 left the area, but within several months most had returned. Many other workers also entered to help with reconstruction. Since wages in other parts of Yugoslavia are normally higher than in Macedonia, these outsiders were given

---

1. The information in this section is taken primarily from an article by Eric Larrabee, "Letter from Skopje," The New Yorker, October 17, 1964, Vol. 40, pp. 131-184.

special bonuses for coming to Skopje, many of them receiving as much as ten times the national average.[2]

The real problem has been obtaining the necessary capital to permit an active rebuilding program. According to the Skopje committee the total value of all aid from abroad at the end of the first year was only $70 million. The lowest estimated cost of reconstruction would require drawing one percent of Yugoslavia's national income for ten years, and the country has not been able to supply that amount of money.[3]

As a result there has been little permanent rebuilding in Skopje. A large proportion of the damaged structures have simply been propped up and plastered together, very frequently by the individual owners themselves, thus creating the impression of a masterpiece in patchwork.

Undoubtedly the small amount of capital trickling into Skopje has hindered their recovery efforts and resulted in makeshift types of reconstruction. As we shall see, this picture is in direct contrast with Anchorage, where reconstruction from the start took a more permanent form.

2. Most of this assistance was supplied during the emergency post-disaster period.

3. In order to house the large influx of people, a number of suburban communities consisting of pre-fabricated dwellings have mushroomed on the outskirts of Skopje. Since it appears that these temporary buildings may become more permanent structures than was originally anticipated, there is some talk that eventually they will be laid out in conformity with an overall ultimate plan for the city.

5

ELEMENTS OF THE ALASKAN RECOVERY

5.1 EXTERNAL AIDS

5.1.1 Formation of the Anderson Commission

Several days after the quake it became c[illegible] that the damage to southcentral Alaska was so great that some coordinating committee would be necessary to supervise reconstruction activities. The need for such a committee was reinforced by the transitional status of Alaska as a new state and its limited financial and industrial resources. The Office of Emergency Planning could not be used because its responsibility ended as soon as the communities could operate in a normal, if still a makeshift, way. The Federal Reconstruction and Development Planning Commission, which President Johnson established by an Executive Order, had a longer-term purpose. Its main objective was to ensure that recovery and reconstruction proceeded in the most effective way in terms of long-run economic development for the state and short-run economic stability.[1]

The Commission, which came to be known as the Anderson Commission because it was chaired by Senator Clinton P. Anderson (New Mexico), consisted of the President and his Cabinet, as well as the Director of the OEP, the Administrators of the Federal Aviation Agency (FAA),

1. The need for a coordinating committee in Alaska was actually recognized before the Good Friday earthquake. In 1963 a joint Federal-State Economic Development Planning Commission had been proposed but the plan was shelved after the assassination of President Kennedy. The commission established by President Johnson was modeled after the earlier draft orders except that the group was given the responsibility of taking measures, if necessary, to maintain economic stability during the immediate post-quake reconstruction period.

Housing and Home Finance Agency (HHFA) and the Small Business Administration (SBA), and the Chairman of the Federal Power Commission. Nine task forces were established under the Commission including groups on economic stabilization, housing, and industrial development. With the aid of a counterpart state organization, the Commission had three main responsibilities:

(1) To assess the damage to public and private facilities and undertake surveys to indicate where reconstruction could take place.

(2) To coordinate plans for reconstruction and development in the areas affected by the quake so that optimum benefits could be obtained from the expenditure of Federal, State, and local funds.

(3) To recommend both immediate and long-range programs which could be carried out by various government agencies. Additional legislation might be necessary to cope with the unusual situation in Alaska and this was also to be proposed by the Commission.

Thus within a week following the earthquake an elaborate organization had been established to cope with the economic recovery. While state civil defense was most effective in coordinating the recovery during the first few days, the Anderson Commission took over this function by the end of the first week in April.

5.1.2 Damage Estimates and External Aid

After investigating the effects of the earthquake, the American Institute of Architects noted that it was almost a miracle that the damage was so mild. The quake occurred during a low tide--schools were out of session and there was no panic. Despite these favorable circumstances, there was still large private and public property damage throughout the area; the total loss of lives was relatively light (115 people) although the small communities were hit fairly hard in proportion to their population. Table 7 lists the population (1960) and the number of fatalities as well as those injured and hospitalized for each of the communities in southcentral Alaska.

Table 7

EFFECTS OF GOOD FRIDAY EARTHQUAKE ON
POPULATION IN SOUTHCENTRAL ALASKAN COMMUNITIES

Community	Population (1960)	Killed	Injured	Hospitalized
Anchorage	83,000	22	212	29
Cordova	1,800	28	9	1
Kodiak	7,200	19	74	5
Seward	3,000	14	126	50
Valdez	555	32	87	7
Total	95,555	115	508	92

Although there was extensive physical damage to the entire area affected by the quake, initial reports tended to exaggerate the losses. Perhaps this is a natural phenomenon following a disaster since it initially may be difficult to determine whether certain buildings and facilities can be patched up or will have to be reconstructed. Therefore it would be logical to assume the worst in the absence of contrary evidence, particularly if external funds are to be allocated on the basis of original estimates.

Table 8 indicates the changes in estimates to state and local public facilities for the communities affected by the quake. These figures, based on Anderson Commission reports,[2] indicate a general downward trend over time. The estimates given towards the end of Ju June still had to be considered preliminary. A more detailed analysis of Anchorage will show that the actual expenditures necessary to repair state and local facilities was considerably less than the $57.3 million total shown in Table 8 (see pages 67-68).

5.1.3 Sources of Funds

In recent years the Federal government has played an increasingly important role in aiding the recovery of disaster areas. The Alaska

2. Damage estimates were calculated on the basis of current replacement cost of facilities. They were obtained through surveys by the Corps of Engineers, the Bureau of Yards and Docks, and the Federal Aviation Agency.

Table 8

CHANGES IN DAMAGE ESTIMATES TO STATE AND LOCAL PUBLIC FACILITIES IN SOUTHCENTRAL ALASKA

Area	Damage Estimate (thousands of dollars) Late April 1964[a]	June 25, 1964[b]
Anchorage[c]	52,260	7,267
Cordova	625	237
Homer	5,500	203
Kenai	400	10
Kodiak	2,255	2,313
Palmer	10	10
Seldovia	2,334	1,334
Seward	17,333	9,590
Spenard	5,000	5,000
Valdez	4,833	3,217
"Alaska General"[d]	12,000	14,801
Total	102,910	83,982

a. Total Federal Reconstruction and Development Planning Commission for Alaska, Weekly Report, May 8, 1964.
b. Housing and Home Finance Agency, letter to the Federal Reconstruction and Development Planning Commission for Alaska, June 2 June 26, 1964.
c. Does not include damage to Anchorage public schools.
d. Contains damage to state buildings in various parts of Alaska.

situation was particularly critical since the area depends heavily on two military bases (Fort Richardson and Elmendorf Air Force Base) as well as a large number of Federal government facilities. Washington, therefore, felt it would be necessary to provide unprecedented aid to help the area back on its feet.

Table 9 lists the amounts and uses of grants to restore public and private facilities damaged or destroyed by the earthquake. In general, all public buildings and facilities were covered by Public Law 875, and the Corps of Engineers did the lion's share of the

repair work.[3] As can be seen from the figures, there was extensive damage to transportation facilities, although the $60 million from the Bureau of Public Roads covers substantial improvements and widening of the highways over their pre-quake status. The Urban Renewal figure represents the Federal government's share of the work; the remaining portion (25 percent) is paid by the local communities themselves. One year after the quake most of this work had not progressed past the planning stage.

The Small Business Administration was largely responsible for aiding the private sector as shown in Table 9. Because of the magnitude of the disaster and the vast rebuilding program it necessitated, SBA modified its policy by making broader and more liberal loans than they had done following other disasters.[4]

Farmers who suffered damage to their homes and property were able to obtain loans through the Farmers Home Administration. The agricultural areas were apparently only mildly affected by the disaster since only 39 loans were made totaling $259,030.

The Bureau of Commercial Fisheries was extremely helpful in getting fishermen back on their feet. During April 1964, the US Senate passed two statutes enabling this agency to make loans for repairing damaged vessels or securing new ones. Fishermen were also permitted to borrow funds for chartering vessels, so they would not miss the season's catch.

The final item in Table 9 refers to the forgiveness provisions applied to mortgages held by financial institutions on severely damaged homes. Soon after the earthquake the Federal National Mortgage Association (FNMA) passed an unprecedented ruling forgiving indebtedness o on outstanding mortgages which they held. Homeowners suffering severe damage were permitted to pay $1,000 in order to relieve them of all obligation; naturally they surrendered equity on the home if it still

---

3. The Bureau of Yards and Docks was in charge of restoring the Naval facilities on Kodiak Island.

4. For descriptions of these changes see Appendix A.

Table 9

SOURCES AND USES OF RECOVERY FUNDS IN SOUTHCENTRAL ALASKA[a]

Source	Use	Amount Millions of $ (Approx.)
	Public Sector	
President's Disaster Fund (PL 875)	Restoration of Public Facilities	58.0
Corps of Engineers		50.1
Bureau of Yards & Docks		2.3
Federal Aviation [illegible]ncy		.8
Other Agencies		.3
		4.5
Bureau of Public Roads	Restoration of highways	37.5
Housing & Home Financing Agency	Urban renewal projects in Anchorage and other communities	27.4
Department of the Interior	Restoration of Alaska railroad	27.0
Bureau of Indian Affairs	Rebuilding Indian villages	.4
Bureau of Reclamation	Repair of federal hydroelectric dam	3.0
Ford Foundation	Grants to education	1.0
Total funds for public sector		154.3
	Private Sector	
Small Business Administration	Loans for repair and reconstruction of public and private facilities	82.2
Bureau of Commercial Fisheries	Loans for repair and replacement of fishing vessels	1.0
Rural Electrification Administration	Loans for repair of cooperative electric power	.1
Farmers Home Administration	Loans for repair and reconstruction of farm dwellings	.3
Federal National Mortgage Assoc and "1964 Alaska Omnibus Act (amended)"	Forgiveness on mortgage and other indebtedness	2.4
Total funds for private sector		86.0

a. Source: Estimates from Federal agencies providing aid to public and private sector (May 1966).

existed.[5] This provision spurred Congress to amend the "Alaska Omnibus Act,"[6] thus permitting victims holding mortgages with private institutions to pay $1,000 for retiring their outstanding debt (not to exceed $30,000 per home). As a criterion for this forgiveness, damage to the property had to be greater than 60% of its value. The state and federal government will equally share the cost of reimbursing the financial institutions who held these mortgages. The latest estimate by the state of Alaska on the total cost of this forgiveness provision is $2 million.

It should be made clear from the above discussion that the Federal Government was willing to modify its concepts of disaster loans and grants and provide sufficient capital to help southcentral Alaska fully recover.

5.2 LABOR MIGRATION PATTERNS

Changes in the labor force in a stricken area reflect some discernible patterns in post-disaster migration. With respect to outward movements, it is important to distinguish between voluntary departures and evacuations. If a person leaves the area voluntarily, he is understood to have had the choice of staying; a person evacuating the disaster zone was forced to leave, e.g., his home may have been destroyed and he could not find other shelter in the community. Although both types are classified as migration, and are therefore not statistically distinct, from a qualitative point of view they are significantly different.

5.2.1 Migration from Other Disasters

Evidence from many other disasters indicates that post-disaster migrations follow a common pattern:

---

5. The FNMA took over the mortgages of 25 homeowners whose residences were totally destroyed or irreparably damaged. Although the total value of the debts incurred was $475,000, FNMA kept its expense down to $410,000 through its receipts of the token $1,000 payments and some slight recovery on the property which they took over.

6. PL 88-451 "Alaska Omnibus Act (Amended" 88th Congress, Aug. 19, 1964.

(1) If families do leave the area they insist on remaining together as a unit while they are in temporary quarters.

(2) Whenever possible they reside with close friends or relatives in the same community. If at all feasible residents will attempt to restore or repair their own dwelling rather than look for a new one.

(3) Residents leave the area voluntarily only when strong warnings indicate possible destruction, and even then many remain.

(4) Convergence problems are often caused by the large numbers of immigrants seeking work or just viewing the disaster damage. These patterns can be seen in the migration behavior following several domestic and foreign disasters described below.

5.2.1.1 Patterns of Migration from a Disaster Area. White County (Arkansas) Tornado (1952). The Arkansas tornado of March 1952 destroyed and damaged a number of homes in the White County[7] area. Despite cold and inclement weather during the night following the disaster, residents preferred to remain in their own dwellings even though many of them lacked windows, heat, gas, or electricity. They "took shelter elsewhere only when their own living quarters were completely unlivable."[8] Of those forced to leave their own homes, only five traveled out of the county and one left the state; the others remained close to their original homes. Of the latter group over half stayed with relatives and another 20 percent with friends. Practically no one chose to live in hotels, with strangers, or in mass shelters.[9] Less than one percent of all displaced families were forced to separate; some of them actually refused shelters because they could not be accommodated together. Each resident desired to reoccupy his old home just as soon as it was made livable again. Several families even returned before their dwelling was repaired,

---

7. Eli S. Marks, Human Reactions in Disaster Situations, Chicago: University National Opinion Research Center, Report No. 52, University of Chicago, June 1954.

8. Ibid., p. 168

9. We can assume that the remaining group of evacuees found apartments or homes somewhere in town, although it is not stated in this Study.

preferring to live in tents or trailers on their land rather than to remain in more distant shelters.

Disasters with Warning Period. In disasters preceded by a warning period[10] or which are reasonably likely to recur in the near future, a different migration pattern prevails. Voluntary migration to a safer region is not unusual with husbands often remaining while wives and children depart. In the wartime bombing experiences of England Germany, and Russia, many wives and children were sent away before the attacks reached their peak intensity. The number leaving Great Britain alone reached 3½ million during the months of July to September 1939.[11] Following the Winstead, Connecticut flood (1955), many parents sent their children to stay with relatives in other areas due to the fear of a typhoid epidemic.[12] In many health disasters, such as polio epidemics, children are often sent to safer communities. The distance that migrants must travel naturally depends on the size of the danger zone. In the cases of localized floods and epidemics, it is not necessary to travel very far. On the other hand, during the London bombings, many families fled to Canada or even Australia.[13]

5.2.1.2 Patterns of Migration to the Disaster Area. Halifax Explosion (1917). One of the few times a record has been kept of migrants entering a disaster area was the period following the Halifax

10. Tornado warnings will rarely trigger any out-migration since the storms are so erratic that people would not know where to move.

11. Fred C. Ickle and Harry V. Kincaid, Social Aspects of Wartime Evacuation of American Cities, Committee on Disaster Studies, National Academy of Sciences, National Research Council, Washington, D. C., 1956, p. 9.

12. Fred C. Ickle and others, Withdrawal Behavior in Disasters: Escape, Flight, and Evacuation of Movements, Committee on Disaster Studies, AAS-ARC, Washington, D. C., April 1957, p. 52.

13. The choice of area was often based on the possibility of staying with friends and relatives.

explosion and fire of 1917 which damaged $35 million worth of property and produced 8000 casualties (15 percent of the population).[14] Immediately after the disaster the Red Cross and other relief groups entered the community to coordinate relief and rehabilitation operations. By establishing a thorough system of personal identification they were able to unite family members and identify victims with a minimum amount of delay. Gradually, this system was extended to cover all incoming personnel. Their figures show that approximately 3500 individuals entered Halifax within the first three months following the explosion and at least 2300 of these actually found jobs in the city during this time.[15] No records were kept beyond the initial three-month recovery period. Nevertheless, population figures show that approximately 2000 new residents were living in the city one year after the disaster.[16]

Waco Tornado (1953). The tornado in Waco, Texas on May 11, 1953, illustrates problems of both mild and severe convergence.[17] Immediately following the disaster a large number of would-be helpers entered the disaster area. The police with the aid of the Air Force, however, were able to control this influx fairly well and after two days had succeeded in establishing an efficient system of work-passes for all incoming vehicles and persons. However, on the weekend following the disaster, the traffic problems created by thousands of sightseers became unmanageable. Crowds were so great that police were unable to keep them out of the city, and cars were lined up for miles trying

---

14. Samuel H. Prince, "Catastrophe and Social Change," from the journal Studies in History, Economics and Public Law, Vol. XCIV, No. 1; Columbia University, New York, 1920. The Halifax catastrophe will be discussed in detail in the section on economic improvements following a disaster (see pp.

15. There undoubtedly were more than 2300 in-migrants who were employed in the city. This figure represents only those who were actually registered as working.

16. Ibid., p. 129.

17. Harry Estill Moore, Tornadoes Over Texas, (Research publication in mental health for the Hogg Foundation), University of Texas: Austin, Texas, 1958.

to get into the devastated area. Many autos were abandoned while visitors proceeded on foot, thus adding to the jam. It was estimated that over 10,000 sightseers were idly standing around on just one intersection where damage had been especially severe. Work had to be stopped for the day as trucks could not push their way through the mobs. Police noted that there was even a sky traffic jam as many small airplanes buzzed the city for a bird's eye view.

5.2.2 Anchorage Experience[18]

5.2.2.1 Migration from Anchorage. The record of other natural disasters suggests that there will be little out-migration from an area unless prolonged warnings of possible destruction are issued. The movements from Anchorage following the quake conformed largely to this pattern. The main stimulus triggering the outward flow appeared to be the series of rather severe aftershocks which occurred in the area during the first few weeks after the big quake.[19] This voluntary out-migration can be compared with the evacuation of certain areas of Europe during World War II in anticipation of future bombing.

In general, the immigrants from Anchorage were wives and children who decided to stay temporarily with relatives in the "lower 48" while rebuilding took place; husbands remained in the area to aid recovery operations. Since the earthquake covered such a wide area the

---

18. The analysis of migration behavior following the quake will be confined to Anchorage because this is the only community for which meaningful data are available. For the same reason we have been able to give detailed figures on reconstruction activity only in Anchorage; the rebuilding pattern in other areas will be discussed in much more general terms.

19. An analysis of seismographic readings on the Richter scale indicates that there were three shocks having a reading of 6.5 or over following the Good Friday quake, which had a record-breaking 8.5 magnitude. In an unpublished report by Dr. Rodman Wilson and Dr. William J. Radar, "A Study of Reactions of Alaskans to the 1964 Earthquake" (February 19, 1965), the authors claimed that there was a significant relationship between the magnitude of the aftershocks and the out-migration from Anchorage. The only statistical analysis performed with the data, however, was a graph relating out-movements from the city to the size of the aftershock.

closest "safe" places to which residents could migrate were Fairbanks (437 miles away) or Juneau (512 miles away); most of the Anchorage emigrants preferred to make the longer trip into the continental United States where they could stay with close friends or relatives.[20]

The number of residents actually leaving Alaska was relatively small as can be seen from the detailed discussion in Appendix A, which we will briefly summarize here.

