

THE ECONOMIC IMPACTS OF THE LOMA PRIETA EARTHQUAKE: A FOCUS ON SMALL BUSINESS

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Abstract

This paper identifies the impacts of the Loma Prieta earthquake on the economy of the San Francisco Bay Area as a whole and specifically for small businesses. Findings are based on an analysis of published aggregate economic data and a survey of small businesses in two cities. The paper finds that the economy showed a great deal of resilience, and concludes by outlining three lessons for future disaster planning in all areas prone to natural disasters.

Introduction

On October 17, 1989, an earthquake of 7.1 Richter magnitude shook northern California. Centered in the Santa Cruz mountains, south of the San Francisco Bay Area, the quake caused significant damage not only in the nearby cities of Santa Cruz and Watsonville but also Oakland and San Francisco -- cities 50 miles from the earthquake epicenter. To a region only somewhat cognizant of earthquake risks (the last earthquake of comparable magnitude was in 1906), the Loma Prieta earthquake came as a sharp reminder of how powerful and how disruptive a major earthquake can be. It also served to remind residents, governments, and businesses in the San Francisco region of the importance of preparing for a major earthquake. Looking to the future, Loma Prieta has provided an opportunity to assess the region's capacity for coping with earthquake damage, and to identify areas of preparedness and response capability that could assist in recovery from a future quake.

This paper identifies the impacts of the Loma Prieta earthquake on the economy of the San Francisco Bay Area as a whole, as well as focusing specifically on the economic impacts for small businesses operating in the heart of the impacted areas. We report findings based on an analysis of published aggregate economic data and a survey of small businesses in the cities of Oakland and Santa Cruz. We conclude with the implications of these findings for future disaster planning. The findings presented in this paper are intended to be indicative, not comprehensive; no comprehensive analysis of the economic impacts of the Loma Prieta earthquake has yet been undertaken.

Summarizing the Damage

Overview of the Physical Damage

Because the Loma Prieta quake occurred in a developed country, it has the distinction of being perhaps the most expensive earthquake in history while having caused relatively few fatalities. Estimated costs of the earthquake, in terms of damage to physical structures, was almost \$6 billion.¹ Close to 4,000 people were injured, but there were only 62 fatalities, most caused by the collapse of the Cypress freeway structure in Oakland. The connection between the high cost and the small number of fatalities is not coincidental -- the earthquake-resistant structures that protected lives have been very expensive to repair or bring back into service.

The extent of damage varied widely by location within the San Francisco and Santa Cruz areas. The bulk of the dollar damage was reported in the San Francisco Bay Area (Table 1), but the largest share of damage to homes occurred in the area including and surrounding Santa Cruz County (Table 2). Region-wide, the dollar value of damage was equivalent to about two-thirds of a year's worth of building permit and heavy construction activity. In the City of San Francisco, dollar damage estimates were almost four times the 1989 building and heavy construction activity (partly because building activity in the city is low compared to places of similar size and relative to existing stock); Santa Cruz suffered damage equivalent to almost twice its annual building activity.

The effects of the earthquake on the housing stock in the San Francisco Bay Area were quite minor. Less than one percent of the region's housing stock was damaged and less than 1/10,000 of the stock was lost. Among Bay Area counties, the largest amount of housing damage and loss occurred in Santa Clara County, the county closest to the quake's epicenter. The housing units that were destroyed tended to be old, built of un-reinforced masonry, poorly maintained, and low-rent. As a result, the earthquake had a disproportionately large effect on the region's low-income housing stock.

The housing effects of the quake were far more severe in Santa Cruz county. Altogether, almost 15 percent of the county's housing stock was damaged, although less than one percent of homes were destroyed.

The effects of the Loma Prieta earthquake on business structures were much more severe (Table 2). While modern high-rise structures and wood-framed, single-family homes withstood the earthquake with relatively little damage, older commercial and industrial buildings (and one modern hotel) proved more vulnerable. More than one percent of San Francisco Bay Area firms reported that their buildings were damaged, although only 0.015 percent were reported destroyed. Among

Table 1

*Dollar Value of Physical Damage to Structures
from the Loma Prieta Quake by County*

County	Damage Assessment (1000s of \$s)				Building Permit & Heavy Constr. Value, 1989	Damage as % of Permit Value
	Private	Public	Undeter- mined	Total		
SAN FRANCISCO METROPOLITAN AREA						
Alameda	\$1,164,813	\$311,673		\$1,476,486	\$1,537,839	96.0%
Contra Costa	\$5,290	\$19,549		\$24,839	\$1,252,675	2.0%
Marin	\$687	\$977		\$1,664	\$330,264	0.5%
Napa	\$0	\$0		\$0	\$228,018	0.0%
San Francisco	\$1,500,000	\$1,259,000		\$2,759,000	\$727,604	379.2%
San Mateo	\$284,889	\$8,042	\$1,336	\$294,267	\$821,922	35.8%
Santa Clara	\$695,300	\$32,400		\$727,700	\$1,661,918	43.8%
Solano	\$203	\$3,557		\$3,760	\$923,687	0.4%
Sonoma	<u>\$0</u>	<u>\$0</u>		<u>\$0</u>	<u>\$648,858</u>	<u>0.0%</u>
9-County Total	\$3,651,182	\$1,635,198	\$1,336	\$5,287,716	\$8,132,785	65.0%
SANTA CRUZ/MONTEREY AREA						
Monterey	\$750	\$6	\$116,980	\$117,736	\$363,668	32.4%
San Benito	\$101,330	\$175		\$101,505	\$75,449	134.5%
Santa Cruz	<u>\$328,907</u>	<u>\$66,339</u>	<u>\$37,551</u>	<u>\$432,797</u>	<u>\$249,453</u>	<u>173.5%</u>
3-County Total	\$430,987	\$66,520	\$154,531	\$652,038	\$688,570	94.7%
12-COUNTY						
TOTAL	\$4,082,169	\$1,701,718	\$155,867	\$5,939,754	\$8,821,355	67.3%