Data from the Canadian border station and Anchorage International Airport are presented in Appendix A (Table A-1) to depict the increased outbound movement. Since the airplane figures include the many government officials and survey teams flying into and out of Anchorage after the quake, it is impossible to isolate the local departures from the overall totals. By using only automobile data we still find that passenger traffic in April 1964 (3000 passengers) was about double the figure for the same period in 1962 (1500) and 1963 (1600) despite no discernible change in pattern for the first three months of the year. By May the traffic had become only slightly higher than normal. A conservative estimate of the number of out-migrants would, therefore, be the 1500 increase in passengers leaving Alaska by car.

Monthly enrollment changes in the Anchorage public schools may provide a more meaningful indicator of out-migration. These data, presented in Appendix A (Table A-2), also indicate that the only notable decline in school population occurred in April. To gain some idea of the total out-migration caused by the quake, we have inflated this drop in school children by the ratio of Anchorage population to total school enrollment at the time the disaster occurred. The resulting figure of 2074 somewhat overestimates the flow from the city because many wives migrated alone with their children while the husband remained in Alaska to help in the rebuilding.

Rather than trying to pinpoint an exact total with the limited data available, we have simply postulated that out-migration from

---

20. In contrast to the Anchorage emigration to the "lower 48," the vast majority of the evacuees from Valdez drove to Fairbanks (363 miles away) immediately following the disaster.

Anchorage lay somewhere between the 1500 passenger increase in automobile traffic for April 1964 compared with the previous two years and the 2074 figure obtained by inflating school enrollment changes.

5.2.2.2 Migration into Anchorage. Estimates of the number of people migrating to Alaska following the quake can be obtained from inbound traffic data and labor market employment statistics. These figures, discussed in detail in Appendix A, will be briefly analyzed here.

Despite an announcement by Governor Egan several days after the quake that recovery needs could be adequately met by local residents, automobile traffic to Alaska increased greatly. According to Inspector William Craig at the Tok, Alaska border station the increased traffic during the months of April and May represented men seeking employment in Anchorage. Many of these individuals had done construction work during pervious summers and decided to return earlier than usual;[21] others who were unemployed in the "lower 48" hoped to find work up north.

Both the contract construction and government sectors experienced a rise in employment as a result of the quake. Surprisingly enough, the total monthly labor force (employed and unemployed) rose only slightly between March and April 1964 when compared with the substantial increase in migration to the Anchorage area. Rather than concluding that the large number of arrivals were not seeking work in the area, it is safer to assume that many residents normally in the work force were omitted from the totals because they were cleaning up debris to re-open their business. Therefore, what appears to be only a slight increase in the labor force between March and April may, in fact, be a substantial rise.[22]

---

21. During normal times summer employees arrive toward the end of May and early June for the start of the construction season.

22. According to the Anchorage Market Newsletter (April 1964), the in-migrants comprised a large fraction of the total unemployed in the area.

Inspector Craig felt that the increased traffic during the summer could be attributed to Alaskans returning from the "lower 48," either to resettle or rejoin their husbands who had remained after the quake. School enrollment figures for September 30 bear out this contention, as shown in Appendix A (Table A-2). After eliminating the difference between out-going twelfth grade and incoming first grade, the adjusted number of students enrolled on September 30, 1964 is found to be considerably higher than the figure one month after the quake and over 150 above the adjusted total for September 1963.

6

RECONSTRUCTION ACTIVITY IN ALASKA

6.1 PUBLIC CONSTRUCTION WORK OF STATE AND LOCAL FACILITIES IN ANCHORAGE

The Corps of Engineers undertook the reconstruction of all public facilities in Anchorage except the International Airport, which was the responsibility of the FAA. A large amount of the work done by both these agencies was covered by Public Law 875, which in the case of Alaska authorized the Federal government to provide funds for debris clearance, the restoration of public utilities, and the repair of docks and other community facilities.

6.1.1 Estimated vs. Actual Construction

Actual public construction work in Anchorage fell far below both the damage estimates and eligible funds under PL 875, as Table 10 indicates. The first two columns have been compiled from estimates made by the Office of Emergency Planning in June 1964; the figures on actual construction conditions were obtained from OEP figures as of May 1966. The data are comparable since by that late date all projects related to state and local facilities in Anchorage either had been completed or were in the final stages of construction.[1]

It is hard to find any specific reason why damage estimates differed so radically from actual construction needs. There obviously was no financial reason for partially restoring facilities since the money actually spent was far below the authorized amounts under PL-875. In fact, the provisions of this legislation were interpreted rather broadly because of the severity of the Anchorage quake.

---

1. The only public construction in Anchorage which had not yet entered the final planning stage was some urban renewal projects to be undertaken by the Corps. This proposed work had nothing to do with state and local facilities but was related to new housing developments.

Table 10

COMPARISON OF DAMAGE ESTIMATES, PL-875 ELIGIBILITY FUNDS AND ACTUAL EXPENDITURES RELATING TO ANCHORAGE STATE AND LOCAL FACILITIES
(millions of $)

Item	Damage[a] Estimate	Amount[a] Eligible (PL 875)	Actual Expenditures[b]
Public Utilities (Water, sewer, electric, telephone)	30.5	20.0	7.1
Public Buildings	0.8	0.8	0.6
Health Facilities	0.2	0.2	0.2
Transportation Facilities	13.8	12.7	2.5
Corps of Engineers work			(1.3)
International Airport Restoration (FAA)			(1.2)
Educational Facilities	10.0	10.0	5.7
Debris Clearance	2.0	1.8	0.8
Engineering		1.6	2.6
Total	57.3	47.1	19.5

a. Source: Office of Emergency Planning, June 19, 1964.
b. Source: Office of Emergency Planning, May 1966
Federal Aviation Agency.

Rather than simply authorizing funds for temporary restoration of public utilities (as was the intent of PL 875), the OEP permitted permanent repair and even some modernization of damaged buildings and utilities.

Perhaps, the best explanation, although not a very satisfactory one, can be found in the uncertainty of making damage estimates before a great deal of work has been done. In such cases, it is politically expedient to overestimate the costs since it is much easier to return unused funds than to ask for more. Recovery may therefore appear unusually rapid simply because the initial estimates of necessary restoration work are far higher than the expenditures actually required.

6.1.2 Progress of Reconstruction Activity

Figure 1 compares the total value of contracts awarded by the Corps and the FAA with the value of work completed during each month following the quake through August, 1965. Aside from the emergency repair contracts assigned immediately in April there was a delay of several months before other awards were made,[2] since restoration work was dependent on the results of soil studies showing where it would be safe to relocate structures.[3] Except for a few small projects awarded during the fall of 1965,[4] all construction work had been assigned by the summer of 1965 and was completed before the winter. The Corps delayed awards of non-priority contracts during the 1964 season so as to ease the pressure on the limited labor force and thus minimize the possibilities of inflation.

During the initial post-disaster period reconstruction was confined to the repair of utilities such as water, sewer, electricity, and telephones. These facilities were first restored to a minimum level of operation which would eliminate any possible health hazard (e.g., contamination of the water supply by broken sewers). At the same time the Corps was involved in demolition and other work for public health and safety, including debris clearance and the razing of irreparable structures.

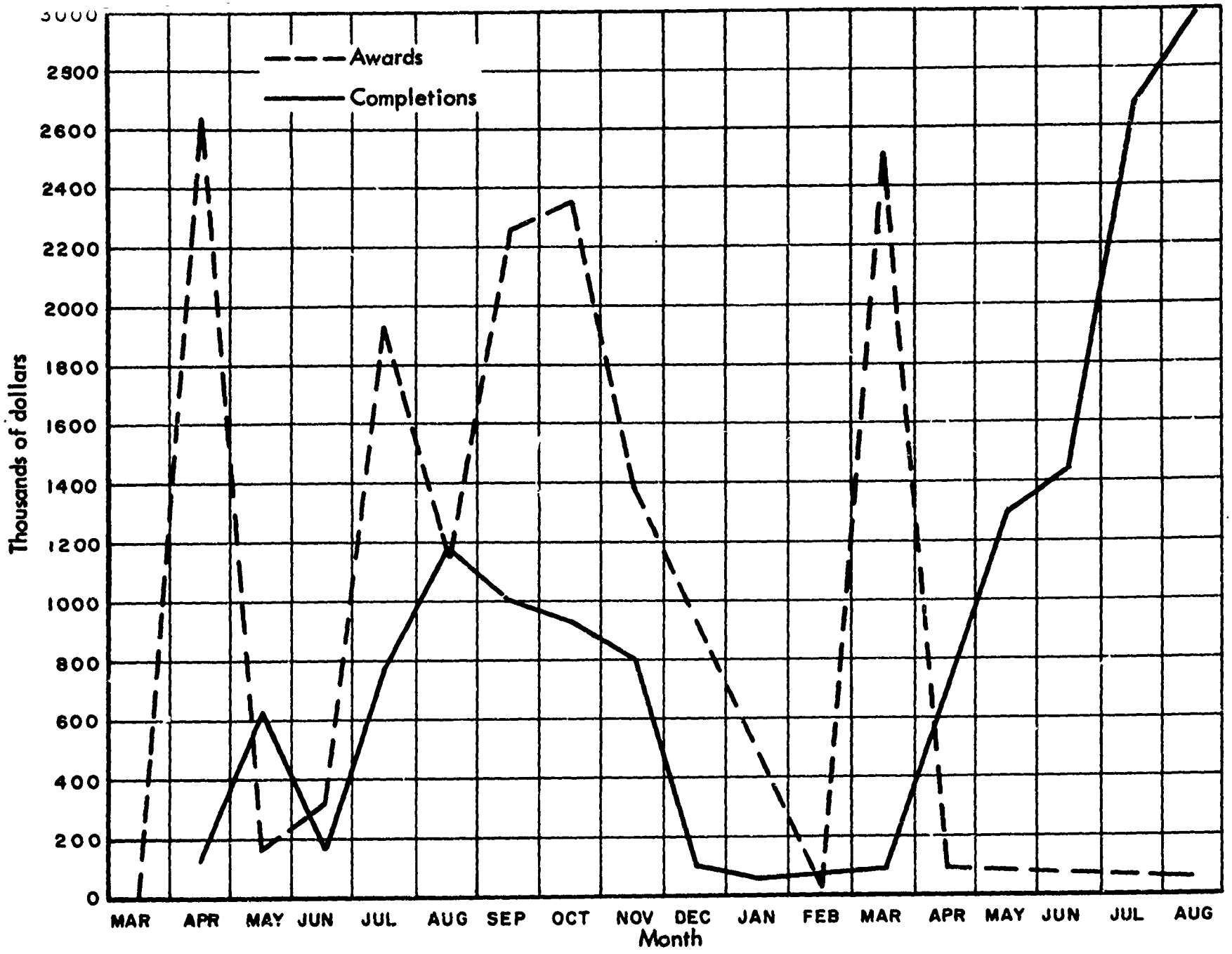
In order to compare the value of awards for new public construction in Anchorage after the quake with those made during 1962 and 1963, monthly figures are presented in Table 11. The unusually high total for April 1964 is primarily due to an $11.4 million award for

---

2. During May and June 1964 the only construction contract was the restoration of telephone lines ($63,019); the remaining awards were for debris clearance and architectural studies.

3. The Corps of Engineers awarded two contracts totaling over $950,000 for soil studies in the Anchorage area and still has to assign four more for urban renewal projects.

4. Specifically there were three contracts, totalling $225,000, which were awareed early in the fall of 1965.



Source: Corps of Engineers (Alaska District Contractual Progress Reports)

FIGURE 1 Value of Earthquake Restoration to Public Facilities in Anchorage (March, 1964 - August, 1965)

Table 11

MONTHLY VALUES OF NEW PUBLIC CONSTRUCTION AWARDS IN THE ANCHORAGE AREA, 1962-1964[a]

	Value of Award (thousands of $)[b]		
Month	1962	1963	1964
January	26	----	32
February	----	48	451
March	2336	----	430
April	----	102	14,417[c]
May	418	----	1,379
June	665	1461	1,235
July	3013	2365	5,814
August	442	216	969
September	182	171	2,678
October	543	442	498
November	102	1446	1,418
December	38	----	1,438
Totals	7765	6251	30,759

a. Source: U.S. Census Bureau.
b. No figures on repairs to public facilities are available so only comparative data on new construction in the area could be presented.
c. This figure includes an $11.4 million award for troop housing at Fort Richardson; not related to earthquake reconstruction.

troop housing at Fort Richardson;[5] however, even after subtracting this figure from the 1964 totals the difference between pre- and post-quake activity is still substantial. Since the Corps also spent $8.2 million to repair damaged structures, the post-quake public construction total should be swelled somewhat further than the figure in Table 11.

6.2 PRIVATE CONSTRUCTION ACTIVITY IN ANCHORAGE

6.2.1 Limitations of the Data

In theory, any person or contractor undertaking private construction is required to hold a building permit for the value of anticipated expenditures. According to the Census Bureau, however, these permit figures should be interpreted with caution when used as a proxy for construction activity. Because the building fee is based on the value stated on the permit, there is good reason to assume that individuals registering with the city office[6] will underestimate the cost of construction. This desire is reinforced by a feeling that the tax assessment of property will somehow be based on the permit figure.[7] On the other hand, there are generally a few permits issued which are not actually used.[8] In the aggregate these forfeitures will partially counteract the individual tendency to be

5. This figure was not included in the Corps of Engineers construction awards to public facilities since it was not related to earthquake damage and therefore did not fall under PL 875 funding.

6. Unless the policing system in the area is inefficient, very few individuals will attempt to engage in construction work without obtaining a permit except in the case of minor alterations and repairs. In Anchorage, for example, individuals do not bother to inform the city about any work under $200, even though there is no charge for a permit.

7. In fact, the tax assessor is given a copy of the building permit just to indicate that a new structure is being put in place. He will eventually make his own estimate of the value of the property.

8. The default rate for the entire United States is 2 percent, although this percentage varies considerably between communities.

unduly conservative. On balance, however, it is generally agreed that consolidated permit data still underestimate actual construction activity.

For the purpose of yearly comparisons this bias is of no consequence if it is consistent. In the case of Anchorage, however, the earthquake appears to have induced more accurate permit figures than for earlier years. Before the disaster the borough assessor, Glen McKee, claims that there was a tendency to underestimate by as much as one-third the value of the proposed structure. Contractors engaged in residential work were the worst offenders since industrial estimates were normally based on the architect's figures. Following the quake all permits for repairs were given free so there was no need to undervalue work. In fact, there was an incentive to report the cost of construction accurately since residents thought that the size of SBA loans were influenced by the value stated on the building permit.[9] However, fees were still charged on new structures and only a portion of post-quake construction was financed by the SBA. Thus, there was still an aggregate underestimation bias although it was much less significant than before. The data presented in the next sections must be interpreted in this light.

6.2.2 Comparison of Pre- and Post-Quake Activity

Building permit figures for Anchorage have been divided into three categories for purposes of comparing construction activity before and after the disaster: (1) new residential; (2) new non-residential; and (3) repairs, additions and alterations. On the basis of these data we will attempt to indicate the path that recovery took in the area.

6.2.2.1 Residential New Construction. Despite liberal financial terms offered by the SBA, there was no pronounced rush to build new

9. This concern about the accuracy of building permits to obtain a requested loan from the SBA proved unfounded since the agency did not actually inspect these figures.

dwellings in Anchorage following the Good Friday disaster. Although there were 971 units destroyed by the quake,[10] the number of building permits for new dwellings issued during 1964 fell considerably below this figure, as shown in Table 12.

The high vacancy rate at the time of the quake[11] would lead one to believe that demand could have been satisfied by the existing stock. This was certainly true for displaced residents who had been living in apartment houses, since most of the openings were in multi-unit structures. Families who had private houses destroyed were in a slightly different position; they wanted larger quarters, which were in distinctly short supply. The Turnagain area, where practically all their homes had been located, was condemned until thorough soil tests had been undertaken, and most residents preferred to take temporary quarters until they knew whether they could rebuild there or not.[12]

The desire for larger quarters and the uncertainty about building sites tended to decelerate the speed of recovery in residential housing units. In fact, if the trend in housing before the quake had continued, the number of permits for 1964 would have been greater than they actually were.

A more specific analysis has been attempted on the basis of three different estimates of housing trends:

(1) The post-quake trend--the average number of units planned during the year following the quake (533 units)

(2) The conservative pre-quake trend--the average number of units planned per year over the period 1960-1963 (365 units)

(3) The liberal pre-quake trend--the average number of units planned per year during 1962 and 1963 (500 units)

---

10. For a description of damage to Anchorage dwellings, see p.26.

11. The 628 units covered by building permits in 1963 far exceeded the figures for the previous three years. It is therefore not surprising that an FHA survey taken just before the quake revealed that approximately 1 in every 7 units were vacant (see p. 25).

12. Electro-osmosis tests to determine strength increase in the clay in the Turnagain area are continuing. Further results were to be presented at a meeting scheduled for October 4 and 5, 1965.

Table 12

NEW PRIVATE HOUSING UNITS COVERED BY BUILDING PERMIT IN ANCHORAGE (1960-1965)[a]

Period	Number of Housing Units			
	Single	Duplex	Multiple	Total
1960	214	14	31	259
1961	140	38	23	201
1962	157	110	104	371
1963	217	114	297	628
1st Quarter	3	0	48	51
2nd Quarter	123	36	97	256
3rd Quarter	70	56	124	250
4th Quarter	21	22	28	71
1964	170	84	262	516
1st Quarter	0	4	0	4
2nd Quarter	72	22	55	149
3rd Quarter	69	32	109	210
4th Quarter	29	26	98	153
1965				
1st Quarter	2	10	9	21
2nd Quarter	58	24	177	259

a. Source: U.S. Census Bureau.

Figure 2 compares the projected post-quake trend of new housing with the two estimates of the pre-quake trend. Since there were 971 units destroyed on Good Friday, the post-quake trend line will obviously start from a lower stock level than the two other trend lines. Figure 2 indicates that even with the conservative estimate of housing starts, it would take six years to restore the number of units in Anchorage to the level foreseen by the pre-quake projection; if the more liberal trend is assumed, it would take 29 years before the number of units reached the projected level.