Source: California Office of Emergency Services, Summary of the Current Situation, December 18, 1989; Construction Industry Research Board; and CREUE calculations.

Bay Area counties, San Mateo County reported the largest number of commercial buildings damaged, while the largest number destroyed were in Alameda County. By far the most severe impacts to firms occurred in Santa Cruz County, where more than 25 percent of firms reported that their buildings were damaged and five percent reported their building destroyed.

Table 2

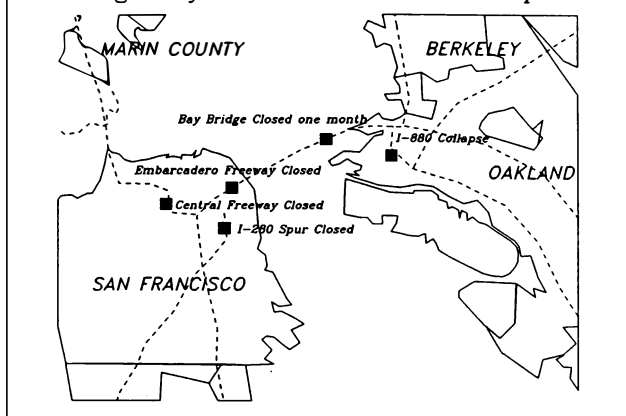
*Housing and Business Impacts
of the Loma Prieta Earthquake by County*

County	Housing Stock Effects				Business Facility Effects			
	Dam- aged Units	Des- troyed Units	% of Units		Dam- aged Busi- nesses	Des- troyed Busi- nesses	% of Businesses	
			Dam- aged	Des- troyed			Dam- aged	Des- troyed
SAN FRANCISCO METROPOLITAN AREA								
Alameda	2,763	17	0.55%	0.00%	414	17	1.32%	0.05%
Contra Costa	485	0	0.16%	0.00%	124	0	0.67%	0.00%
Marin	24	0	0.02%	0.00%	20	0	0.22%	0.00%
Napa	0	0	0.00%	0.00%	0	0	0.00%	0.00%
San Francisco	382	11	0.12%	0.00%	134	0	0.42%	0.00%
San Mateo	782	1	0.31%	0.00%	793	1	4.43%	0.01%
Santa Clara	5,124	131	0.96%	0.02%	364	6	0.97%	0.02%
Solano	2	0	0.00%	0.00%	0	0	0.00%	0.00%
Sonoma	0	0	0.00%	0.00%	0	0	0.00%	0.00%
9-County Total	9,562	160	0.41%	0.01%	1849	24	1.12%	0.01%
SANTA CRUZ/MONTEREY AREA								
Monterey	341	19	0.29%	0.02%	48	11	0.62%	0.14%
San Benito	174	62	1.44%	0.51%	35	22	5.27%	3.31%
Santa Cruz	<u>13,329</u>	<u>774</u>	<u>14.58%</u>	<u>0.85%</u>	<u>1,615</u>	<u>310</u>	<u>25.95%</u>	<u>4.98%</u>
3-County Total	13,844	855	6.23%	0.38%	1,698	343	11.57%	2.34%

Source: California Department of Finance, California Office of Emergency Services, U.S. Bureau of the Census, County Business Patterns, and CREUE calculations

The most publicized damage resulting from the earthquake was the damage to the region's transportation infrastructure (Figure 1). Damage to the San Francisco Bay Bridge closed the bridge for a month. Freeway structures (I-280, the Embarcadero Freeway, and the Central Expressway in San Francisco; and the Cypress Structure in Oakland) leading to and from the Bay Bridge on both sides of the bay were also severely damaged or destroyed, and, as of this writing, have not yet been replaced or repaired. Damage also caused a one-month closure of the major highway route linking Santa Cruz to job centers in Santa Clara County. Any analysis of the economic impacts of the quake must take into account the extent to which effects were caused by direct

Figure 1: Major Bay Area Highway Facilities Damaged by the Loma Prieta Earthquake



damage to firms and facilities, and the extent to which they resulted from effects on transportation facilities.

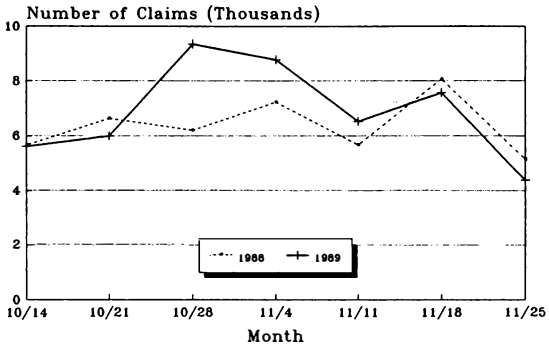
Regionwide Economic Effects

Aggregate statistics on employment and unemployment suggest that although the larger San Francisco Bay Area regional economy proved quite resilient, there were some significant economic impacts on specific locations and business sectors.

The employment effects of the Loma Prieta earthquake, while substantial, appear to have been short-lived. Unemployment insurance claims for the entire San Francisco Bay Area jumped sharply in the week immediately following the quake (Figure 2), but then quickly settled back down to historical levels. By contrast, the number of unemployment claims in the cities of Oakland and San Francisco remained at an elevated level until the re-opening of the Bay Bridge (Figure 3), one month after the quake. Santa Cruz County unemployment claims followed a similar pattern, returning to close to normal levels within a month (Figure 4).

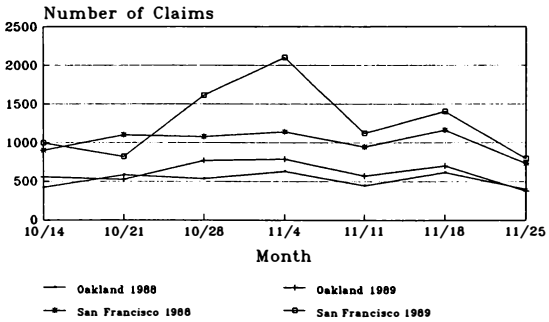
In the fifteen months since the earthquake, the economy of northern California has slowed down considerably -- following a more general slowdown in the national economy. As yet, we lack a sufficient trendline against which to statistically evaluate the long-term employment

Figure 2: San Francisco Bay Area
Unemployment Claims: 1988, 1989

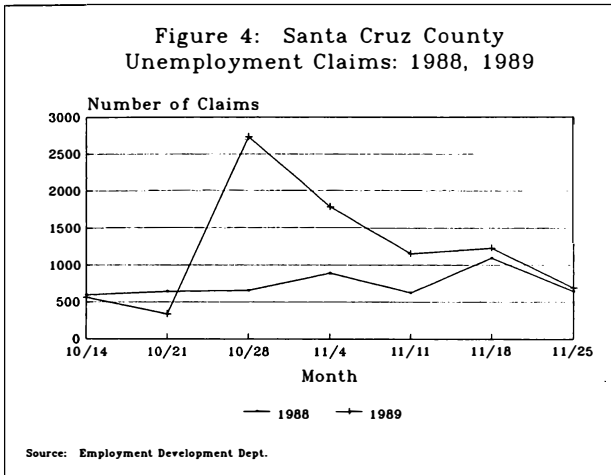


Source: Employment Development Dept.

Figure 3: Oakland and San Francisco
Unemployment Claims: 1988, 1989



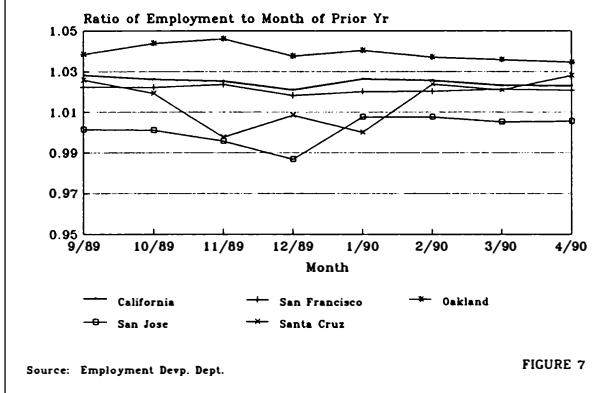
Source: Employment Development Dept.



impacts of the Loma Prieta earthquake as opposed to the effects of the broader economic slowdown. However, simple comparisons of employment levels (by sector) with employment levels during the same month of the previous year provide suggestive evidence of the effects of the earthquake. Our comparisons are based on an index which is the ratio of current-year employment (by week) to employment levels during the previous year. For example, an index value of 1.044 for the Oakland Metropolitan Statistical Area (MSA) for October 1989 indicates that employment in the Oakland MSA in 1989 was 4.4 percent above (or 1.044 times) the 1988 level. As shown in Figure 5, we compared relative employment levels by location and sector before and after the October 1989 quake.

The effects of the earthquake on total (nonagricultural) employment appear minor for most parts of the San Francisco Bay Area. Quite apart from the later effects of the earthquake, employment growth in California had already begun to slow during the third quarter of 1989. For the fourth quarter of 1989 and the first quarter of 1990, the San Francisco and Oakland MSAs show no more or less of a slowdown in employment growth than for the state as a whole.² In fact, in some sectors, employment trends in the East Bay (Oakland MSA) suggest that the earthquake may have induced a mini-boom during November and the

Figure 5: Bay Area and Santa Cruz Employment Levels: 1988 vs. 1989



last two weeks in October 1989. Due to a slowdown in the electronics industry, employment growth in Santa Clara County had already started to decline in the months prior to the earthquake. As of January 1990, however, the Silicon Valley economy seemed to have rebounded -- at least temporarily -- both from its broader economic slowdown, and from any earthquake effects.