One qualification is in order which may temper this result. Recent optimism regarding the growth of Anchorage may substantially increase building activity in the future, so that the number of years necessary to equate the pre- and post-quake trend lines will be considerably reduced from the figures depicted in the diagram. However, the fact remains that recovery of residential housing during the first year following the quake was much slower than would have been expected on the basis of the Federal government's liberal policy of loans and grants.

A brief look at permit data for the first half of 1965 indicates that a much larger number of multiple units are being constructed than in previous years. Construction of single family houses is slightly below the comparable 1964 period and less than half of what it was for the first half of 1963. Apparently families are still awaiting the results of the Turnagain tests before taking any action.

6.2.2.2 Non-Residential New Construction. Table 13 clearly shows a definite increase in the value of non-residential permits issued during the quarters following the disaster over the comparable period for 1962 and 1963; the number of post-quake permits, however, was not significantly higher. As the main street in Anchorage (Fourth Avenue) was severely affected by the quake, many business establishments which were destroyed beyond repair had an opportunity to modernize and expand their facilities over their previous size.

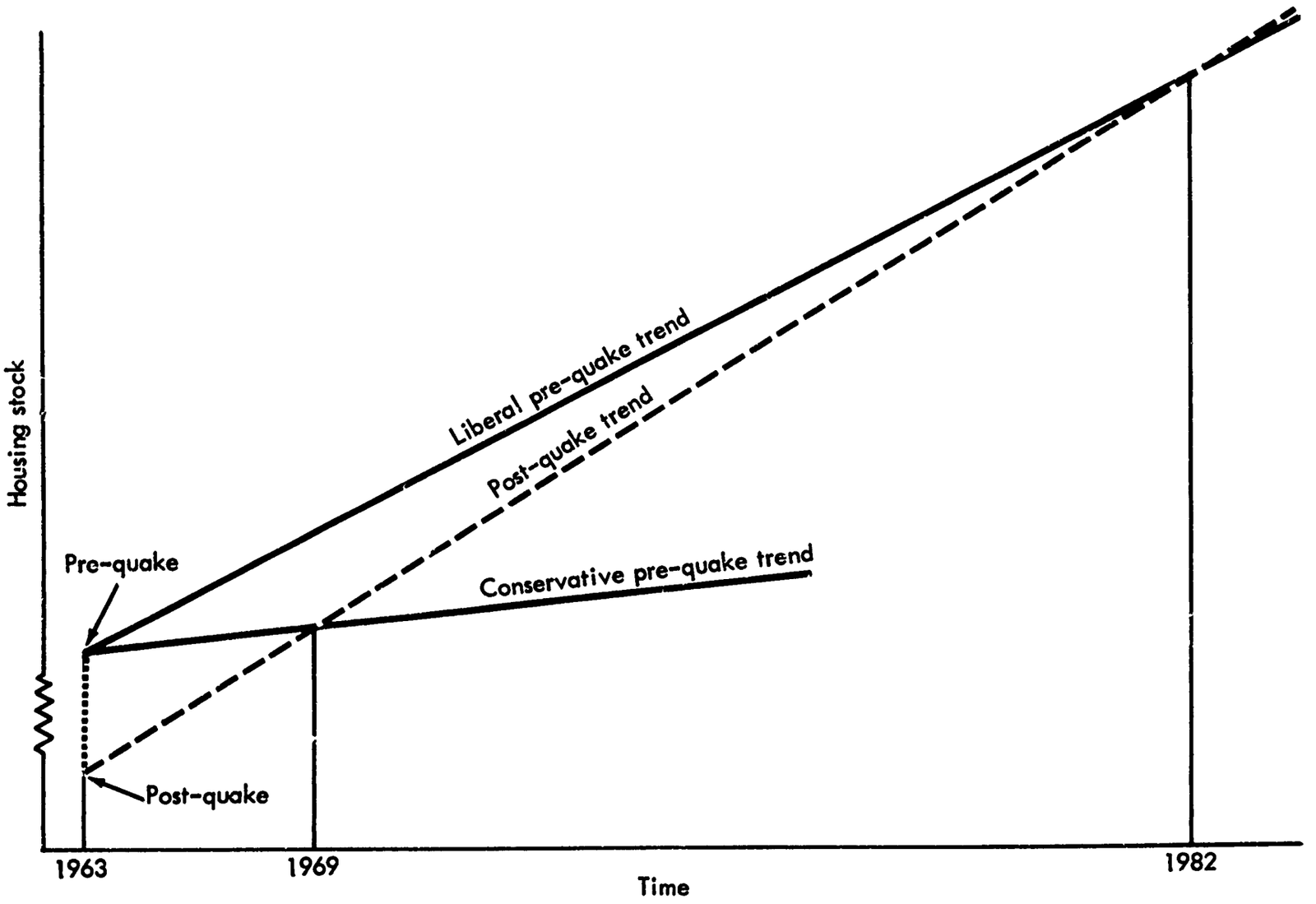


FIGURE 2 Comparison of Projected Pre- and Post-Quake Anchorage Housing Trends

Table 13

NUMBER AND VALUE OF BUILDING PERMITS
FOR NEW NON-RESIDENTIAL CONSTRUCTION[a]

	Value, in thousands of $, and number of permits( )			
Quarter	1962	1963	1964	1965
First	2683[b] (14)	-- (--)	176 (6)	551 (8)
Second	1948 (47)	1988 (32)	3197 (41)	2071 (30)
Third	1730 (42)	1184 (72)	2859 (74)	
Fourth	896 (24)	185 (23)	3037[c] (21)	
Total	7257 (127)	3357 (127)	9269 (142)	

a. Source: Anchorage Building Permit Data.
b. Includes permits for a Shell Oil refinery tank ($1,275,000) and a J.C. Penney Store ($1,078,000).
c. Includes a $2.2 million permit to rebuild J.C. Penney.

Therefore, although the actual number of permits did not increase as a result of the disaster their average value was considerably above the comparable figures for 1962 and 1963.[13]

To demonstrate their confidence in Anchorage, the board of the First National Bank unanimously agreed, one week following the quake,

13. Actual construction activity in the non-residential sphere may not have been much greater after the quake than in 1962 since two large permits for a Shell Refinery Tank ($1.275 million) and a J.C. Penney Store ($1.078 million) were taken out during the first quarter of that year. Work on these structures only got underway during the spring of 1962, so that the value of construction put in place during the last three quarters was undoubtedly somewhat higher than the permit figures indicate.

to proceed with the construction of their proposed new building. At about the same time Walter Hickel and his associates decided to begin immediately on the $3 million Captain Cook Hotel which had been in the planning stage before the quake. These two positive actions indicated faith on the part of business leaders in the future of Anchorage, since they came at a time when firms were undecided as to what future actions they would take. Owners of commercial establishments now were convinced that they could not afford to bide their time in rebuilding, in the same way that displaced families were able to do, so most of them obtained a permit during the 1964 season. Therefore, it is not surprising to find that for the second quarter permit activity in 1965 was considerably less than in 1964 and only slightly higher than for the comparable period during the two pre-quake years.

In fact, with the major exception of the J. C. Penney store (which only took out a permit to rebuild its store in December 1964) practically all the other damaged establishments had been restored or modernized within a year following the Good Friday disaster.

6.2.2.3 Repairs, Additions and Alterations. Naturally the quake triggered a large amount of repair work as well as additions and alterations to homes and businesses. It is difficult to differentiate between these types of construction following a disaster so the categories have been combined. Comparative figures on permits for 1963, 1964, and the first half of 1965 are presented in Table 14.[14]

Unlike new residential construction, a large percentage of the repairs and changes to partially damaged homes were begun during the 1964 season as can be seen from the data in Table 14. If residents did not have to build a new house they were perfectly willing to restore their old structure once they obtained an SBA loan. On the other hand, repairs for the second quarter of 1965 are still somewhat

14. Permit data on repairs were not available for 1962, so the post-quake period could only be compared with the previous year.

Table 14

NUMBER AND VALUE OF BUILDING PERMITS FOR REPAIR, ADDITIONS, AND ALTERATIONS[a]

	Value, in thousands of $, and number () of permits		
Quarter	1963	1964	1964
Residential			
First	116 (64)	218 (49)	283 (77)
Second	438 (186)	1478 (459)	663 (222)
Third	256 (173)	1671 (421)	
Fourth	122 (91)	693 (175)	
Total	932 (514)	4060 (1114)	
Non-Residential			
First	89 (48)	163 (48)	379 (50)
Second	425 (68)	2478 (309)	1087 (88)
Third	251 (63)	733 (87)	
Fourth	73 (30)	434 (52)	
Total	838 (209)	3808 (496)	

a. Source: Anchorage Building Permit Data.

higher than during 1963. Notwithstanding a normal upward trend, this late surge of activity may have been caused by a delay in completion of the geological soil studies. It would not be unusual for families, upon learning towards the end of 1964 that their land was safe, to wait until the following spring to take out a permit and restore their home.

If permit data are meaningful measures of construction activity, restoration of commercial structures occurred much faster than that of residential dwellings. A comparison of figures in Table 14 indicates that the value of repair and alterations was between 4 and 5 times as high in 1964 than during 1963 but that the second quarter ratio was much higher for non-residential work than it was for housing units. These figures seem to be consistent with the pattern of new construction, lending further evidence to the assertion that businesses wanted to get back on their feet much faster than families desired to be permanently resettled again. As the permit valuation for the second quarter of 1965 is more than 2½ times what it was in 1963 some restoration work on commercial structures appears to have been delayed until the 1965 season. Of course, this figure is still considerably less than for the quarter immediately following the quake.

6.3 RECONSTRUCTION OF OTHER AREAS

The outlying communities in southcentral Alaska did not recover nearly as rapidly as Anchorage. This section will briefly examine some of the reconstruction problems faced by several of these smaller towns.

6.3.1 Valdez

Before the earthquake Valdez was popularly known in Alaska as the "Switzerland of America" since it was surrounded by mountains and located at the end of a 30-mile fjord. The quake destroyed the waterfront and damaged most of the homes in the city so that evacuation from the area was necessary. Geological surveys indicated that the town's subsoil was sliding into the bay and could not be stabilized

by engineers. As a result, it has been found necessary to move the entire town with its businesses, homes, schools, streets and utilities to more solid ground--4½ miles away. Ironically enough, this location had been seriously considered as the original site for Valdez when it was decided to build a community in that area.

By the end of the summer most outside utilities and streets were complete, and the remaining portion scheduled to be put into place during the fall. Approximately $3.5 million will be spent on urban renewal for Valdez, although much of the work is still in the planning stage. Thorough geological tests and the investigation of a new site have been responsible for these delays in recovery operations.

6.3.2 Kodiak

The city of Kodiak is on Kodiak Island, part of a group of islands about 75 miles southwest of Kenai Peninsula. Of its 5000 inhabitants, approximately 3000 were connected with either the naval or Coast Guard stations on the island.

The seismic waves following the quake were responsible for most of the damage to the community. Over 100 homes, 45 fishing boats, and various public utilities and commercial structures were battered by the unusually high water. The quake itself caused the city to sink over 5½ feet into the sea so that rebuilding of the business section was impossible until the area could be filled in to be above tidal reach. An urban renewal project of $6.1 million has been scheduled to start towards the end of the 1965 construction season.

6.3.3 Seldovia

A small picturesque town on the Kenai Peninsula, Seldovia was built entirely on wooden pilings to protect the homes from the high tides. The earthquake caused most of these pilings to sink into the ground so that the town has subsided and today must be evacuated during very high tides.

A contract to rehabilitate the water front was awarded in mid-July 1965 but delays could prevent completion until the 1966 season.

Other urban renewal projects totaling over $3.0 million have been developed to move the entire town ashore to dry ground but no awards have yet been made.

6.3.4 Cordova

Located in southcentral Alaska, Cordova is accessible only by air or water and is primarily a fishing village. The earthquake caused the town to rise although all the other communities in the area actually subsided. By the end of the summer practically all of the dredging work on the harbor was finished. Once this contract is completed the new city dock and other urban renewal projects should proceed rather rapidly.

6.4 CONCLUSIONS FROM THE STUDY OF RECONSTRUCTION ACTIVITY

Despite a rather slow rebuilding of residential dwellings in Anchorage, the overall recovery of the community was quite rapid. Restoration of commercial and public facilities was begun as soon as the basic geological soil studies were completed, so that one year following the quake there remained only slight traces of the damage brought by the disaster.

Several reasons can be suggested to explain why Anchorage recovered faster than the surrounding communities in southcentral Alaska:

(1) Despite the large dollar value loss in Anchorage, its relative damage was less than that of practically any other community. Because it is a major headquarters for Alaska's construction industry, manpower and equipment were already in the city to handle much of the rebuilding activity. In the outlying areas residents had to evacuate for periods of weeks so that the post-quake work force, instead of increasing, was actually below normal until late in the summer of 1964.

(2) The destruction in Anchorage involved individual businesses and homes rather than the sinking of an entire section (e.g., Valdez and Kodiak) or the substantial rising of land (Cordova). In Anchorage once the geological surveys were completed serious reconstruction could begin immediately. Other areas had to develop comprehensive urban renewal plans to redesign or relocate their towns.

(3) Because Anchorage is the largest city in the area and has two military bases, the Federal government was more concerned about its recovery than that of the outlying towns whose economies are based mainly on fishing and canning.[15]

15. The one exception is Kodiak where the military does play an important role. The substantial sinking of land there prevented rapid recovery as we have said.

7

ECONOMIC IMPROVEMENTS FOLLOWING A DISASTER

The preceding sections have indicated that despite a large amount of destruction following a disaster, recovery can be rapid if capital in the form of loans and grants is made available. In fact, a disaster may actually be a blessing in disguise. Aside from the economic boom which often follows, due to the large amount of reconstruction, there is an opportunity for commercial establishments and homeowners to improve their facilities. This opportunity can be explained by two interrelated factors:

(1) The availability of grants and cheap loans for reconstruction and replacement; and

(2) destruction of old business establishments thus permitting rapid modernization rather than gradual renovations.

The economic and social reorganization of Halifax (described in Section 7.1) following substantial damage to the town from a ship explosion in her harbor in 1917 illustrates these factors.

It should be pointed out that even if substantial aid is made available, economic improvement may not occur after a serious disaster. The individuals in the community must be sufficiently motivated to rebuild and modernize their city. For example, residents of Galveston, Texas were so discouraged after the flood and tidal wave of 1900 that the city was rebuilt very slowly despite the availability of outside funds. Thus, despite its commercial advantages, Galveston was outstripped in growth by Houston (50 miles away) within a short period of time and never fully regained its pre-disaster status.[1]

---

1. The possibility of future floods may also have hindered Galveston's growth.

7.1 IMPROVEMENTS AFTER OTHER DISASTERS: THE HALIFAX EXPLOSION (1917)

The record of economic, political, or social changes following a major disaster is generally incomplete simply because most studies are concerned only with immediate events following the catastrophe rather than long term developments. Among the few studies discussing these far-reaching changes, the Samuel H. Prince book on the Halifax explosion is perhaps the most complete.[2]

The city of Halifax, on the southeastern coast of Nova Scotia, had developed into one of the most important British seaports during the First World War. Virtually all the American munitions destined for the European front passed through her harbor. Despite the dangers inherent in handling such vast amounts of explosives, the city had never passed any precautionary regulations.

On the morning of December 6, 1917, a heavily laden French munition ship collided in the harbor channel with an empty Belgian relief freighter, setting off an explosion that killed two thousand and seriously injured another 6000. Over 10,000 were left homeless--more than 1/5 of the entire population of Halifax. Damage was estimated at about $35 million.[3]

After a long period of rescue and relief operations conducted primarily by outside organizations, Halifax was faced with the task of rebuilding. It soon became apparent that the new city would hardly resemble the old either in social organization or in physical appearance.

"Up to the time of the disaster, Halifax had certainly preserved the status quo," (Prince, p. 121). The community was staid, unambitious, conservative and content to live in the past. People sat back and watched events happen to Halifax; there was no desire or attempt to control the city's future.

---

2. Samuel H. Prince, Catastrophe and Social Change, (New York: Columbia University, 1920), p. 2.

3. The explosion was the largest known to man at that time.

In the wake of physical destruction came an equally severe collapse of the old order since individuals from all social classes were forced to work together. The necessity of planning the future of the city for the first time, and the exposure to new ideas introduced by the external relief organizations, produced far-reaching changes in community attitudes. The net result was a social consciousness and appreciation of the individual as an essential part of the community. This new outlook was reflected in the many physical changes that were subsequently made in Halifax.

Civic groups were formed to help the government plan the new city; streets were widened, uniform sidewalks installed, store fronts made more appealing and modern architecture adopted for homes and offices. Zoning laws were immediately passed dividing the city into residential, industrial and commercial areas. Plans for planting trees and shrubs throughout the city were approved and, for the first time, areas for parks and playgrounds were reserved.

Interest in public health was especially keen due to the numbers of serious and often permanent injuries, such as blindness, resulting from the explosion. Within two years, the city had expanded its virtually nonexistent public health program to one that was admired as "the finest ... and most complete public health organization in the Dominion," (Prince, p. 133).

Overnight the city became receptive to new ideas and innovations. Trams were installed, telephone lines to major cities in Canada and the United States were made available to the public and new industries were encouraged. The outlook toward commerce became more receptive and encouraging since residents began to realize that the future of the city lay in its harbor. Consequently plans were developed for improving port facilities and attracting more traffic.

Comprehensive munitions laws were gradually instituted to prevent the occurrence of a similar catastrophe. Additional regulations standardizing relief procedures and assigning post-disaster responsibilities to different organizations were passed for the first time in Canada.

Almost overnight Halifax became a new city socially as well as physically. There is little doubt that without the stimulus provided by the disaster these changes would have taken at least a generation to accomplish.

7.2 CHANGES IN ALASKA

7.2.1 The Rebuilding of Seward

The case of Seward is worth studying in some detail because it illustrates not only the economic improvement that can follow disaster, but also how sociological factors can influence actions at the expense of purely economic considerations. Seward has a year-round ice-free harbor and is the terminal of the Alaskan railroad; it was, therefore, a transportation center for most of southcentral Alaska up until the time of the earthquake. In fact, most of the goods destined for Anchorage were shipped into Seward and then transported by railroad.

Seward was hit by three of the "elements" the night of Good Friday--fire, earth and water. Almost immediately after the earthquake, petroleum tank farms along the water front went up in flames. The great seismic waves that followed spread blazing gasoline and oil over most of the community so that utilities were battered, the harbor wiped out, and rail and road transportation lines wrecked. In short, the town was helpless with about $20 million damage on its hands.

Fortunately the port of Anchorage, which suffered some damage to its facilities, was repaired within a few days and could effectively substitute for Seward's functions.[4] Further assistance was provided by the ice-free port of Whittier, since its habor was relatively unscathed and rail connections to Anchorage were temporarily restored early in April. In fact, several days after the quake, when

4. Following the destruction of Seward, the Port of Anchorage operated in the black for the first time in its history. During the months of April and May 1964 tonnage coming into Anchorage was almost 2½ times the figure for the same period during the previous year.

it was apparent that Seward would almost have to be rebuilt from the ground up, Under Secretary of Interior James Carr raised the possibility of permanently moving the terminal of the Alaskan railroad to Whittier. He reasoned that before the quake there was a duplication of facilities between the two ports, and since Whittier could be restored to normal in two weeks with little cost, there was absolutely no sense in spending an additional $20 million to rebuild Seward.[5]

Senator Bartlett voiced strong objections to this proposal solely on sociological grounds when he asserted that Seward "is dependent upon transportation facilities and would be wiped out by a decision not to rebuild port facilities."[6] In the end Bartlett had his way, since the final decision authorized the complete rebuilding of Seward with Anchorage and Whittier serving as substitute ports during the reconstruction period.

Almost immediately after this action was approved, several new developments occurred indicating that Seward would be much improved over its pre-quake position. An announcement by Universal Seafood Processors noted that the town might obtain a $500,000 seafood processing and freezing plant which would provide $750,000 in annual income for the area as well as forty year-round jobs and forty seasonal positions. The company already has completed initial financial arrangements with the Area Redevelopment Commission for funds to construct the plant. Interestingly enough, the firm had intended to build this structure in an entirely different location before the quake struck.

Only a few days later Seward residents learned that their town was getting a much more modern dock than before; President Johnson

---

5. The distance between Whittier and Anchorage is only 65 miles, about half the distance between Seward and Anchorage.

6. Anchorage Daily Times, April 1.

also appropriated the necessary $19 million for rebuilding the Anchorage-Seward railroad.[7]

Once a decision was reached to rebuild Seward, it is understandable that new improvements should have been made. However, there is some question as to whether the funds for restoration could not have been better spent on building a road into Whittier and improving the port of Anchorage,[8] particularly as there were relatively few people dependent on Seward for their livelihood. These longshoremen could have been reimbursed by the Federal government for relocation expenses.

7.2.2 The Fishing Industry

The fishing industry in Alaska is highly seasonal since the catch is brought in during the spring and early summer. Serious damage to vessels and canneries following the Good Friday earthquake therefore provoked comments that 1964 output might be seriously affected because the season was so near at hand.

Table 15 shows the latest estimates of damage to both vessels and processing facilities caused by the earthquake and seismic waves. Despite substantial losses to irdividual fishermen and canneries, these figures conceal the fact that damage to the entire industry was rather minor; only 15 percent of the canneries and only 3 percent of the vessels were either damaged or destroyed.

It is therefore not so surprising to find that the 1964 fishing season was the best in Alaskan history. According to the Bureau of Commercial Fisheries, the catch for the three principal fish in the

---

7. Although work on the city dock and inner harbor facilities was completed by June 1965, Seward can still not receive large quantities of freight since the Alaska Railroad has not been fully restored. Therefore Anchorage and Whittier will continue to assume major importance until 1966.

8. Anchorage residents recently approved bond issues permitting the expansion of their port. A $750,000 150-foot extension of the north end of the dock was sanctioned as well as a new $1,750,000 petroleum tanker dock. With these additions in Anchorage, Seward may even be less important than it was before the quake.

Table 15

DAMAGE ESTIMATES TO FISHING VESSELS AND COMMERCIAL CANNERIES IN SOUTHCENTRAL ALASKA[a]

	Vessels		Canneries	
Type of Fish Processed	Number	Value, millions of $	Number	Value, millions of $
King Crab	134	4.14	5	2.10
Salmon	165	3.05	13	1.95
Dungeness Crab	3	0.12[b]		
Shrimp	1	0.08	--	--
	303	7.39	18	4.05

a. Sources: Post-Earthquake Fisheries Evaluation Alaska Department of Fish and Game, January 1965. Earthquake and Seismic Wave Effects on Fish and Game (March 27, 1964 - May 15, 1964). Alaska Department of Fish and Game.

b. Estimate includes damage to 800 crab pots.

area was greater than in any year since 1950.[9] From the point of view of the industry as a whole there obviously existed some over-capacity before the quake, since the loss of facilities in Kodiak enabled the Aleutian Islands to double their output from the previous year.[10] On the other hand, because of the accelerated growth of the king crab industry in recent years the 1964 catch may have been somewhat higher if canneries in the Kodiak area had not received any damage.

9. The 1964 catch was a record for king crab and dungeness crab, both relatively new industries in Alaska; salmon reached its peak back in 1935.

10. In 1963 the Aleutian Islands handled approximately 16 million pounds of king crab; this figure jumped to 33.6 million in 1964. The catch of king crab in the Kodiak area decreased from 43 million pounds (1963) to 29.6 million pounds (1964).

As indicated above, the loss of the 300 fishing vessels had only a small effect on the industry, particularly as most fishermen were able to replace or repair their damaged craft and equipment through loans from the Bureau of Commercial Fisheries (BCF) or the SBA.[11] In fact, as early as May 15 the Commissioner was advising non-residents that Alaska had plenty of fishing vessels and gear to harvest this year's runs and that an influx of non-resident fishing equipment would only compound management problems and result in greatly reduced fishing time for everyone.[12]

Both the BCF loans for new replacement of vessels and gear and those from SBA for restoration of canneries will enable the industry to modernize facilities and expand them over their pre-quake level.[13]

In a letter dated March 1965, Walter Kirkness, Alaska Commissioner of Fish and Game, pointed out that already "the crab processing facilities in the Kodiak area have been rebuilt so that their capacity is equal to or greater than that prior to the earthquake."[14]

---

11. Fishermen who were found to be ineligible or were rejected under the Bureau of Commercial Fisheries program could still apply for an SBA loan. For example, an individual was not entitled to BCF funds unless he actually owned the vessel which was damaged or lost. Many fishermen had conditionally bought a boat from one of the canneries by making a small down payment but did not officially own the craft until the final installment was made. SBA was willing to make replacement loans under these circumstances.

12. Two months after the quake 68 loans totaling $1.1 million had been approved by the BCF or SBA. All fishermen, except for one, chose to replace their vessels immediately rather than charter a boat for the season. The final number of loans was 133 with a total value of $3.1 million, thus indicating that over half had been approved before the 1964 fishing season had really gotten underway.

13. For example, one of the canneries which suffered approximately $100,000 damage received an SBA loan for $750,000. $325,000 was used to rebuild and modernize their facilities; the remainder of the loan went to debt retirement ($294,000) or working capital ($131,000).

14. Personal letter, March 19, 1965.

7.2.3 Lengthening of the Construction Season

One of the most beneficial of all possible economic effects of the earthquake is the change it may have induced in the length of the Anchorage construction season. Prior to 1964 building activity was limited to only five or six months, beginning sometime in April and tapering off by October. In order to complete as much work as possible, contractors often had their employees undertake substantial amounts of overtime during the summer months, thereby increasing overall costs and lowering workers' efficiency by long hours.

The winter construction was normally restricted to structures which had been closed-in by the end of fall and therefore could be adequately heated. The need for workers was thus restricted to the specialized trades (e.g., electricians and plumbers); common laborers either departed for the "lower 48" or remained unemployed during the winter months.

Because of the required soil studies following the quake there was a substantial delay in reconstruction contract awards, so it was not until late July that most jobs were actually underway. The need to repair or restore facilities (e.g., schools) as rapidly as possible thus forced contractors to adopt new methods for continuing work on buildings which were not closed-in by the end of October. By draping a plastic covering, such as Visqueen, over the partially completed structure, portable heaters were effective in warming up the work area. Consequently substantial construction was undertaken during the winter months.

To illustrate this change in the winter building pattern caused by the quake we have computed the total number of hours worked per quarter in contract construction for the Anchorage area. Table 16 presents these figures for the years 1962 to 1964, as well as the quarterly hours worked as a percentage of the peak period. The number of construction hours worked during the fourth quarter of 1964 as well as the percentage of the peak-period hours worked during that quarter, increased significantly beyond the figures for the previous two years.

Table 16

ANCHORAGE CONTRACT CONSTRUCTION HOURS FOR 1962-1964[a]

	Number of Hours Worked and Percentage of Peak Period ( )		
Quarter	1962	1963	1964
First	9,687 (27)	7,258 (21)	9,719 (23)
Second	19,625 (55)	16,585 (47)	23,909 (57)
Third	35,587 (100)	35,234 (100)	42,334 (100)
Fourth	19,139 (54)	19,094 (54)	33,102 (78)

a. Source: Alaska Department of Labor (Employment Security Division). We would like to express our appreciation to Mr. Fred Lupro of the Employment Security Division (Juneau) for providing us with these figures.

Due to the effectiveness of the plastic covering, contractors now feel it is to their advantage to continue this expansion of winter construction in the future. Since productivity per worker increased during the cold weather, they would prefer to have a more stable labor force working regular hours throughout the year than to rely quite as much on substantial blocks of overtime from their summer crew, who also tend to spend most of their earned money in the "lower 48" rather than in Alaska.[15]

15. The building pattern for 1965 should be more indicative of whether the post-quake winter construction season was a basic change or simply a temporary measure to meet an emergency situation.

PART III

ROLE OF THE FEDERAL GOVERNMENT IN A DISASTER

8

THE SMALL BUSINESS ADMINISTRATION IN ALASKA

The general purpose of SBA disaster loans is "to restore a victim's home or business property as nearly as possible to its pre-disaster condition."[1] However, following the earthquake, certain liberal changes in policy were undertaken to cope with the severity of damage. The conclusions of this section are based on a review of the types of loans made by SBA (Section 8.1), an overview of SBA's general lending policy in Alaska (Section 8.2), and an analysis of the specific uses to which SBA loans were put as revealed in a large random sample of cases from SBA's files (Section 8.3).

8.1 SBA LOAN POLICY IN ALASKA

The SBA is authorized by Congress to make two distinct types of disaster loans--one covering physical losses to either homes or businesses and the other for economic injuries resulting from the disaster.

8.1.1 Loans Covering Physical Losses

Over 97 percent of SBA loans made in Alaska were designed to replace or repair physical property damaged by the earthquake. Due to special changes in SBA policy,[2] these loans tended to be very liberal, not only allowing for repair or replacement to a predisaster level, but also permitting economic improvements or modernization. The

---

1. SBA Disaster Loans, Small Business Administration, October 1964, p. 2.

2. For a detailed list of special changes in SBA policy to handle the Alaska recovery see Appendix B.

agency also authorized loans for debt retirement, usually in connection with damaged structures or property being replaced or repaired with SBA funds. Large businesses, however, often received money for unrelated debts, such as mortgages on non-damaged structures.

To illustrate the SBA disaster loan policy in Alaska more clearly, we will now describe in some detail several types of approved loans, taken from actual cases.

(1) A Home Loan (Seward)

Loss: $17,000	Loan:	$17,000
	New Construction	9,500
	Replacement of lost effects	7,500

The tidal wave completely destroyed the applicant's home and washed away his personal effects, including furniture, clothing, and automobile. The cost of rebuilding a new dwelling and replacing the lost articles was estimated at about $17,000; this amount was readily approved by the SBA. As there was neither a mortgage on the home nor any outstanding debts on the possessions, the applicant did not request funds for debt retirement.

(2) Home Loan (Anchorage)

Loss: $12,300	Loan:	$21,800
	Repairs	11,900
	Replace lost equip.	600
	Debt retirement	9,300

This Anchorage resident suffered damage to his residence, grounds, and equipment such as lawn mower, clothes washer, and dryer. He received a loan for $12,500 to repair or replace these items, with the slight upgrading required to purchase new equipment. In addition he refinanced the remainder of his mortgage, $9,300, at the low SBA interest rate.

(3) Business Loan (Anchorage)

Loss: $30,215	Loan:	$94,500
	Repairs	30,215
	Debt	64,285

The earthquake damaged this Land Management Company's home office as well as the foundations on several of its rental units. The firm recovered its losses completely through an SBA loan and refinanced the mortgages to provide a longer term for repayment and ease the applicant's cash flow.

(4) Business Loan (Valdez)

Loss: $32,000	Loan:	$46,838
	Repairs	27,475
	New construction	5,000
	Debt retirement	14,363

This small construction business in Valdez suffered extensive damage to its inventory and equipment as well as structural damage to a building under construction; in addition, a warehouse was completely destroyed. The loss from these items was approximately $32,000 and the applicant received $32,475 to repair or replace them. He also received funds for debt retirement on damaged equipment and the purchase of new stock.

(5) A Loan Involving Economic Upgrading

Loss: $36,000	Loan:	$52,000
	New construction	48,200
	Replacement	2,800
	Debt retirement	1,000

The home in this case was an old Anchorage duplex on which all but $1000 of the mortgage had been paid. The entire dwelling and the property on which it was located was destroyed by the earthquake. The SBA approved a loan covering payment of the mortgage, purchase of a new lot, as well as the construction and furnishing of a new duplex. The value of the new structure was to be about $15,000 above that of the old.

(6) A Business Loan Involving Substantial Debt Retirement

Loss: $13,850	Loan:	$75,000
	Repairs	13,860
	Moving	1,140
	Debt Retirement	60,000

The quake shifted the land of an Anchorage mobile trailer camp causing damage to some vehicles and forcing the relocation of the others. In addition to full coverage of these losses, the SBA made a loan of $60,000 to help the applicant retire mortgages on the damaged trailers and to pay off a variety of other debts relating to the business.

8.1.2 Economic Injury Loans

SBA loans enabled commercial operations faced with substantially lower demand following the disaster to remain in operation until business picked up again. These loans were used for debt retirement, for working capital, and for modernization or diversification.

As an illustration the following case has been taken from the SBA files:

Loan: $20,000

Working Capital: $ 4,159
Debt Retirement: 15,841

The president of a small Anchorage new and used auto sales corporation submitted this application claiming that his income had decreased severely following the earthquake thereby constituting an undue economic hardship on himself and his family. Quarterly figures from previous years indicated that the firm normally experienced a sharp rise in auto sales during the second quarter. In addition, the firm had expanded its operations over the past year. A combination of these factors led the applicant to expect sales for the second quarter of 1964 to be over $200,000. As can be seen from the following figures, actual sales were considerably lower:

	Quarterly Sales	
	I	II
1963	$11,074	$95,094
1964	$57,066	$36,603

In order to assist the applicant in meeting his obligations so that he might be able to continue in business until sales reached a more normal level, the SBA loaned the firm $20,000. These funds covered the payment of three demand notes, salaries due, and a small amount of working capital.

8.2 SBA OVERALL LENDING OPERATIONS

8.2.1 Application vs. Approved Loans

By the end of June 1965 the Small Business Administration had made available $79 million, approximately 80 percent of which was earmarked for business loans and the remainder for home financing. Table 17 shows the cumulative number and value of applications received and approved by the SBA at the end of each quarter for home and business loans.

Businessmen applied for loans much faster than homeowners mainly because they wanted to resume operations as fast as possible.[3] Commercial loan applications reached a peak during May and June and then tapered off. Applications for home loans were highest in June but did not decline significantly during the summer months. The average home loan requested was for $22,000 and the actual grant averaged $20,000. In the case of business loans, the average requested figure was $103,000 and the average SBA loan granted was $93,000. By comparing the applications "received" and "approved" columns in Table 17, it is clear that SBA loans were processed fairly rapidly and were made in generous amounts.

Although the SBA was willing to make loans for debt payment, the applicant's response to this offer was surprisingly slow. Of the 44 home loans requested during the first month after the quake only four were partially concerned with debt payment; in value terms only $52,000 was specified for debt retirement which is only 8 percent of the value of requests during this period ($649,000).[4] Business debt

---

3. Homeowners often found temporary living quarters so they could take their time deciding where they would rebuild and await the results of the geological survey.

4. The above figures were obtained from a computer tabulation detailing the type of requests for SBA funds during the final six months following the quake. A random sample of loans through March 1965 (see pp. 98-99) indicates that debt retirement accounted for over 36 percent of the total value of home loans, a substantial increase over the 8 percent figure for April 1964.

Table 17

CUMULATIVE APPLICATIONS AND APPROVALS OF SBA LOANS[a]

Year and Quarter	Applications Received		Loans Approved	
	Number	Value, Thousands of $	Number	Value, Thousands of $
Home Loans				
1964, 2nd	257	4,789	229	4,112
1964, 3rd	559	12,330	472	9,662
1964, 4th	678	14,986	599	12,381
1965, 1st	724	15,687	644	13,187
1965, 2nd	775	16,865	701	14,047
Averages		22		20
Business Loans				
1964, 2nd	377	39,400	276	25,879
1964, 3rd	610	62,302	478	41,976
1964, 4th	748	76,112	589	49,256
1965, 1st	801	83,385	638	55,484
1965, 2nd	851	87,984	697	64,808
Averages		103		93

a. Source: Small Business Administration.

loans appear to have been requested only slightly faster. This relatively slow response may have been due to the reluctance of individuals to act until the extent of their damage liability became more clearly understood.

The major purpose of SBA disaster loans, as stated previously, is to restore the injured person's property to its predisaster value. Strictly speaking, the SBA could meet this objective by granting a low-interest loan covering the exact amount of physical damage and stipulating that the borrower would use the loan for the purpose of rebuilding or repairing. However, such a plan frequently would leave the borrower with a debt too far out of line with his ability to repay. If the borrower had some mortgage obligation before the disaster, his monthly payments would be increased by the exact amount of the SBA monthly repayment. In most cases the new debt would be so burdensome that the borrower would not take advantage of the SBA loan policy, and the offer of assistance would be more of a formality than an aid.

In the case of the Alaskan earthquake the SBA offered a double loan. The borrower could obtain low interest SBA money to refinance his old debt as well as to rebuild or repair his property to its prequake value. Although he would have a larger obligation than before the disaster, his monthly payments would not be excessively high due to a thirty year mortgage and a 3 percent interest rate.