Not surprisingly, the impacts of the Loma Prieta Earthquake on employment were the largest in Santa Cruz County: total employment dropped from a level 2.6 percent above the previous year in September 1989 to a level just below that of the previous year in November 1989. However, by February 1990, even Santa Cruz County appeared to have returned to its pre-quake rate of employment growth.

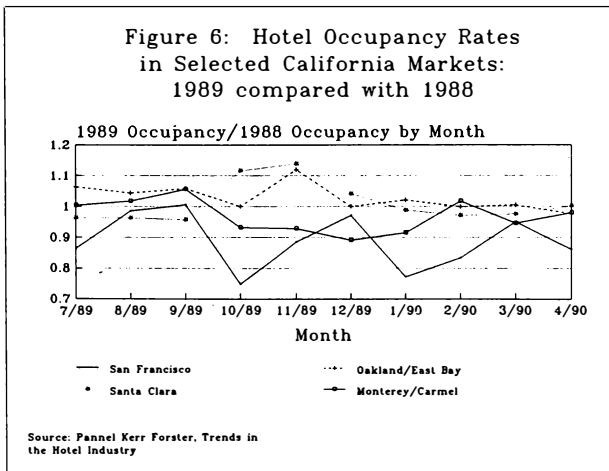
Impacts on employment varied considerably by sector as well as by location. Manufacturing sectors throughout the Bay Area showed no sign of any employment impacts as a result of the earthquake. In contrast, employment in general merchandise stores (a major retail category) dropped slightly in the Oakland MSA, and sharply in Santa Cruz County and the San Francisco MSA following the quake. By early 1990, however, general merchandise employment levels in the Oakland and San Francisco MSAs had largely recovered; in Santa Cruz, employment levels in general merchandise stores remained depressed. Hotel

employment declined sharply in Santa Cruz and slightly in San Francisco for a few months following the quake, but these declines were mirrored by increases in hotel employment in the Oakland and San Jose MSAs during the same period. The quake boosted construction employment throughout the affected area.

In sum, the effects of the Loma Prieta earthquake on employment were for the most part small and temporary. Longer-term effects are most evident for the retail sector in the Santa Cruz area.

Tourism and Retail Trade -- A Closer Look

The Loma Prieta earthquake has been widely blamed for slowdowns in tourism and retail sales activity, especially in the City of San Francisco. The available data suggests that such effects were predominantly short-term, lasting several months at most. Hotel occupancy was *down* relative to the previous year in San Francisco and Santa Cruz during the four to five months following the Loma Prieta quake. In contrast, the Oakland/East Bay area showed an unusually high level of hotel occupancy in November of 1989; likewise, Santa Clara County had unusually high levels of hotel occupancy during the last quarter of 1989 (Figure 6). All four hotel market areas -- San Francisco, Santa Clara, Oakland/East Bay, and Monterey/Carmel -- posted March and April 1990 occupancy levels at or below the level of the previous year. It is not clear, however, that the decline in hotel occupancy was the result of the quake. For the same period, similar declines occurred in major Southern California markets, including Orange County and Los Angeles.



Assessing the longer-term effects of the earthquake on retail sales is complicated by the fact that information on taxable sales -- a measure of retail activity -- has only recently become available for the fourth quarter of 1989, and is not yet available for 1990. What impacts there are appear to be confined to local areas affected by physical damage. Examined on a county level, only San Francisco showed a relatively weak fourth-quarter 1989 sales activity (Table 3). Alameda County

Table 3

*Taxable Retail Sales Comparisons: 1988 and 1989
Areas Affected by the Loma Prieta Earthquake*

<u>Geographic Area</u>	<u>Ratio of 1989 to 1988 Taxable Sales by Quarter</u>			
	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
California	1.06	1.09	1.10	1.08
County				
Alameda	1.05	1.09	1.10	1.05
Contra Costa	1.04	1.06	1.09	1.06
San Francisco	1.06	1.03	1.06	1.00
Santa Clara	1.09	1.08	1.09	1.07
Santa Cruz	1.00	1.06	1.07	1.06
Selected Cities				
Hollister	1.06	1.02	1.05	1.12
Oakland	0.99	1.03	1.06	1.00
Santa Cruz	0.94	1.09	1.03	0.96
Watsonville	1.04	1.01	1.21	0.96

Source: California State Board of Equalization, Taxable Sales in California, Quarterly Reports, and press releases

shows fourth-quarter sales at five percent above 1988 levels, while Santa Cruz County, taken as a whole, reported taxable fourth-quarter 1989 sales at six percent above 1988 levels.

At the city level, however, greater effects appear. In addition to lower sales for the City of San Francisco, Oakland had weaker sales during the fourth quarter of 1989 when compared to the previous two quarters. For example, retail sales in Oakland in the fourth quarter of 1989 were equivalent to their 1988 levels, while second- and third-quarter sales were well above 1988 levels.

The cities of Santa Cruz and Watsonville (also in Santa Cruz County) experienced even steeper declines. Retail sales for 1989 in Santa Cruz declined from a third-quarter level 3 percent above that of 1988, to a level four percent below 1988 sales during the fourth quarter. The Watsonville area saw sales drop from 21 percent above 1988 sales in the third quarter to 4 percent below in the fourth quarter. As a result of the earthquake, each of these three cities (Santa Cruz, Watsonville, and Oakland) appear to have lost the benefit of higher sales levels normally experienced during the Christmas season.

What is most significant about these findings is the level *within counties* of substitution between areas hard hit by the quake and the areas left undamaged. Even in hard-hit Santa Cruz County, shoppers transferred much of their business from damaged establishments to undamaged ones, rather than traveling to more distant shopping areas.

Small Business Impacts

The information reported above is useful in understanding how well the overall economy fared in response to the Loma Prieta earthquake, but is less useful for understanding how individual businesses responded, the role that preparedness played in the response, how rapidly businesses recovered from damage, which particular businesses gained and lost from the quake, and the responses of individual businesses to damaged bridges and highways.

To gain such insights, it was necessary to survey individual businesses. Generally speaking, our concerns are with small and moderately-sized business. Large firms and corporations typically possess the financial cushion needed to cope with the temporary dislocations resulting from disasters such as earthquakes; small businesses rarely have sufficient cash reserves. Large business, particularly multi-branch firms, can often shift operations to less-affected facilities and locations. Large businesses are more likely to be in newer facilities, and thus less vulnerable to quake damage than small businesses. Large businesses are better positioned to negotiate with suppliers, workers, and customers to cope with disruptions. And finally, large businesses, by virtue of their more developed level of administrative structure, are better able to implement specific emergency response programs. In short, the major dislocations resulting from the Loma Prieta Earthquake were more likely to have been experienced by small companies and businesses.

In the days immediately following the earthquake, little funding was available to launch a survey of firms in affected areas. Fortunately, with the cooperation of the Oakland Chamber of Commerce and the Santa Cruz Downtown Association, we were able to distribute surveys to approximately 1,200 Oakland firms and 600 Santa Cruz firms in

January 1990. The Oakland area response rate was 23 percent, and the Santa Cruz response rate was just below 10 percent.³

Survey Coverage, Biases, and Damage Incidence

The surveys were directed at businesses with 100 or fewer employees. Firms in this size category represent 99.85 percent of the Alameda County firm population and 99.88 percent of the Santa Cruz County firm population. They represent an estimated 45 percent of employment in Alameda County and 60 percent of employment in Santa Cruz County. Because the surveys were mailed out through Chamber-type organizations, they tended to reach retail and service firms in greater proportions than are present in the population. This was particularly true for the Santa Cruz sample. As a result, the survey findings are somewhat biased toward local retail and service firms.

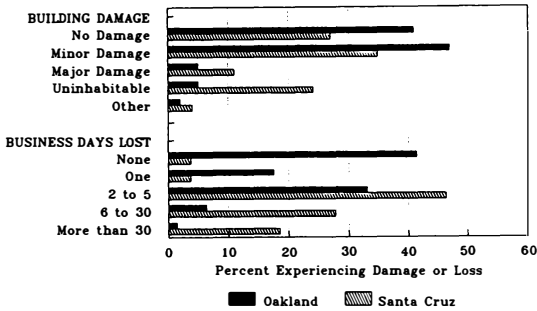
An even larger problem resulted from the fact that no attempt was made to track down firms that might have permanently closed their doors as a result of the earthquake. Thus, the number of destroyed firms in the sample is probably an underestimate. Nevertheless, with careful interpretation, the timeliness of the sample offers a useful snapshot of small business perceptions of the impacts of, and response to, a major natural disaster.

One of the most striking features of the earthquake was the localized incidence of the impacts. Heavily damaged areas were separated from areas with no visible damage by only a few city blocks. In the City of Oakland, where the downtown area was badly damaged, almost 41 percent of firms reported no damage at all while an additional 47 percent reported only minor damage (Figure 7). Even in the hard-hit Santa Cruz, 27 percent of responding firms experienced no building damage and 35 percent experienced only minor damage. Almost one fourth of Santa Cruz firms, however, were in buildings that were rendered uninhabitable by the earthquake. By contrast, only 5 percent of Oakland respondents were located in uninhabitable buildings.

Business Losses and Gains

The differential impact of the earthquake is most apparent in the distribution of business days lost as a result of the earthquake. The limited building damage to firms in Oakland translated into relatively minor disruptions in business. Over 90 percent of firms in Oakland reopened for business less than one week following the quake, and all but 1.5 percent were back in business within a month following the quake. Over 40 percent of firms in Oakland lost no working days at all. In Santa Cruz, more than half of firms were back in business in less than a week, but 18.5 percent remained closed a month following the earthquake, and only 4 percent reported no loss in working days. In both

Figure 7: Oakland and Santa Cruz Firms: Building Damage and Business Days Lost



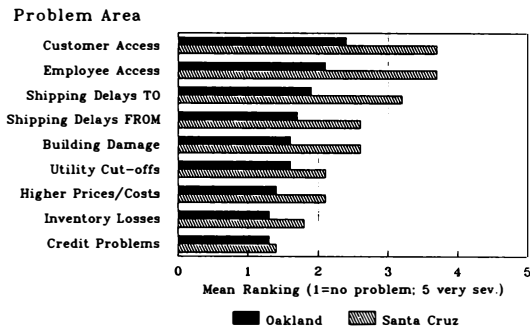
Source: Survey of Small Business, Oakland and Santa Cruz, January 1990.

cities, the number of business days lost increased sharply with the amount of building damage incurred.