8.2.2 Home Activity

Table 18 lists the number and the value of home loans on a quarterly basis from April 1964 through March 1965. Anchorage not only received far more loans than the outlying areas but their average size was much larger. A brief look at the type of destruction in each area should explain these differentials. The most serious damage to Anchorage homes was on the Turnagain bluff where most of the large and expensive residences were located. The numerous land slides in this area often caused total destruction, so that large SBA loans were granted. In the outlying communities there were

Table 18

NUMBER AND VALUE OF SBA HOME LOANS IN ALASKA[a]

	SBA Home Loans			
	Anchorage		Other Areas	
Year and Quarter	Number	Value, Thousands of $	Number	Value, Thousands of $
1964, 2nd	146	3,155	83	958
1964, 3rd	209	5,006	34	543
1964, 4th	108	2,448	19	271
1965, 1st	34	692	11	114
1965, 2nd	44	729	13	131
Totals	541	12,030	160	2,017
Averages		22		13

a. Source: Small Business Administration.

very few homes of a comparable value which were damaged. In fact, in some of the smaller towns which were hit by seismic waves, the most serious losses were to lower-income waterfront dwellings.

In communities such as Valdez or Seldovia, the sinking of soil necessitated a relocation of the entire town and home owners were frequently advised to postpone reconstruction of their dwellings until urban renewal plans were completed. For this reason many people in these areas did not seek SBA loans during the first year following the earthquake. Since much of the reconstruction in these towns will be financed by the Corps of Engineers or urban renewal agencies, the SBA will probably not be involved with individual loans to homeowners.

8.2.3 Business Activity

In contrast with home loans, the number of business loans was evenly divided between Anchorage and other areas, as Table 19 indicates.

Table 19

NUMBER AND VALUE OF SBA BUSINESS LOANS IN ALASKA[a]

	SBA Business Loans			
	Anchorage		Other Areas	
Year and Quarter	Number	Value, Thousands of $	Number	Value, Thousands of $
1964, 2nd	133	20,203	143	5,677
1964, 3rd	112	8,992	90	7,105
1964, 4th	66	5,643	45	1,637
1965, 1st	24	4,651	25	1,576
1965, 2nd	28	5,103	31	4,220
Total	363	44,592	334	20,215
Averages		123		61

a. Source: Small Business Administration.

Despite plans for urban renewal, it would not have been economically feasible for firms in the small communities to postpone reconstruction for one year; in fact, it was imperative for them to resume operation as soon as possible. In some cases SBA funds were only used to repair or replace equipment, or perhaps to establish a temporary office until these development plans were implemented. On the other hand, the restoration of the fishing industry did not conflict at all with urban renewal projects. The size of the loans to Anchorage commercial establishments was much greater than those made to business operations in other areas. This fact is not surprising since the largest concerns were located near the "big city"; the major damage in the outlying communities was to their fishing vessels and canneries.

8.3 USES OF SBA LOANS

8.3.1 Home Loans

In order to analyze the purposes of SBA loans, a large random sample of actual cases was studied. The sample, consisting of every

third disaster loan folder on file in the Anchorage SBA office,[5] yielded information on the fraction of each loan allocated for debt retirement, repairs, and new construction. The last category includes not only funds for replacement of personal property and capital equipment but also working capital loans.

Sample data on home loans are given in Table 20 for Anchorage and "other areas." Displaced residents in the Turnagain part of Anchorage with their large and expensive dwellings, were heavily mortgaged and, therefore, made far greater use of SBA loans for debt retirement than elsewhere. At the same time many of these families postponed applying for SBA funds to build a new house until they knew whether their area had been declared geologically sound. These two factors largely explain why the proportional allocation of funds for new construction in Anchorage was lower than in the outlying regions.

8.3.2 Business Loans

A similar pattern is evident for business loans as shown in Table 21. Anchorage firms used a smaller proportion of their SBA loans for new construction than did businesses in other regions mainly because they took the earthquake as an occasion for refinancing their sizable debts at the more favorable interest rates offered by the Federal government.

It is also possible that some Anchorage businesses had over-expanded prior to the earthquake and consequently used SBA funds for rebuilding facilities to less than their pre-disaster levels. It is difficult to confirm this hypothesis statistically, but some close observers of Alaska business trends have stated that extreme optimism at the time of statehood undoubtedly engendered some excess construction by firms in Anchorage and that the disaster helped to rectify past mistakes.

---

5. We would like to express our appreciation to Miss Judith Pepper of the SBA who compiled these sample data for us. These folders applied only to SBA approved loans; however, approximately 18 percent were missing from the Anchorage files. Since we do not know the characteristics of the missing folders, we are not certain that the sample is representative of SBA loans.

Table 20

NUMBER AND VALUE OF SBA HOME LOANS (TOTAL SAMPLE)[a]

Year and Quarter	Number	Value, Thousands of $	Distribution of Loan, thousands of $		
			Debt Retirement	New Construction	Repair
Anchorage					
1964, 2nd	48	1020	372	323	325
1964, 3rd	61	1055	379	251	425
1964, 4th	26	508	176	219	113
1965, 1st	10	454	265	57	132
Totals	145	3037	1192	850	995
Other Areas					
1964, 2nd	23	205	11	166	28
1964, 3rd	12	135	24	81	30
1964, 4th	7	112	32	29	51
1965, 1st	1	1	0	1	0
Totals	43	453	67	277	109

a. Source: Small Business Administration.

Table 21

NUMBER AND VALUE OF SBA BUSINESS LOANS (TOTAL SAMPLE)[a]

Year and Quarter	Number	Value, Thousands of $	Distribution of Loan, thousands of $		
			Debt Retirement	New Construction	Repair
Anchorage					
1964, 2nd	29	4619	1681	2571	367
1964, 3rd	24	1792	1134	337	321
1964, 4th	14	717	303	231	183
1965, 1st	6	432	260	140	32
Totals	73	7560	3378	3279	903
Other Areas					
1964, 2nd	49	1697	277	1307	113
1964, 3rd	19	3231	596	2599	36
1964, 4th	18	775	255	383	137
1965, 1st	3	90	13	77	---
Totals	89	5793	1141	4366	286

a. Source: Small Business Administration.

8.3.3 Economic Upgrading

A common feature of economic recovery is property upgrading. Frequently, damaged or destroyed real estate is restored beyond its previous state so that the new structure is larger or better in some way than the old one. This modernization is simply one facet of the rising standard of living that accompanies rising incomes. When the terms are favorable, as they were following the Alaskan earthquake, one might expect to observe a considerable amount of economic upgrading.

Some idea of the degree of economic upgrading allowed by the SBA is necessary in order to make a strict evaluation of their lending behavior. On the basis of newspaper accounts and other impressions, it was conjectured that the portion of a loan earmarked for either new construction or repair was generally larger than that required to restore the victim's property to its pre-disaster condition.[6]

The above hypothesis is empirical and is subject to testing. In fact, one of the purposes of our sample was to provide evidence for making the test.[7] Unfortunately, the data do not yield much direct evidence since the loan application forms did not require that the applicant state whether he intended to build a larger or better structure and required no supporting document such as a building permit.

Consequently, we need to define economic upgrading in some way that will allow us to infer from the raw data whether such modernization actually took place. As a working definition, we shall consider economic upgrading to be the difference between the value of the loss

---

6. This statement is not meant to have any normative significance.

7. Because SBA request forms for large loans (usually defined as those over $150,000-$200,000) do not require any statement of disaster losses, we do not have loss data for approximately 15 percent of the loans in sample. The elimination of these large loans obviously reduces the average size of the loan substantially as it leaves merely a random sample of the "small" SBA loans. It does not, however, affect the analysis in terms of economic upgrading.

and the amount of the actual loan allocated for new construction or repair. The "degree" of upgrading can be taken as the percentage difference between the loss and the loan.

Using this concept of economic upgrading the data do not support the hypothesis that the SBA approved loans to individuals for the purpose of upgrading their homes. If anything, it indicates a considerable amount of property degradation. During the first year following the quake only 12 out of the 126 loans granted in Anchorage had a value significantly larger (10 percent or more) than the stated loss.[8] Table 22 shows the number of home loans in several arbitrary "upgrading" classifications.

Table 22

SBA HOME LOANS CLASSIFIED BY RATIO OF CONSTRUCTION LOAN/VALUE OF LOSS FOR ANCHORAGE

Loan for Construction/Value of Loss	Number of Loans
Less than 0.90	31
0.99 to 0.90	15
1.01 to 0.99	58
1.10 to 1.01	10
More than 1.10	12
	126

Further evidence on the absence of upgrading in the city is given in Table 23, which lists the composition of home loans where estimates of the losses were given in Anchorage and other areas. These figures indicate that the total amount borrowed for the purpose of new construction and repairs was only about 86 percent of the declared loss.

8. We have considered only those loans for which some loss estimate was given. These constitute the vast majority of all home loans in Anchorage both in number and dollar value. Since most business loans did not have a loss estimate, an analysis of upgrading using the above definition would not be very meaningful.

Table 23

SAMPLE DATA ON SBA HOME LOANS WHERE ESTIMATE OF LOSS IS GIVEN[a]

Year and Quarter	Number	Estimated Loss, Thousands of $	Loan Value, Thousands of $	Distribution of Loan, thousands of $	
				Debt Retirement	New Construction and Repair
Anchorage					
1964, 2nd	40	724	992	363	629
1964, 3rd	55	722	1022	371	651
1964, 4th	24	230	413	176	237
1965, 1st	11	239	307	159	148
Total	130	1915	2734	1069	1665
Other Areas					
1964, 2nd	19	177	195	11	184
1964, 3rd	10	95	111	21	90
1964, 4th	7	66	112	32	80
1965, 1st	1	5	1	0	1
Total	37	343	419	64	355

a. Source: Small Business Administration.

In "other areas" homeowners planned to spend slightly more on new construction and repairs than their stated losses.

To a certain extent the difference observed between Anchorage and "other areas" can be explained by the reluctance of homeowners in Turnagain to rebuild until soil tests had been completed. Furthermore one would expect that families having expensive homes destroyed (Anchorage area) would not feel the need to upgrade their new structure, whereas owners of relatively poor quality homes which were destroyed ("other areas") would take advantage of SBA liberal terms to erect a larger and better furnished residence.

Consolidated quarterly data from the sample of business loans, where loss estimates were available are presented in Table 24. Loans for new construction and repairs were about 80 percent of the stated amount of the loss in "other areas" and 90 percent in Anchorage.

From the statistical information available it is difficult to avoid the conclusion that Alaskans did not use the SBA's generous loan policy to upgrade their facilities. However, this is a most tenuous observation because the accuracy of the loss claims is subject to doubt. In fact, information obtained from personal interviews in Anchorage as well as some supplementary data given on the loan forms indicates that there was a consistent exaggeration of losses, more pronounced in Anchorage, but present in all communities. This over-estimation can be attributed to several factors. In some cases losses were simply not known, nor could they be estimated accurately, as would be true of much repair work. Often mortgage or debt balances were included in overall loan statements which clearly exaggerated the loss. It would also be normal to expect that many applicants not familiar with the SBA policy would deliberately inflate their loss estimates, anticipating that the SBA would not grant the total requested. This last tendency is consistent with our previous discussion on damage assessment and must be considered in disaster relief planning. Even if the loss values have been properly stated, the difference between value of loss and value of new construction does not necessarily imply an absence of economic

Table 24

SAMPLE DATA ON SBA BUSINESS LOANS WHERE ESTIMATE OF LOSS IS GIVEN[a]

Year and Quarter	Number	Estimated Loss, Thousands of $	Loan Value, Thousands of $	Distribution of Loan, thousands of $	
				Debt Retirement	New Construction and Repair
Anchorage					
1964, 2nd	23	843	1274	522	752
1964, 3rd	22	598	1218	673	545
1964, 4th	12	448	653	263	390
1965, 1st	2	9	10	0	10
Total	59	1898	3155	1458	1697
Other Areas					
1964, 2nd	42	1348	1256	241	1015
1964, 3rd	12	472	602	180	422
1964, 4th	14	414	435	100	335
1965, 1st	3	121	90	13	77
Total	71	2355	2383	534	1849

a. Source: Small Business Administration.

upgrading. It is quite possible that individuals accepted as much money as they were able to get from the SBA and in addition obtained a smaller loan from local lending agencies. If information were available on the volume of second mortgages associated with properties restored primarily through SBA financing, we might be able to judge the extent to which properties were restored beyond their original conditions.

In some instances in which SBA loans for construction and repairs approximately equaled the physical loss, homeowners might have dipped into their personal savings to upgrade their facilities. Although available figures do not confirm the hypothesis that upgrading occurred after the earthquake, the data are not sufficient to disprove this conjecture. A closer examination of each loan application, a better understanding of the manner in which the loss estimates were made--i.e., whether based on original cost, replacement value or property tax assessment--and further information on second mortgages are necessary before any definitive conclusion can be reached.

8.4 CONCLUSIONS FROM THE ANALYSIS OF SBA ACTIVITIES

If speed and generosity are the major criteria for judging SBA activity in Alaska, there can be little question that the agency performed its task admirably. Within a few days following the earthquake it had set up offices and received loan applications from homeowners and businessmen. Loans were processed rapidly and in most cases the amount approved approximated the funds requested.

In order to facilitate its operation and to broaden its coverage, SBA amended many of the rules which normally govern its disaster relief activities. Its low 3 percent interest rate was extended to include debt retirement as well as new construction and repairs, thereby stimulating the urge to rebuild in Alaska, a desire which may have been considerably dampened under more conventional financial arrangements.

But did SBA financing speed up economic recovery in Alaska? Because it is impossible to know what economic activity in 1964 would

have been without these low interest loans, the answer to this question must be based more on impression than fact. There is widespread feeling among Alaskans that the earthquake was the "best thing that ever happened to Alaska." Residents are convinced that the large amount of financial assistance they received not only spurred recovery but also encouraged economic development that may not have been forthcoming under normal circumstances. Since the SBA was by far the largest source of funds for the private sector, it must be responsible for much of the economic activity following the Good Friday earthquake.[9]

Finally, there is one result of the SBA operation that must not be overlooked. The agency's provision for debt retirement was aimed at preventing both personal and commercial bankruptcies. In this way they were able to maintain the credit rating of Alaskans in general, as well as preserving the financial condition of those Eastern banks and insurance companies who held conventional Alaskan mortgages and loans.

A wave of bankruptcies would very likely have led financial institutions to raise the mortgage rates or downpayments (or both) on Alaskan homes and businesses to reflect the increased risk in purchasing these long-term debts. If the SBA loan policy helped to avert this chain of events, then it must be counted as a real benefit.

---

9. These general impressions are not conclusive proof of progress. On the surface it would seem reasonable to assume that the large amount of SBA money poured into Alaska had some impact; however, we do not know how much of the $70 million in loans simply substituted for conventional financing that would have taken place in any event.

9

THE NEED FOR DISASTER INSURANCE

The cost of natural disasters and the problems they have created for both the local community and Federal government have increased in recent years.[1] Although some of the policy problems created by natural disasters have been given special attention in recent Congressional legislation,[2] a number of criticisms can be leveled at the present system of disaster relief:

(1) If a region has suffered some calamity but is not declared a disaster area, then Federal aid in the form of loans and grants will not be forthcoming. People who do not have insurance covering damage to their property will have to cover their losses through conventional means.

(2) Even though a part of the country may be classified as a disaster area, Federal aid may not be forthcoming immediately because present legislation does not cover certain peculiar circumstances.

For example, following the tornadoes in the mid-West during the spring of 1965, many communities did not receive Federal aid even as late as 10 weeks afterwards.

---

1. The only publication on the subject of economic problems facing disaster areas is a study by Jack Hirshleifer, Disaster and Recovery: A Historical Survey, RM-3079-PR (Santa Monica: RAND Corporation, 1963). The author, however, is primarily concerned with the problems of recovery from large scale man-made disasters (e.g., recovery of Germany after World War II, reconstruction of the south following the Civil War).

2. During the session of the 89th Congress two major disaster bills were passed: (a) "The Disaster Relief Act of 1965," which provided additional assistance for areas suffering a major disaster, and (b) "The Southeast Hurricane Disaster Bill" which offered additional assistance to victims of Hurricane Betsy as well as providing for a study by the HHFA on alternative programs to provide financial assistance in disaster situations.

(3) This government aid does nothing to discourage individuals from living in certain regions (e.g., flood plains), thus perpetuating the need for more loans and grants in the future. In fact, there may be so much Federal aid poured into an area following a disaster that many individuals suffering damage are better off than before the calamity.

In Alaska, the SBA did not hesitate to let homeowners and businesses retire substantial debts having little to do with the earthquake itself; money for this purpose was made available at 3 percent interest rates rather than the conventional 8 percent loan rates from banks. Homeowners or businesses who suffered a large loss, but who paid very little on their mortgages, benefited most from the government's actions. If their property was damaged by more than 60 percent of its value, they were permitted to write off their old mortgage for $1000; those suffering a smaller percentage loss could pay a 3 percent SBA loan. These liberal terms were particularly disturbing to individuals who actually owned their house outright and suffered serious or total damage to their property. It is not surprising to find that they are now attempting to take out long-term mortgages with small downpayments on their new homes in order to be in a position to take advantage of the government's generosity if another disaster hits Anchorage. Under the present system it does not make any sense for them to tie up their capital in real estate.

One way of alleviating these problems is to develop a system of disaster insurance which will provide protection in a more equitable fashion than does the current system. This section analyzes the problems involved in developing some comprehensive insurance scheme.

9.1 CURRENT DISASTER INSURANCE POLICIES

9.1.1 Fire

Since the word "disaster" commonly refers to an event affecting a large group of people, fires are normally not classified under this heading unless a number of homes or businesses are damaged. It is precisely because blazes are generally localized that insurance

companies are more than willing to issue policies--the danger of a holocaust in any one area is small so that the premiums of many individuals pay for the losses of a few.

It makes little sense for an individual not to carry fire insurance on his house since it would be a disaster if he were liable for all losses. Therefore, practically every homeowner in the country pays the small premium for fire insurance although he will probably never actually collect on the policy.

9.1.2 Tornadoes

When tornadoes actually hit a community, they normally produce serious destruction as evidenced by the series of twisters which affected the mid-west during the spring of 1965. Since windstorms can affect any area of the country,[3] interest in some form of protection is nationwide. Since the damage from wind is normally limited to a small area, companies have been willing to include this type of disaster as part of the extended coverage policy which generally accompanies fire insurance.

9.1.3 Earthquakes

Insurance companies are in an awkward position when it comes to issuing earthquake policies. Since there have been few serious earthquakes in parts of the world where dwellings are constructed with materials similar to those used in the United States, it has been difficult to determine an accurate basis for premiums except through geologists' theoretical reports. Nevertheless, it is generally accepted by companies that wood frame houses will stand up well even under the strongest shocks. This was certainly the case in Anchorage, where most of the homes were of this type construction and serious losses to these dwellings were primarily caused by the earth slides in the Turnagain area.

---

3. During 1957, for example, the only three states not hit by tornadoes were Maryland, Nevada, and Rhode Island.

Table 25 details the premiums for different structures in Alaska as specified by the Pacific Fire Rating Bureau.

Despite these low rates on wood frame dwellings very few homeowners in Alaska actually carried policies. A comparison of the amount of fire and earthquake insurance premiums written in the state during each of the last six years is presented in Table 26. The rise in 1964 earthquake policies over the previous year is mainly due to the SBA's requirement that insurance be taken out when using the 3 percent on homes in high-risk areas. According to Anchorage insurance firms, a large voluntary demand for coverage on the part of the general public did not occur; most residents felt that another serious quake would not take place in their lifetime and if it did, the government would again come to the rescue. At the same time, companies have not encouraged residents to buy insurance policies protecting them against damage from a quake, since a single firm stands to lose a substantial sum of money if it has insured a large number of houses in one region and they are all destroyed. Therefore, concerns are only willing to hold a limited block of insurance in any one region so the risk of a single large loss is minimized. If too many residents request coverage from them, they will simply have to reinsure with another company.

The obvious solution from the point of view of a single company would be to increase existing rates so as to protect against a potential high loss from an earthquake occurring tomorrow rather than twenty years from now. At present, firms prefer to look at this type of insurance as a special service for customers holding other policies with them rather than as a profit-making business; they accept the premiums set by the Fire Rating Bureau primarily because few people take out policies.

9.1.4 Floods and Hurricanes

It is impossible for property owners to buy insurance against floods or water damage from other storms even if they are willing to pay a high premium. Protection is available only on movable or

Table 25

EARTHQUAKE INSURANCE RATES IN ALASKA[a]

Construction[b]	Mandatory[c] Deduction, %	Rate per $1000 of Insurance, $			
		1-4 Family		5-20 Family	
		Building	Contents	Building	Contents
Frame Houses (3 stories or less in height)	5	1.10	1.10	1.10	1.10
Frame Houses (over 3 stories in height)	5	1.10	1.10	2.30	1.10
All or part of brick, stone or concrete (not concrete block)	10	5.30	4.20	5.00	4.20
All or part masonry-building veneer Contents	15 5	17.50	1.10	16.60	1.10
All or part concrete block, tile, adobe, or metal	15	17.50	17.50	16.60	17.50

a. Source: Pacific Fire Rating Bureau (July 1964).
b. If building is on filled ground (not firm natural ground), increase all earthquake rates 25%.
c. Deductible percent applies to actual cash value of the property insured (not amount of insurance).

Table 26

VALUE OF FIRE AND EARTHQUAKE INSURANCE PREMIUMS WRITTEN IN ALASKA

Year	Fire Insurance	Earthquake Insurance
1959	$5,302,343	$17,731
1960	5,719,705	11,637
1961	5,352,916	7,505
1962	5,528,924	20,623
1963	5,026,287	4,811
1964	not available	22,659

personal property such as jewelry or furs (covered by a floater policy)[4] or motor vehicles (covered by comprehensive insurance) or boats, shipping equipment and cargo in transit (covered by marine insurance).[5]

A number of studies have been undertaken in recent years on the feasibility of some form of flood insurance.[6] In a staff report for the Senate Banking and Currency Committee in 1956, the following conclusion was reached:

> Because of the virtual certainty of the loss and its catastrophic nature and the impossibility of making this line of insurance self-supporting due to refusal of the public to purchase such insurance at the rates which would have to be charged to pay annual losses, companies generally could not prudently engage in this field of underwriting.[7]

4. A floater policy insures against damage to the object regardless of change in location.

5. Tunnels and bridges are the only non-movable objects where it is possible to buy insurance against water damage (under an all-risk policy).

6. See, for example, two reports by the American Insurance Association, Studies of Floods and Flood Damage (1952-1955) and Studies of Floods and Flood Damage (1962 report).

7. US Senate Committee on Banking and Currency, Federal Disaster Insurance (Washington: Government Printing Office, 1956), p. 238.

Following the disastrous floods which affected the mid-west in 1952, the factory mutual insurance companies sent questionnaires to 25,000 of their fire insurance policyholders in the country. Only 10 percent of those who responded were interested in any form of flood insurance and then only if the rates were low. Since only those property owners who had a flood hazard would insure their risks, the premiums to be charged would necessarily have to be high and, therefore, corporations would rather take their losses as a deduction from their Federal income taxes.[8]

Homeowners might be more willing to take out policies even at a high premium since their tax write-offs would undoubtedly be less than a corporation's and a large part of their equity is tied up in their own dwelling unit. However, insurance concerns are hesitant to offer flood protection even at high rates unless their competitors follow suit. According to the 1956 Senate report, "the entire industry apparently agreed with the conclusion that flood insurance did not provide an attractive commercial venture for profit making purposes."[9]

9.1.5 Summary of Current Disaster Insurance Policies

This study of protection currently offered by insurance companies against various natural disasters has shown the following policies to be widespread:

(1) If there is a small risk of serious and large-scale damage to any area then companies encourage individuals to take out insurance policies, e.g., fire.

(2) If a disaster can potentially affect any part of the country, e.g., tornadoes, then insurance firms can actually justify coverage since the relatively low premiums of many will pay for the damage of a few.

(3) Insurance companies are concerned with their public image and will therefore insure against earthquakes at low rates. Since damage to most homes is small, companies are not in danger of suffering overwhelming losses.

---

8. Ibid., p. 241.

9. Ibid., p. 241.

(4) In the case of floods, companies are opposed to insurance because of the relative certainty of the event in particular regions and the knowledge that only individuals in those areas would be interested in a policy, thereby necessitating unusually high rates.

9.2 FRAMEWORK FOR COMPREHENSIVE DISASTER INSURANCE SYSTEM

If experience has proved that a natural disaster can strike any area of the country, insurance companies will include protection against these losses under the standardized extended coverage clause. Catastrophies which are considered to be regional will either be covered by a separate policy (i.e., earthquake)[10] or not insured at all (i.e., floods and water damage from hurricanes).

The Federal government has preferred to stay out of the insurance field unless the industry was not in a position to handle particular types of policies. This section will consider the basic framework necessary for developing a comprehensive system of private insurance where all natural disasters are combined into a single package policy. We will be concerned not only with the economic benefits resulting from such a plan but with its feasibility as well.

9.2.1 Spreading the Risk

In order for firms to be interested in any disaster insurance plan there must be enough people from different parts of the country participating to diversify the risks. On the other hand, insurance executives are not enthusiastic about compulsory insurance. They prefer to look at their industry as a service group selling a product to consumers because they want it, not because they are a captive market. Although this form of logic may have psychological merit, it certainly cannot be justified economically since compulsory

10. Although seismologists claim that no area of the country is immune from earthquakes, only the western part of the country has suffered any damage during the last 100 years. Insurance companies, therefore, look at shocks as a regional rather than national problem.

insurance is bound to increase business for the industry as a whole. In fact, there have been few complaints from insurance personnel on the rulings in certain states forcing all automobile drivers to have liability and property damage insurance before taking the wheel. More in line with the subject of disasters, it should be noted that residents having mortgages are normally required to take out policies protecting their dwellings against fire and extended coverage damage. In this way the financial institutions safeguard their collateral in case an unexpected blaze destroys a house.

In principle, there is no reason why disasters currently receiving separate coverage (e.g., earthquakes) or no coverage (e.g., floods) could not be included under the extended coverage clause. Since the homeowners throughout the country would be required to take out this form of insurance, the risks would be spread out. At the same time individuals would be protected against damage from all natural catastrophies without having to rely on the generosity of the Federal government. The main problem is to develop a scheme which the insurance companies feel will be marketable, profitable, and in the public interest.

9.2.2 Nature of Premiums

It is much easier to talk theoretically about a basis for insurance premiums than to actually calculate the rates. Suppose, for example, that a man wants to insure his $50,000 house against fire damage. If the insurance company had determined that the expected annual loss on a home of this type construction and value was $50 then the rate per $1000 would be $1 plus a certain fraction for company overhead.[11]

If this concept of premiums based on degree of risk were utilized in developing a system of comprehensive disaster insurance the

---

11. In fact, one must also consider the interest income which the insurance companies will receive by investing customer payments. Actual premiums would thus be somewhat lower than the above calculation.

suggested program should be clear. Individuals in disaster-prone regions would pay the price for living there; fees should be highest in areas most likely to receive severe damage from natural disasters.[12] This principle of differential premiums is in direct contrast with the government's recent attitude toward disasters in the United States. Once a stricken community or region is classified as a "disaster area" large amounts of Federal grants and loans are made for rehabilitation. It is true that southcentral Alaska was an extreme case because of its dependence on Federal funds in normal times; however, aid to flood and tornado victims suffering damage during the first half of 1965 was generous although somewhat more selective than in Alaska.

The problem of actually calculating premiums may be particularly difficult. For example, in attempting to develop realistic rates against flood insurance it would be necessary to differentiate between homes on a river bank and those located 100 yards away from it. However, only by charging these differential rates would insurance accurately represent the cost of living in a disaster-prone area.

9.2.3 Government Reinsurance Aspect

In order for insurance to be equitable, rates must be based on the expected annual loss calculated over a number of years. To use a simplified example, suppose that past data indicate that only one earthquake every ten years will cause any damage worth calculating. Annual rates should then be based on 1/10 the estimates of destruction from this big shock. If companies began issuing insurance tomorrow and a serious earthquake occurred next year, then the losses paid out would be far greater than any reserve which the companies would have been able to build up.

---

12. Even today the requirements on home mortgages reflect the risk of living in a particular area and the absence of some forms of insurance coverage (e.g., against water damage from hurricanes). Thus if a person wishes to buy a home on the Middle Atlantic shores he characteristically makes a downpayment which reflects the proportional value of the building to the total value of property. If, for example, a cottage is worth $10,000 and the land $12,000, an $11,000 downpayment protects the bank from disaster damages to the dwelling.

In order to counteract this action it would seem feasible to institute some form of government reinsurance. By paying a certain percentage of each disaster policy to some designated Federal agency, companies would be protected against any unusual losses due to a natural disaster. In other words, the government would come to the aid of insurance firms much in the same way it has promised to rescue the banks through the Federal Deposit Insurance Corporation.[13]

Insurance companies would then be assured that they would be protected during unusually severe years, such as 1965 with its numerous floods and tornadoes in the mid-west.

9.3 LEGISLATION ON DISASTER INSURANCE

The history of legislation on disaster insurance has closely followed the record of natural catastrophes affecting various parts of the United States. Following the disastrous mid-west floods of 1951, with total property and income loss estimated at $2 billion, President Truman sent a special message to Congress requesting a $400 million appropriation for a Federal flood-relief plan. He recommended that $50 million of this fund be set aside for financing a flood insurance program which would be administered by a Flood Disaster Administration.[14] After extensive hearings both the Senate and House postponed any legislative action and the bill was subsequently dropped from consideration.

During the next two years, interest in disaster insurance waned since there were no unusual disasters affecting the United States. However, following the 1955 hurricanes and floods (which led to even more extensive damage than in 1951) interest in legislation was renewed. Senator Fulbright, Chairman of the Senate Committee on Banking and Currency, requested a study of the practicability of

---

13. In fact, the similarity between bank insurance and disaster reinsurance might be indicated by a duplication of initials. In this case, FDIC would stand for the Federal Disaster Insurance Corporation.

14. The Flood Disaster Administration was to be a small policy-making body of approximately thirty people chosen by the President.

Federal disaster insurance with a view towards possible legislation in the next session of Congress. On the basis of a rather thorough report on Federal disaster insurance, the Federal Flood Insurance Act established three programs under the administration of the Housing and Home Finance Agency (HHFA) for aiding flood damage victims:

> (1) Direct Insurance Program. In order to permit marketability, fees charged to private individuals could be as low as 60 percent of an estimated fair rate covering the expected loss from floods over a period of years. The difference between the actual fee and the estimated rate was to be covered by a Federal subsidy. Individuals were not required to take out insurance, but it was hoped that the relatively low rates would encourage most property owners to protect themselves.
>
> (2) Reinsurance. The HHFA Administrator could enter into reinsurance agreements with private insurance companies. Reinsurance fees were to be adequate to pay all claims for unusual losses over a reasonable period of years.
>
> (3) Loan Contracts. The HHFA was willing to guarantee any loans from financial institutions to private individuals covering flood loss. In case these funds were not made available on reasonable terms from private sources the HHFA was obligated to make them directly. The amount of this loan could not exceed flood damage and was also subject to the limitations of $250,000 per person and $10,000 per dwelling unit.

This threefold plan was abolished in 1957 after being in existence for nine months when Congress declined to appropriate funds for its operations.

The serious floods and tornadoes of 1965 coupled with the Alaska earthquake spurred new legislation in the 89th Congress. A bill is now pending before the House which authorizes the HHFA to undertake "a study of methods of helping to provide financial assistance to victims of future natural disasters.... The report shall include, among other things, an indication of the feasibility of each program studied, an estimate of its cost to the Federal government and to

property owners on the basis of reasonable assumptions, and the legal authority for state financial participation."[15]

9.4 SUGGESTED DISASTER INSURANCE PROPOSALS

The proposal set forth above for a comprehensive scheme of disaster insurance as part of the extended coverage clause appears consistent with the industry's actions to include other natural and man-made disasters under this policy if they feel it will be profitable to them and in the public interest.[16] For example, after the government passed a Federal hail insurance act in the 1930's, insurance companies decided that a private program would be feasible. They therefore included direct loss due to hail in their extended coverage clause, thus obviating any need for a Federal program. It is in this spirit that we are suggesting that the extended coverage clause be enlarged to include disasters where it is currently impossible to buy insurance (i.e., flood and water damage from hurricanes).

9.4.1 Specific Disaster Systems

Three types of insurance schemes would permit companies to obtain sufficiently broad coverage.

The simplest device would be for the Federal government to require fire and extended coverage insurance from all homeowners. Payments against natural disasters would thus be a type of property tax with premiums reflecting the risk of living in a disaster-prone area. While this method assures that everyone will be protected against natural disaster, it has the disadvantage from the insurance industry's viewpoint of being compulsory.

A more moderate scheme would be to include fire and disaster insurance premiums as part of a mortgage, thereby formalizing the requirement that people who owe money on their home protect it from

---

15. S. 408 89th Congress. This bill passed the Senate on January 28, 1965 and was committed before the House on July 21, 1965.

16. Today a standard extended coverage policy for the New England and Middle Atlantic states includes "direct loss from windstorm, hail, explosion, riot, riot attending a strike, civil commotion, aircraft, vehicles, and smoke."

unexpected calamities with some form of insurance. Individuals would not actually have to arrange their own policies since it could be jointly handled by the financial institutior issuing the mortgage and the insurance company. While this proposal represents a more painless method of insurance than the present one, it has a corresponding disadvantage: families may neglect to continue taking out policies once they own their house outright because of the automatic nature of insurance coverage.

The most desirable possibility would be to include other natural disasters on the extended coverage clause and have policies handled by insurance companies on a competitive basis just as they are today. Since financial institutions would normally require their mortgage holders to take out this policy, coverage would be sufficiently wide for premiums to be at a reasonable level. While this sytem has the advantage of maintaining the present insurance structure, it does require companies to include the same natural disasters in their policies. Competition would otherwise lead to some exclusions (e.g., floods) thereby lowering the rate and defeating the whole purpose of the insurance scheme. Insurance companies would be able to rely on a system of government reinsurance in all three cases to guard against unusual losses in any one year.

9.4.2 Critical Analysis

If the proposed system is not made compulsory, the most serious problem will be taking care of individuals who receive substantial damage but have no insurance. From a purely economic point of view the answer is clear: they should suffer the consequences. In effect, this attitude exists today when a home is damaged by fire and the homeowner is not covered by insurance; he must pay all the losses himself. For this reason all potential buyers are required to protect themselves before they can take out a mortgage.

There should be no reason why the same attitude could not prevail regarding other disasters. If practically every house in a community has insurance coverage and an earthquake causes widespread

damage, then it would not be necessary to classify the region as a "Federal disaster area" except for the purpose of restoring public facilities. The isolated homeowner without insurance surely would not receive the sympathy of his neighbors or outsiders in the same way as he does today. If everyone would have been fully aware of the opportunity to protect himself from unexpected losses, this person would simply be considered a gambler who lost; commiseration for risk takers on the short-end is not a common phenomenon.

Besides providing for a more equitable recovery, a system of disaster insurance would also increase tax payments to the Federal government. Currently if a person suffers damage and is not insured against it he can write it off as a tax loss. For example, in 1952 a total of $296 million was deducted in taxable returns as net losses on non-business property resulting from destruction by fire, storm, automobile accident, flood or other natural physical forces, and from losses due to theft.[17] These savings could be used as a basis for a subsidy of the insurance premiums, thereby lowering the actual fees paid by property holders. By also considering the amount of money the government would save by not pouring in grants and low-interest loans to private individuals, a further reduction in actual premiums could be instituted.

Insurance companies would benefit from a system of comprehensive insurance through the elimination of a large number of disagreements as to whether damage to a house was caused by wind (included under "extended coverage") or water (excluded). For example, families whose homes were affected by a hurricane may claim that the initial damage was caused by wind (e.g., breaking a window) thus permitting

---

17. US Senate Committee on Banking and Currency, Federal Disaster Insurance, (Washington: Government Printing Office, 1956), p. 266. The report argues that private damage from flood and other disasters where insurance is not available can be assumed to make up the large proportion of the $296 million figure. Since most people do insure against the other unfortunate occurrences listed above they cannot use their losses as a tax deduction.

water to enter; insurance companies might argue that water was the sole cause of destruction. Since both types of damage would be included under the proposed system of disaster insurance a large number of dollars could be saved in time-consuming arguments and occasional legal battles concerned with this subtle point.

A system of disaster insurance has the further advantage of reassuring individuals that they will receive money to repair their damage. Currently there is a great deal of uncertainty as to the fate which befalls property owners in a disaster stricken community; in some mid-west areas, Federal money was still not forthcoming ten weeks after a twister had produced serious damage during the spring of 1965.[18] Of course, under the suggested system of insurance, payments would only restore the homes or businesses to pre-disaster condition rather than permitting modernization of an out-dated establishment. Therefore the SBA would still have a role to play in stricken areas by supplementing insurance claims with normal loans for economic up-grading.