Impacts to business stemmed from more than building damage. Over one fifth of Oakland firms and half of Santa Cruz firms lost some of their inventory due to the quake. The size of losses ranged from less than \$100 up to \$1,000,000, with an average size of loss (or businesses experiencing inventory losses) of about \$40,000 in Oakland and \$30,000 in Santa Cruz. This level of loss is approximately 3 percent of average gross income in both cities -- a significant but not devastating level of loss, for most firms.

Changes in the surrounding business environment also present problems for small businesses. We asked respondents to rank the severity of several types of problems on a scale from 1 (no problem) to 5 (very severe problem). Not surprisingly, Santa Cruz firms reported more severe problems than did Oakland firms (Figure 8). Many Oakland firms found few problems in operating their business, even in the first week following the earthquake. Customer and employee access had the highest average rankings (most problematic) for Oakland, of 2.4 and 2.1, respectively. Santa Cruz businesses, in contrast, encountered a wide range of problems, especially in the first week following the earthquake. As in Oakland, customer and employee access received the highest (most problematic) rating -- an average of

Figure 8: Major Business Problems During the First Week After Loma Prieta



Source: Survey, January 1990.

3.7 for both factors in Santa Cruz. Building damage and shipping delays also averaged between 2.5 and 3.5. Within a month, the mean ranking had dropped below 2 for all factors in both Oakland and Santa Cruz.

The firms that remained open or reopened felt some impacts to their level of business, as shown in Table 4. In Oakland, 26 percent of firms experienced a decrease in business of over 20 percent in the first week following the quake. Losses at this level continued for 13 percent of businesses during the first month and for 6 percent for more than a month after the earthquake. Two-thirds of Santa Cruz firms experienced a loss greater than 20 percent for the first week following the quake, 40 percent reported a loss of this size for at least a month following the quake, and 18 percent continued to have losses greater than 20 percent more than a month following the quake.

In Oakland, trade and service firms were particularly vulnerable to larger, longer-lasting business losses, while the greatest share of losses were incurred by trade firms in Santa Cruz. Not surprisingly, those in damaged buildings had substantially larger losses, for longer durations than other firms. In Oakland, smaller firms were more likely to experience larger, longer-lasting losses than were larger firms. (This did not appear to be the case in Santa Cruz, although the small size of the sample makes generalizations difficult).

Table 4

*Business Losses and Gains after the Loma Prieta Earthquake:
Oakland and Santa Cruz Firms*

	First Week: Business Losses & Gains						After Nov. 18: Business Losses & Gains					
	TOTAL #	21+% Loss	1-20% Loss	No Change	1-20% Gain	21+% Gain	TOTAL #	21+% Loss	1-20% Loss	No Change	1-20% Gain	21+% Gain
OAKLAND RESPONDENTS												
All Responses	279	26%	17%	46%	7%	1%	279	6%	12%	72%	6%	2%
By Business Size												
1-5 employees	87	31%	13%	45%	6%	2%	87	11%	11%	70%	4%	2%
6-10 employees	54	29%	24%	40%	3%	1%	54	5%	16%	74%	1%	1%
11-20 employees	41	19%	12%	53%	14%	0%	41	4%	2%	78%	9%	4%
21-50 employees	52	30%	19%	38%	11%	0%	52	1%	17%	65%	13%	1%
50+ employees	30	10%	10%	73%	0%	6%	30	3%	16%	76%	0%	3%
Other	9	11%	66%	22%	0%	0%	9	0%	11%	77%	0%	11%
By Building Damage												
None	114	18%	16%	52%	12%	0%	114	3%	8%	78%	7%	1%
Minor	130	24%	21%	45%	4%	3%	130	6%	13%	70%	4%	4%
Severe	15	66%	13%	20%	0%	0%	15	26%	26%	46%	0%	0%
Unoccupiable	14	71%	14%	14%	0%	0%	14	7%	14%	71%	7%	0%
Other	6	66%	16%	16%	0%	0%	6	0%	33%	33%	33%	0%
SANTA CRUZ RESPONDENTS												
All Responses	55	67%	7%	23%	0%	1%	55	18%	9%	47%	14%	10%
By Business Size												
1-5 employees	30	56%	10%	30%	0%	3%	30	16%	6%	50%	13%	13%
6-10 employees	5	100%	0%	0%	0%	0%	5	0%	40%	20%	0%	40%
11-20 employees	6	66%	0%	33%	0%	0%	6	16%	0%	50%	33%	0%
21-50 employees	6	83%	0%	16%	0%	0%	6	33%	0%	33%	33%	0%
50+ employees	3	66%	33%	0%	0%	0%	3	66%	33%	0%	0%	0%
Other	5	80%	0%	20%	0%	0%	6	0%	16%	83%	0%	0%
By Building Damage												
None							55	18%	9%	47%	14%	
None	15	66%	0%	33%	0%	0%	15	6%	6%	53%	26%	6%
Minor	19	47%	21%	26%	0%	5%	19	10%	15%	57%	5%	10%
Severe	6	83%	0%	16%	0%	0%	6	16%	0%	66%	0%	16%
Unoccupiable	13	84%	0%	15%	0%	0%	13	46%	0%	23%	15%	15%
Other	2	100%	0%	0%	0%	0%	2	0%	50%	0%	50%	0%

Source: Survey of Oakland and Santa Cruz Small Businesses, January 1990.

While the earthquake was a disaster for some businesses, it became a stimulus for others. Construction firms, in particular, reported increases in business following the earthquake. A significant number of trade firms also reported business gains following the earthquake, as business shifted from damaged firms to those still in operation.

Coping with the Damage

Businesses found several means of coping with physical damage to buildings and roadways (Table 5). In the two weeks immediately after the earthquake, more than one-third of Oakland firms and over one-fifth of Santa Cruz firms allowed employees to work more flexible

Table 5

Oakland and Santa Cruz Business Adjustments to the Earthquake

	Total Responses	Type of Business Adjustment								Move Location
		Encourage Car-pooling	Adopt Employee Flextime	Encourage Working at Home	Expanded Business Hours	Change Receiving Hours	Shipping Hours	Special Sales	Consolidate Oper.	
OAKLAND										
All	264	9.1%	35.2%	8.7%	10.2%	5.3%	12.5%	6.1%	4.5%	4.5%
OAKLAND by Sector										
Construction	9	11.1%	22.2%	0.0%	22.2%	0.0%	22.2%	11.1%	11.1%	11.1%
Manufacturing	22	13.6%	45.5%	4.5%	4.5%	18.2%	31.8%	9.1%	0.0%	0.0%
Trade	74	1.4%	24.3%	8.1%	8.1%	5.4%	17.6%	10.8%	5.4%	5.4%
FIRE	32	15.6%	40.6%	9.4%	12.5%	0.0%	0.0%	0.0%	6.3%	9.4%
Services	121	10.7%	33.1%	9.9%	9.9%	5.0%	8.3%	4.1%	3.3%	3.3%
Other	6	0.0%	0.0%	16.7%	33.3%	0.0%	16.7%	0.0%	16.7%	0.0%
OAKLAND by Business Size										
1-5 employees	81	6.2%	34.6%	7.4%	13.6%	6.2%	9.9%	8.6%	7.4%	7.4%
6-10 employees	53	7.5%	28.3%	7.5%	5.7%	3.8%	15.1%	5.7%	1.9%	0.0%
11-20 employees	40	5.0%	27.5%	10.0%	2.5%	7.5%	10.0%	7.5%	5.0%	7.5%
21-50 employees	51	17.6%	47.1%	11.8%	15.7%	5.9%	17.6%	3.9%	3.9%	2.0%
50+ employees	29	13.8%	41.4%	3.4%	6.9%	3.4%	10.3%	3.4%	0.0%	3.4%
Other	8	0.0%	25.0%	25.0%	12.5%	0.0%	12.5%	0.0%	12.5%	12.5%
SANTACRUZ										
All	51	1%	21%	17%	7%	9%	19%	9%	11%	19%
SANTA CRUZ by Sector										
Trade	29	0%	17%	13%	6%	10%	24%	10%	10%	24%
FIRE	6	0%	0%	16%	0%	16%	33%	16%	33%	16%
Services	16	6%	38%	25%	12%	6%	6%	6%	6%	12%
SANTA CRUZ by Business Size										
1-5 employees	28	0%	25%	25%	10%	14%	10%	10%	10%	21%
6-10 employees	5	0%	0%	0%	0%	0%	20%	0%	0%	0%
11-20 employees	5	0%	20%	20%	0%	20%	60%	0%	0%	20%
21-50 employees	6	16%	33%	16%	0%	0%	16%	16%	50%	16%
50+ employees	3	0%	33%	0%	33%	0%	33%	33%	0%	66%
Other	4	0%	0%	0%	0%	0%	25%	0%	0%	0%

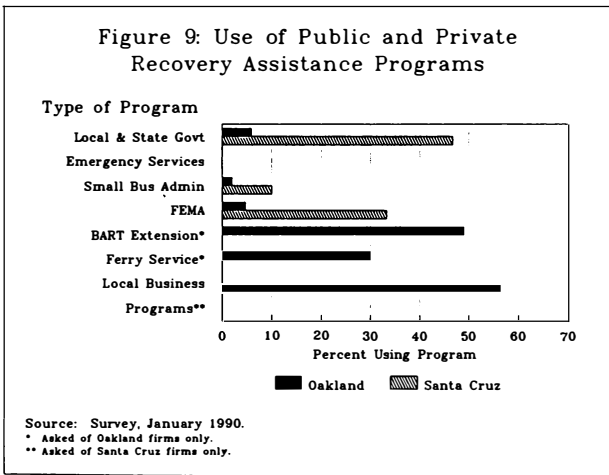
Source: Survey of Oakland and San Francisco Small Businesses, January 1990.

hours. About 10 percent of Oakland firms also introduced carpooling, expanded business hours, new shipping schedules, and/or working at home as means of coping with the immediate problems from the

quake. In Santa Cruz, carpooling was quite unimportant as a response to quake impacts, in contrast to other roadway-related responses. About one-fifth of Santa Cruz firms moved to a new location, changed shipping hours, and/or encouraged employees to work at home. Overall, larger firms appeared to be more likely to make specific adjustments to keep the business in operation. In Oakland, manufacturing firms were the most likely to concentrate their efforts on transportation-related responses (carpooling and shipping schedules).