By combining Federal and private spending in this way, disaster recovery should be more efficient and equitable than it is today. Disaster-prone areas would be contributing larger shares than they currently do; however, it is highly likely that total nationwide payments for extended coverage would be smaller, if the Federal government were willing to subsidize insurance premiums by the amount of money they would not have had to spend on disaster relief.

---

18. See US Senate Hearings on the Disaster Relief Act of 1965 (S. 1861), pp. 37-45.

PART IV

LESSONS FOR CIVIL DEFENSE PLANNING

10

A COMPARISON OF POST-ATTACK POST-DISASTER ENVIRONMENTS

10.1 SUPPLIES FROM OUTSIDE

Following a natural disaster there generally is no difficulty in obtaining supplies from outside markets within hours after the event has occurred. For example, the day after the Good Friday earthquake, plane-loads of hospital supplies and other emergency equipment were flown into Anchorage. President Johnson immediately declared southcentral Alaska a "disaster area," thus indicating that the Federal government would continue to provide substantial amounts of aid in the form of loans and grants.

If only a limited area was hit by a nuclear attack, the remainder of the country would be in a position to provide some resource aid just as after a natural catastrophe. However, the presence of radioactive fallout might prevent any direct contact with the disaster area for a period of days during which time surviving residents would be forced to remain in shelters.[1] When the danger of fallout has passed, outside help should be forthcoming in the form of labor and capital. If there was substantial capital destruction, the time period necessary for the community to regain its previous status would undoubtedly be longer than following a natural disaster. Of course, any nuclear attack on the United States implies an abnormal international environment. The demands on Federal energies and resources will differ quantitatively and qualitatively from those normal in a peaceful situation, even considering problems like Vietnam. Naturally, these demands will diminish the extent and

1. We are implicitly assuming that the surviving population will have fallout shelters available for their protection.

timing of Federal aid, but the assessment of this phenomenon is beyond the scope of this Study.

An all-out nuclear attack on the United States would lead to much more severe recovery problems. Economic self-sufficiency would undoubtedly be required for a relatively long period of time due to serious transportation and communication problems, an overall shortage of raw materials, not to mention the substantial amount of radioactive fallout. Even if scientific knowledge were preserved, recovery would still be slow and painful because of limited outside capital to replace damaged facilities and a reduction in the available labor force.

10.2 MIGRATION PROBLEMS

There may be a substantial difference in migration patterns following a natural disaster and a nuclear attack. The experience of residents in stricken communities indicates a hesitancy to leave the area unless their homes are destroyed, and they cannot find shelter with neighboring friends and relatives. In that case they may temporarily migrate to nearby towns with the intention of returning as soon as possible.

Because Alaska is geographically isolated, people who left the Anchorage region generally traveled a considerable distance to relative's homes in the "lower 48," although a few were able to stay with friends or relatives in Juneau or Fairbanks; by the end of the summer practically all of the out-migrants had returned to the region. The fact that husbands remained behind to help with debris clearance and reconstruction indicates that families had no intention of leaving permanently.

Speculating on what might happen after a nuclear attack, the picture looks somewhat different. Following either limited or all-out blasts, the survivors would remain in their bomb shelters until radiation levels had subsided. Therefore during the immediate post-disaster period there should be little if any movement from the stricken regions, in direct contrast with a natural disaster.

After the all-clear signal, however, a substantial out-movement from the nuclear scarred region to rather distant areas might follow a localized attack; the choice of region would probably be determined by the location of friends and relatives. The London bombings during World War II provide some helpful hints in this regard; many individuals traveled as far as Canada and Australia to gain safety from future attacks.

Following an all-out nuclear attack there would very likely be little movement unless one part of the country is physically in better shape than another. Even in this case it might be difficult for a family to travel from one region to another because of the disruption in transportation facilities.

10.3 CONVERGENCE

Convergence problems can pose certain difficulties during the period immediately following a natural disaster. Communication delays due to telephone tie-ups and an unmanageable number of telegrams are common phenomena. At the same time the arrival of sightseers and individuals trying to lend a hand often hinders emergency operations in the stricken community. This latter problem was not so prevalent in Alaska both because of its distance from "the lower 48" and the serious warnings by Governor Egan that enough labor was on hand to handle the debris clearance and restoration of facilities.

The only organizational problems in a nuclear-attack area would occur underground. If there were too many people crowded into the community fallout shelters then it may be difficult for them to operate efficiently. After people can safely emerge from their hideouts there may be "divergence behavior," if the attack was known to be limited, with people fleeing to other non-radioactive areas. These movements may lead to problems in nearby "safe zones" not directly affected by the disaster.

If the nuclear attack were widespread, individuals would probably remain in their own area without a great concern for other communities. Old clothes, hospital needs, and other supplies which are

normally shipped in large quantities to a natural disaster area would not be moved to any particular location partly because of inadequate transportation facilities but mainly because all areas would be faced with the same problems. Convergence behavior in the form of mass phone calls and telegrams would not occur because the facilities would not be in operation. Life would be centered around the bomb shelter during the emergency period when convergence usually is prominent.

10.4 HOUSING

People who were fortunate enough not to lose their homes in a natural disaster are almost always willing to open up some of their rooms to the victims. For example, when the dikes broke in the coastal areas of Holland during the spring of 1953, the Dutch people in non-flooded regions volunteered parts of their normally crowded quarters to homeless strangers.

Of course, most individuals display this generosity under the assumption that the imposition on their privacy will be temporary. It is therefore not at all obvious that the same pattern would exist after a limited nuclear attack. Homeowners in "safe areas" may be a bit hesitant to welcome strangers fleeing from a bombed region because they might fear a resulting food shortage for their own family. A natural, although uninformed, desire to avoid as much close contact as possible with "radio-active" bodies or materials may also be a strong factor influencing their closed-door policy. If the people searching for shelter are relatives or close friends then this negative attitude may be tempered a bit, though it is unlikely that homeowners would be as willing to take in strangers as after the Dutch floods.

An all-out nuclear attack would probably not produce these conflicts because of the damage to homes in all areas. Residents would most likely be concerned with rebuilding their own communities rather than living elsewhere.

10.5 PRICE BEHAVIOR

Rarely has it been necessary to institute price controls following a natural disaster because shortages were assumed to be short-lived. In Anchorage both food prices and rents showed little change over their pre-quake status; in fact, some declines occurred in highly-demanded items, which perhaps can best be explained by the short-run altruism of the community.

Once the economy begins to function again after a nuclear attack price controls, however undesirable for economic recovery, would probably replace normal market mechanisms, particularly if the damage was widespread. In view of future uncertainty and the rather serious long-run shortages, many people would probably hoard stocks in anticipation, and as a consequence, of price controls.

10.6 EFFECT ON PRODUCTIVITY

It is interesting to speculate on how efficient recovery would be following a full-scale nuclear bombing in contrast with a limited attack or a natural disaster. We have placed the targets affected by a limited attack in the same category as flood or earthquake regions under the assumption that outside aid would be forthcoming in both cases. However, it is likely that productivity would be lower in the nuclear-scarred communities than in natural disaster areas because of the severity of the damage from the blasts as well as the deterring effect of radioactivity on economic activity.

10.7 CAPITAL EQUIPMENT

If the entire nation is affected by bombing, then regions will probably have to rebuild with capital they have on hand. Due to the need for improvisation, these goods will assume more general uses than in normal times. The effect of an all-out nuclear attack on total productivity of capital is not so clear. If goods are used much more intensely than normally, then they may yield more unit

output than those used after a natural disaster or selective bombing. The actual value of total output will depend on:

(1) The marginal productivity of capital in its different uses.

(2) The length of time the equipment is operating.

(3) The quality of the work force utilizing the goods.

10.8 LABOR FORCE

In discussing the productivity of labor under these situations, perhaps the most important difference relates to the size and motivation of the work force. Even if relatively few people were killed by an all-out nuclear attack the remaining population would probably not be as highly motivated to rebuild their communities as are residents in natural disaster areas. As their whole world would have collapsed, a form of lethargy would be likely to exist which will be difficult to overcome. By contrast, an area struck by a natural disaster or a selective blast can see more hope for the future since the rest of the nation would pour out their sympathies not just in words but also with aid. Workers would migrate in from other areas to help, thus stimulating the community to get back on their feet and resume normal operations as fast as possible. Even if the labor force was highly motivated following a large-scale attack, its <u>marginal</u> productivity would still be lower than in the less extreme situation. Besides utilizing more generalized type capital, workers would have to be content solely with raw materials on hand to rebuild damaged structures. For example, following the earthquake Alaska received large shipments of epoxy to help patch up damaged walls which they could not have brought up from the "lower 48" if the state were truly isolated. The damaged structures could then have only been repaired through much more time-consuming methods, thus lowering the marginal productivity of labor from what it actually was. It would be difficult to imagine <u>total</u> productivity being higher after full-scale nuclear bombing than in the other cases

under consideration. Even with much longer hours workers would have a difficult time compensating for the less efficient materials and capital; in fact, they would have to go without much sleep if they lengthened the construction day over what it was in Alaska during the summer following the quake.

10.9 BEHAVIOR IN THE COMMUNITY

Behavior in the individual communities after either an all-out or limited nuclear attack should follow a pattern similar to post-natural-disaster activity.

Residents in Alaska cooperated after the quake because they had all experienced a common event which was beyond their control. Families with undamaged homes were willing to house friends and relatives who had been unfortunate enough to lose their dwellings; people were urged not to hoard goods to prevent shortages, and they complied with the request. Workers gave freely of their time to help restore emergency facilities and provide food and locate shelter for the homeless. It was an unusual period when the most admirable human qualities were exhibited by practically all the Alaskan residents.

There is no reason to suspect that following a nuclear attack behavior within the community would differ substantially from what occurred in Alaska. While radioactivity still poses a problem, the community bomb shelter may be regarded as analogous to the quake-stricken town for a period of several weeks. Once the community attempts to rebuild and get back on its feet there should be some spirit of cooperation although some apathy may exist due to the severity of destruction and the consequent difficulty of seeing an end to reconstruction activities.

Natural disaster experience may provide some guide as to the length of time this altruistic attitude should prevail. Once individuals feel that the emergency period or crisis has passed, they will resume their normal pattern of existence, with the

community taking second place to their own actions. Whether a nuclear disaster would generate a longer interim period than a natural catastrophe is difficult to predict. It all depends on what people's concept of an "emergency period" will be under these unusual circumstances.

10.10 FLEXIBILITY OF RESOURCES

Immediately following a natural disaster it is not uncommon to find that certain goods and resources are utilized in abnormal ways to help counteract shortages and/or temporarily repair basic facilities. For example, in Anchorage, aluminum piping and garden hoses were used to restore the water system until permanent reconstruction could take place. This makeshift use of resources could be expected on a much larger scale and for a longer period of time following nuclear attack of any intensity. In fact, ingenuity would be one of the most valuable qualities for efficient recovery, particularly if outside aid was not forthcoming.

11

CONCLUSIONS FOR CIVIL DEFENSE

This investigation of the effects of the Alaskan earthquake was undertaken with the hope that it would be possible to extract information useful for civil defense planning. The nature of the disaster (i.e., no overpressure, fallout, etc.) coupled with the relatively small loss of human life had the effect of concentrating the effort on the economic aspects of the disaster and its aftermath.

The results of the research effort can be thought of in terms of three objectives:

(1) Relevance to an all-out nuclear war;

(2) Relevance to a limited strike nuclear war;

(3) Relevance to the civil defense mission as it applies to natural disasters.

Thought of in its broadest terms, the analysis of the effects of the earthquake on the Alaskan economy possessed wide differences in its application to the three objectives mentioned above.

In sum, it is concluded that the economic consequences of a natural disaster which is limited in its geographic scope has virtually no application to US civil defense planning for a large-scale nuclear war. One would expect to find little interactions between regions following a widespread nuclear attack since transportation and communication facilities would be drastically curtailed, not to mention the severity of damage to all areas. Consequently, recovery is primarily a result of self-help. The economic problems faced by a natural disaster community, where the supply of resources from the outside is highly elastic, are therefore largely irrelevant to planning for recovery from a full-scale nuclear attack.

Parallels between the economic consequences of natural disasters and limited nuclear attacks are not hard to find. Given the national survival of transportation and communication facilities as well as the basic economic structure of the nation, in both cases, the economics of recovery are not dissimilar. The main differences between the two situations is essentially one of degree and timing. During the first few weeks after a limited nuclear attack the presence of radioactivity would restrict the flow of capital goods and migration of labor from outside areas. Under certain conditions, fear of a repetition of the attack in additional cities could have some effect but it is not believed that this would be of major proportions. Perhaps more important, but extremely difficult to assess, is the effect on Federal aid of the international environment implied by a limited attack. The attack would have occurred in an international context that might demand a significant portion of Federal money, attention, and energy. The extent to which the needs of the attack communities would be denied because of external events is a question beyond the scope of this Study.

APPENDIX A

ANALYSIS OF MIGRATION PATTERNS AFTER THE ALASKA EARTHQUAKE

Appendix A

ANALYSIS OF MIGRATION PATTERNS AFTER THE ALASKA EARTHQUAKE

A1. MIGRATION FROM ANCHORAGE

A1.1 Transportation Data

In order to estimate the outward movement we have obtained figures for the past three years from the Canadian border station on the monthly automobile traffic heading south along the Alcan highway. Ordinarily these totals coupled with data from Anchorage International Airport would indicate the flow of residents from the city during the spring months.[1] However, following the quake there were so many government officials and survey teams flying into and out of Anchorage that it would be impossible to isolate the local departures from the total figures. Nonetheless we have presented the monthly figures for both outbound automobile and airplane traffic for the years 1962-64 in Table A-1 to depict the overall increased movement.

Discussions with Anchorage residents indicate that the vast majority of those leaving the area departed by car during the first month following the disaster; by comparing April figures for 1964 with the two previous years we see that automobile traffic more than doubled despite no discernible change in pattern for the first three months of the year. By May the traffic had become only slightly higher than normal.

---

1. A few tourist departures may have occurred during these months but these would have a negligible effect on the total since the season really begins in June. There were also very few out-migrants from outlying communities traveling by car into Canada since practically all these individuals going to the "lower 48" were flown to Seattle. According to the Red Cross the Navy sent about seven planeloads of people directly from Kodiak to Seattle. Some of the escapees from Valdez also went to the Continental United States by plane from Fairbanks.

Table A-1

TRAFFIC LEAVING THE ANCHORAGE AREA BY PLANE AND AUTOMOBILE[a]

[February 1962 - December 1964]
(Figures in Thousands of Passengers)

Month	Anchorage International Airport Departures			Anchorage Automobile Departures		
	1962	1963	1964	1962	1963	1964
Jan.	--	9.0	10.3	--	1.1	1.3
Feb.	7.5	8.3	9.7	1.0	1.1	1.3
Mar.	9.1	10.0	11.2	1.4	1.5	1.4
April	9.8	10.7	14.2	1.5	1.6	3.0
May	13.5	13.7	18.6	4.1	5.2	5.8
June	17.0	16.6	18.8	4.7	8.4	7.1
July	14.6	18.1	20.2	9.6	10.8	11.0
Aug.	18.2	20.0	22.3	8.6	10.3	10.1
Sept.	13.2	15.1	18.3	4.6	4.6	4.8
Oct.	11.3	12.4	15.1	3.2	3.1	3.5
Nov.	8.3	10.7	13.1	2.4	2.4	2.4
Dec.	10.0	11.3	13.5	2.1	2.1	2.4

a. Sources: Automobile Traffic: Beaver Creek (Canada) Customs Office.
Airplane Traffic : Division of Aviation (Anchorage International Airport).

A1.2 School Enrollment Statistics

For this post-disaster situation monthly enrollment changes in the Anchorage public schools are more meaningful indicators of out-migration. These data, presented in Table A-2, for January through May during the last five years detail both cumulative totals and monthly changes for all twelve grades. One can easily observe the significant change in the pattern following the quake.

For the four years preceding the disaster, school population remained relatively stable through April and then declined in May because early vacationing families took their children out of classes shortly before the end of the academic year.[2] During the month of April 1964, a substantial decline in school population occurred, although May appeared to follow the normal pattern. It is therefore safe to assume that the bulk of outgoing traffic occurred during the first month following the quake, as would have been expected from the record of other disasters.

We can supplement the figures on Anchorage public school population during April with data from a survey made of military school enrollment changes[3] one month after the quake. In Table A-3 the relevant statistics have been listed for both type schools along with the combined totals.

To gain some idea of the total out-migration caused by the quake the drop in school children during April can be inflated by the ratio of Anchorage population to total school enrollment at the time the disaster occurred. Since many wives migrated along with their

---

2. The school totals are compiled on the last day of each month so that the May 31 figure represents the enrollment at the end of the school year. The explanation for the drop in May totals was given to us by Gerald Marquees, Director of Records for the Anchorage public schools, who assembled all these figures.

3. The Army and Air Force have schools for children of military personnel at Fort Richardson and Elmendorf Air Force Base respectively.

Table A-2

TOTAL MONTHLY SCHOOL ENROLLMENT (1st thru 12th Grade)[a]

Anchorage Independent School District
(Sept. 1961-Jan. 1965)

	1960-1961[b]	1961-1962[b]	1962-1963[b]	1963-1964[b]	1964-1965[b]
Sept. 30	12,475	14,019	15,166	16,351	17,704
	+ 34	+12	+ 22	+ 36	+105
Oct. 31	12,509	14,031	15,188	16,387	17,809
	+107	+18	- 93	- 45	+ 86
Nov. 30	12,616	14,049	15,095	16,342	17,895
	- 75	-31	- 89	- 41	- 68
Dec. 31	12,541	14,018	15,006	16,301	17,827
	+123	- 6	+165	+ 53	+ 98
Jan. 31	12,664	14,012	15,171	16,354	17,925
	+ 76	-32	+110	+ 38	
Feb. 28	12,740	14,044	15,281	16,392	
	+ 12	- 9	+ 48	+ 29	
Mar. 31	12,752	14,035	15,329	16,421	
	+ 14	-28	+ 34	-555	
Apr. 30	12,766	14,007	15,363	15,866	
	-124	-85	- 79	-105	
May 31	12,642	13,922	15,284	15,761	

a. Source: Division of Records (Anchorage Independent School District).
b. Numbers between entrees indicate monthly change.

Table A-3

CHANGE IN ANCHORAGE PUBLIC AND MILITARY SCHOOL ENROLLMENT CAUSED BY GOOD FRIDAY EARTHQUAKE

	Pre-Quake Enrollment (March 27)	Post-Quake Enrollment (April 30)	Change
Public Schools	16,421	15,866	-555
Military Schools	4,797	4,606	-191
Total	21,218	20,472	-746

children while the husband remained in Alaska to help in the re-building, the resulting figure will undoubtedly overestimate the flow from the city. The following variables will be introduced in the analysis:

x_t = number of Anchorage school children enrolled on March 27, 1964;

x_{t+1} = number of Anchorage school children enrolled on April 30, 1964;

y = estimated total population of Anchorage on March 27, 1964; and

z = estimated out-migration during April 1964.

The objective is to determine z on the basis of the other three variables, all of which are assumed to be known. It is easy to see that:

$$z = (x_{t+1} - x_t)\, y/x_t. \qquad (1)$$

As of April 1, 1960 the population of the Anchorage school district was 53,311 and the Census Bureau estimates that it increased by approximately 1500 during each of the past four years. Using an adjusted figure of 59,000 inhabitants for the pre-quake figure, the migration of residents is found by equation (1) to be:

$$z = (-746)\,\frac{59,000}{21,218} = -2074.$$

Rather than trying to pinpoint an exact total with the limited data available we will simply postulate that out-migration from Anchorage lay somewhere between the 1500 passenger increase in automobile traffic for April 1964 compared with the previous two years and the 2074 figure obtained by inflating school enrollment changes.

A2. MIGRATION INTO ANCHORAGE

A2.1 Automobile Traffic

Despite an announcement by Governor Egan several days following the quake that recovery needs could be adequately met by local residents, a large increase in automobile traffic to Alaska still occurred, as shown in Table A-4. These data, listed monthly for the past six years,[4] indicate that traffic during the spring months of 1964 was higher than usual. Although weather conditions do play a role in determining the flow of cars along the highway there was no substantial change in temperature or condition of the road over the previous years to account for this pattern.

A comparison of the difference in traffic between April 1964 and the pre-quake month of March indicates a much larger increase than for any of the previous five years. From 1959 to 1963 volume never rose from March to April by more than 710 passengers; this figure was more than doubled in 1964. After April the monthly differences were not abnormally high but the absolute totals were far above previous years' movements.

Inspector William Craig at the Tok border station attempted to analyze the migration pattern in the post-quake months by keeping

---

4. Immigrant Inspector William Craig at the Tok border organized these figures for us as well as describing changes in the composition of incoming traffic as a result of the quake. Automobiles crossing the Tok border have the option of branching off to either Anchorage or Fairbanks. Before the quake about 65 percent headed for Anchorage; after the disaster this percentage increased to approximately 75 percent for the next two months and then dropped down to normal again.

Table A-4

MONTHLY PASSENGER TRAFFIC BY AUTOMOBILE INTO ALASKA[a]
(1959 - 1964)

Months	1959	1960	1961	1962	1963	1964
Jan.	1,365	1,206	1,827	924	1,566	1,866
Feb.	1,307	1,284	1,612	1,134	1,732	1,825
Mar.	2,652	2,072	2,306	1,615	2,402	2,205
April	3,087	2,783	2,985	2,138	2,725	3,745
May	4,116	3,734	3,426	3,060	3,792	4,616
June	9,052	8,788	7,770	7,202	9,917	10,048
July	11,210	11,292	10,969	12,061	13,392	15,624
Aug.	8,090	8,031	8,971	10,451	10,992	12,302
Sept.	2,942	3,150	3,811	4,518	4,574	6,506
Oct.	1,248	1,702	1,407	1,867	1,777	2,749
Nov.	826	1,183	815	1,271	1,200	1,820
Dec.	697	953	652	1,178	1,090	1,651
Total	46,592	46,178	46,557	47,419	55,159	64,957

a. Source: Tok (Alaska) Immigration and Naturalization Service.

tabs on the reasons for travel into Alaska. According to his observations the increased traffic during the months of April and May represented men seeking employment in Anchorage. Many of these individuals had done construction work in the area during previous summers and decided to return earlier than usual;[5] others, who were unemployed in the "lower 48" hoped to find work up north. During the summer months the increased traffic can be attributed to Alaskans returning from the "lower 48," either to resettle or rejoin their husbands who had remained after the quake.

A2.2 Labor Market Trends

A further understanding of the effect of migration on the work force can be gleaned from Table A-5 which details labor market figures in the Anchorage area from March 1962 through December 1964. Contract construction and government have been isolated for consideration since these were the only two sectors of the economy which experienced a rise in employment as a result of the quake. The construction industry utilized more workers each month from April until September and then the totals declined somewhat through the end of the year. Federal employment in Anchorage naturally rose immediately following the quake as personnel were brought into the area to cope with the disaster. By the end of the year there were still a number of government employees coping with recovery problems although the figure declined somewhat from its June high.

Upon examining total monthly labor force figures (employed plus unemployed) one is struck by its slight change from March to April compared with the substantial increase in migration to the Anchorage area. At first glance it appears that the large number of arrivals were not seeking work in the area; however, it should be observed that, aside from the two groups singled out for consideration, total employment in the remainder of the economy (the "other" category)

5. During normal times summer employees arrive towards the end of May and early June for the start of the construction season.

Table A-5

LABOR MARKET STATISTICS FOR ANCHORAGE[a]
(March 1962 - December 1964)

1962	Total Labor Force	Total un-Employment	Total Employment	Contract Construction	Government	Other
Jan.	27,487	2359	25,120	1000	11,220	12,900
Feb.	27,714	2468	25,240	960	11,220	13,060
Mar.	28,290	2660	25,630	1080	11,380	13,170
Apr.	28,630	2480	26,150	1210	11,230	13,710
May	29,430	1940	27,490	1910	11,350	14,230
June	30,430	1640	28,790	2820	11,350	14,620
July	30,690	1220	29,470	3230	11,330	14,910
Aug.	30,760	1100	29,660	3460	11,360	14,840
Sept.	30,320	940	29,380	3440	11,560	14,380
Oct.	29,560	820	28,740	2870	11,670	14,200
Nov.	29,160	1600	27,560	1910	11,720	13,930
Dec.	28,520	1830	26,690	1310	11,760	13,620
1963						
Jan.	28,190	2120	26,070	870	11,910	13,290
Feb.	29,010	2600	26,410	820	11,720	13,870
Mar.	29,240	2550	26,690	860	11,940	13,890
Apr.	29,590	2450	27,140	990	11,950	14,200
May	30,750	1940	28,810	1780	12,060	14,970
June	31,850	1690	30,160	2560	12,180	15,420
July	31,710	1460	30,250	3040	12,170	15,040
Aug.	32,320	1400	30,920	3450	12,260	15,210
Sept.	31,740	1100	30,640	3230	12,230	15,180
Oct.	30,800	1090	29,710	2580	11,970	15,160
Nov.	30,070	1660	28,410	1800	11,890	14,720
Dec.	29,480	1910	27,570	1570	11,940	14,060
1964						
Jan.	29,130	2310	26,820	1040	11,980	13,800
Feb.	29,500	2660	26,840	1100	11,900	13,840
Mar.	29,700	2630	27,070	1100	12,020	13,950
Apr.	30,340	2340	28,000	1710	12,540	13,745
May	31,140	1390	29,750	2360	12,940	14,450
June	32,380	1340	31,040	3000	13,000	15,040
July	32,840	1070	31,770	3720	12,620	15,430
Aug.	33,590	990	32,600	4510	12,610	15,480
Sept.	33,500	880	32,620	4590	12,540	15,490
Oct.	33,110	990	32,120	4160	12,640	15,320
Nov.	32,060	1040	31,070	3250	12,620	15,200
Dec.	31,410	1450	29,960	2480	12,520	14,960

a. Source: Monthly Labor Market Newsletter (Anchorage).

declined as contrasted with an increase during this same period for 1962 and 1963. It is likely that many of the individuals normally in these groups were cleaning up debris so they could re-open their business, and as a result were not included in the labor force figures.

This assumption is reinforced by a statement in the Anchorage Labor Market Newsletter (April 1964) that "much of the Anchorage area unemployment was among in-migrants, who were far more numerous than in 1963."[6] Judging from the total unemployment figure of 2340 for April it seems safe to conclude that over 1000 new workers arrived during the first month following the quake.

During the summer a large number of Alaskan families returned to the area swelling the in-migration figures. A look at September 30 school enrollment figures in Table A-6 adjusted to eliminate the difference between outgoing twelfth grade and incoming first grade

Table A-6

TOTAL ANCHORAGE PUBLIC SCHOOL ADJUSTED ENROLLMENT[a]
(Sept. 1961 - Sept. 1964)

	Unadjusted	1st grade Sept. 30	12th grade March 30	Adjusted[b]
Sept. 30 (1960)	12,475	1656	567	--
Sept. 30 (1961)	14,019	1815	657	12,771
Sept. 30 (1962)	15,166	2009	693	12,566
Sept. 30 (1963)	16,351	1955	886	12,489
March 30 (1964)	15,866	1955	886	12,004
Sept. 30 (1964)	17,704	2076	--	12,652

a. Source: Division of Records (Anchorage Independent School District).
b. Adjusted data eliminate trend due to differential between incoming first grade in year t and outgoing twelfth grade in year t-1.

6. Alaska Department of Labor. Labor Market Newsletter (Anchorage) April 1964. Anchorage; Employment Security Division, April 1964.

confirms this trend.[7] The number of students enrolled on September 30, 1964 was considerably higher than one month after the quake and even surpassed the total for September 1963 by over 150 students. Immigration personnel indicated that the increase in school children came from families who had temporarily left the area after the quake and were resettling again.

A3. CONCLUSIONS FROM ANCHORAGE MIGRATION PATTERNS

(1) As in other natural disasters a number of wives temporarily left the area with their children following the Good Friday quake while husbands remained behind to aid in cleanup and reconstruction.

(2) Normally following a disaster outgoing residents remain relatively near the stricken area and return as soon as possible. Families who left Anchorage generally decided to stay with relatives in the "lower 48." Since distances traveled were far they tended to remain away longer than if they were living in temporary quarters nearby. By the end of the summer, however, most of these families had returned to Alaska.

(3) Problems of convergence occurred in Anchorage following the quake although the composition of arrivals differed slightly from that observed in other disasters. Whereas in other disasters people come from surrounding areas to view the damage, the relative isolation of Alaska discouraged the majority of sightseers during the spring months. As would be expected, workers did arrive in Anchorage seeking construction jobs despite discouraging announcements by Governor Egan on the possibility of finding employment.

---

7. The adjustment for the first and twelfth grade differential can be calculated as follows: Assume in a base year t the school population is p_t. Let the difference s_t represent the incoming first grade in year t minus the outgoing 12th grade in year t-1. Then the adjusted school population p^*_t is simply $p_t - s_t$. Expressing the enrollment of future years in terms of the base year (to make valid migration comparisons) we must calculate:

$$p^*_{t+n} = p_{t+n} - \sum_{i=0}^{n} s_{t+i} \text{ for each year } t+n.$$

(4) Labor force statistics for the period after the earthquake appear to understate the total number of workers in the area. Owners of damaged commercial establishments may not have been included in the employment figures although these individuals undoubtedly were cleaning up debris and trying to restore their business. Similar underestimates of total labor force would probably occur immediately following other disasters although there is no statistical evidence to support this conjecture.

APPENDIX B

OFFICIAL SBA DISASTER LOAN POLICY

Appendix B

OFFICIAL SBA DISASTER LOAN POLICY[1]

Because of the magnitude of the disaster and the vast rebuilding program it necessitated, SBA adopted a policy of making broad, liberal loans. These policies--never before applied by the agency to any disaster--were applied in Alaska:

(1) SBA authorized officials of its disaster offices to approve loans in greater amounts than normal, thereby speeding up the processing and disbursal of loans.

(2) On existing SBA loans and new disaster loans, the agency permitted a moratorium of principal and interest up to 1 year and on principal only up to an additional 4 years.

(3) Where necessary, SBA paid off an existing mortgage and included the amount in a new loan to repair or reconstruct the damaged realty. It also gave disaster victims a 30 year amortization period--the normal SBA 20-year maturity plus a 10-year orderly liquidation period.

The longer amortization period was particularly helpful to commercial property owners. Suppose, for example, that a commercial property valued at $40,000, with an existing mortgage of $20,000, was damaged. The $20,000 mortgage was on a 10-year basis at 8 percent interest and the monthly mortgage payment was $243. The owner needed $40,000 to replace the building and $20,000 to pay off the existing mortgage. A $60,000 SBA loan at 3 percent interest amortized over 30 years would cost the owner about $253 a month, or only $10 more than his former payment on a much smaller amount. Furthermore, if the property owner requested it, SBA would waive any payments on principal or interest the first year, or payments on principal only up to an additional 4 years.

---

1. Small Business Administration 1964 Annual Report, p. 25.

(4) SBA permitted banks to make disaster loans which included short-term indebtedness, both secured and unsecured, of the borrower.

By including short-term obligations in the loan, SBA made it possible for disaster victims to convert short-term, 8 percent obligations to long-term, 3 percent ones. The action also helped free bank funds needed in restoring the Alaskan economy.

(5) Under its Blanket Participation Program in which banks join with SBA in loans, the agency authorized banks to lend up to $250,000 while providing as little as 10 percent of the funds.

This meant that local banks could process many of the loans, and, because they knew the borrowers and the local situation better than SBA, could give faster service.

(6) Fishermen whose boats were destroyed and who could not obtain replacement boats for the fishing season could obtain loans to lease boats.

(7) Persons owning property on land which might be subject to additional flooding because of land subsidance were made eligible for loans to move the property to higher ground even though it was not actually damaged by the disaster.

(8) The agency eliminated its usual requirement of personal guarantees on disaster loans, so that it would not tie up disaster victims' personal assets.

(9) Non-homeowners who suffered loss of personal property were permitted to apply loan funds covering their losses to down payments on homes if they wished.

Persons whose rented dwellings were damaged or destroyed thus could obtain living quarters even though they suffered no realty loss.

(10) SBA made available to local development companies in Alaska 90 percent of the financing needed to establish new small businesses or help existing ones to expand.

The small firms need not have suffered damage in the quake to be eligible. Elsewhere SBA provides only 80 percent of the funds and the development company must provide 20 percent. SBA will lend the development company up to $350,000 for each small firm it will help and the loans may be for as long as 25 years at 4 percent interest.

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1 ORIGINATING ACTIVITY (Corporate author)	2a REPORT SECURITY CLASSIFICATION
INSTITUTE FOR DEFENSE ANALYSES ECONOMIC AND POLITICAL STUDIES DIVISION	UNCLASSIFIED 2b GROUP

3. REPORT TITLE

THE ALASKAN EARTHQUAKE: A CASE STUDY IN THE ECONOMICS OF DISASTER

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5 AUTHOR(S) (Last name, first name, initial)

KUNREUTHER, HOWARD C. AND FIORE, ELISSANDRA S.

6. REPORT DATE	7a TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1966	174	44

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
OCD-OS-63-134 b. PROJECT NO. Sub-Task 4113C c. d.	S-228. 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

10. AVAILABILITY/LIMITATION NOTICES

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Office of Civil Defense Department of the Army

13. ABSTRACT

The economic problems of recovery in Alaska following the severe Good Friday earthquake of March 27, 1964 are investigated. The immediate recuperation period is characterized by a great deal of uncertainty as to the status of the disaster region. The problems which this created in terms of obtaining and communicating accurate information and its effect on emergency needs such as food and housing are studied. The long-term economic recovery process is also examined. Using the concept of the capital/labor ratio the type of destruction to physical and human resources as well as the speed of recovery through outside aid (capital) and migration behavior (labor) are analyzed.

Finally, the role of the Federal government in the private sector (via the SBA) is discussed, and a policy recommendation is made for developing a system of private disaster insurance supplemented by Federal funds to repair damage to public facilities. Recovery under this program should be more equitable and efficient than it is today.

Wherever possible the study of the Alaskan experience is supplemented with observations from other disaster studies. Although many of the actions taken in the area were rather special, they do not appear to differ in kind from the response following other disasters. A study of the Alaskan quake and other natural calamities may provide some clues as to the expected problems in recovering from a limited nuclear war, following which assistance in the form of labor and capital can be expected.

DD FORM 1 JAN 64 1473

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
HOUSING						
EARTHQUAKES						
FLOODS						
REPAIR						
TRAFFIC						
CONSTRUCTION						
REAL ESTATE						
REFUGEES						
ECONOMICS						
BANKING						
INSURANCE						
LABOR						
LAW						
DISASTERS						
RECOVERY						

INSTRUCTIONS

1. **ORIGINATING ACTIVITY:** Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization *(corporate author)* issuing the report.

2a. **REPORT SECURITY CLASSIFICATION:** Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.

2b. **GROUP:** Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.

3. **REPORT TITLE:** Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.

4. **DESCRIPTIVE NOTES:** If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.

5. **AUTHOR(S):** Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.

6. **REPORT DATE:** Enter the date of the report as day, month, year; or month, year. If more than one date appears on the report, use date of publication.

7a. **TOTAL NUMBER OF PAGES:** The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.

7b. **NUMBER OF REFERENCES:** Enter the total number of references cited in the report.

8a. **CONTRACT OR GRANT NUMBER:** If appropriate, enter the applicable number of the contract or grant under which the report was written.

8b, 8c, & 8d. **PROJECT NUMBER:** Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.

9a. **ORIGINATOR'S REPORT NUMBER(S):** Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.

9b. **OTHER REPORT NUMBER(S):** If the report has been assigned any other report numbers *(either by the originator or by the sponsor)*, also enter this number(s).

10. **AVAILABILITY/LIMITATION NOTICES:** Enter any limitations on further dissemination of the report, other than those imposed by security classification, using standard statements such as:

(1) "Qualified requesters may obtain copies of this report from DDC."

(2) "Foreign announcement and dissemination of this report by DDC is not authorized."

(3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through _____."

(4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through _____."

(5) "All distribution of this report is controlled. Qualified DDC users shall request through _____."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. **SUPPLEMENTARY NOTES:** Use for additional explanatory notes.

12. **SPONSORING MILITARY ACTIVITY:** Enter the name of the departmental project office or laboratory sponsoring *(paying for)* the research and development. Include address.

13. **ABSTRACT:** Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as *(TS), (S), (C), or (U).*

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. **KEY WORDS:** Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, rules, and weights is optional.