Use of Public and Private Emergency Response Programs

Assistance came to the earthquake-stricken areas from all levels of government and from the private sector as well (Figure 9). Overall, federal assistance showed the lowest level of usage and generated the least amount of satisfaction among businesses. In Oakland, less than five percent of responding businesses received assistance from the Small Business Administration (SBA) or from the Federal Emergency Management Administration (FEMA). In Santa Cruz, ten percent of firms utilized SBA programs, while one-third of the responding firms worked with FEMA. Both Oakland and Santa Cruz firms expressed some dissatisfaction with FEMA procedures. In contrast, responding businesses had generally favorable comments on the responsiveness of state and local agencies.



Locally-initiated programs were more widely appreciated than state and federal programs. In Oakland, six percent of businesses made use of some form of formal state or local disaster-response program, whereas almost half of the responding firms profited from the extended transit service offered by the Bay Area Rapid Transit District (BART). Another 30 percent of Oakland respondents benefitted from the start-up of cross-bay ferry service. In Santa Cruz, some 48 percent of respondents utilized local and state government emergency services. However, an even larger percentage of firms -- 56 percent -- made use of the recovery services provided through local public and private business programs such as the Downtown Association.

Although not specifically covered in the survey, many government agencies were poorly prepared to meet with their own disaster needs. In Oakland, numerous government offices were displaced because of severe damage to public buildings. This substantially hindered the city's emergency response efforts. In Santa Cruz, the building and planning departments faced the task of issuing both demolition and building permits in the absence of a formal policy framework. For example, the city had to address the question of whether permits for new or re-constructed buildings should be issued for sites that had proven to be geologically unsound. Because of the lack of local government policy guidelines, rebuilding and reconstruction activities in Santa Cruz were substantially impeded.

Conclusions and Implications

One of the things that was most remarkable about the Loma Prieta earthquake of 1989 was how little it affected the economy of the San Francisco Bay region. In spite of a severing of the major transportation link between Oakland and San Francisco, and the destruction of a six-block area of downtown Santa Cruz, the economy of the region continued right along with little obvious long-term impact. The economy showed a great deal of resilience in the face of a significant natural disaster, and where impacts were severe, they were also confined to limited geographic areas. Some of the reasons for the region's quick economic recovery are:

- The fact that the earthquake was centered away from the most populous portions of Northern California. *This was a fortunate circumstance that may not hold true for the region's next major earthquake.*
- The economic diversity of the region and the geographic dispersal of the region's economy. The economy of the greater San Francisco Bay Area relies on no single industrial sector (such as tourism in San Francisco), and there are numerous economic activity centers throughout the San Francisco, Easy Bay, Santa Clara, and Santa Cruz areas.

- The strong performance of the region's communications and utility systems, which were brought back on-line within a few hours of the earthquake, and which then operated reliably at or above capacity.
- The fact that so much of the region's economic base is located in newer, and thus earthquake-resistant, facilities.
- Redundancy in the transportation system. Although many residents of the Bay Area were surprised at the degree of damage to supposedly-safe road facilities, the existence of alternate routes and facilities (such as ferries and BART) made it possible for many businesses to continue to operate quite normally.

A major theme that emerges from these findings is that preparedness works. While some structures failed, the great majority of buildings and structures designed to survive a major quake came through with little damage. Communications and utility services became operational again so quickly because of good design, and planning for emergency response.

The weaknesses that emerged were in the poor preparedness of individual small businesses, and the inability of single-purpose agencies (federal, state, and local) to react quickly and flexibly to localized damage and dislocations.

The lessons of Loma Prieta are important for future disaster-planning in all areas prone to large earthquake (or other natural disasters), not just Northern California. Most important, the Loma Prieta quake illustrated that the damage from a major earthquake can occur at very specific locations within a very wide radius around the quake epicenter. This means that planning for earthquake and disaster preparedness needs to be coordinated across municipal boundaries and agencies. At the same time, planners designing recovery and rebuilding programs should account for the fact that major earthquakes are likely to result in nodes of intense damage amidst unaffected areas. Rather than focusing on widespread relief and reconstruction, recovery programs need to be flexible enough to permit a concentration of resources and rebuilding efforts in such nodes.

Second, the fact that the economy in general and most private businesses were impacted so slightly by the Loma Prieta earthquake is largely due to widespread adoption of earthquake-resistant building codes. Earthquake-resistant building codes were as much responsible for the lack of economic damage as they were responsible for the lack of physical damage and human injury. The private sector needs to understand this linkage, and become a champion and facilitator of appropriate building codes and earthquake retrofit efforts. Third, the major economic impacts of a major disaster are likely to be dispropor-

tionately experienced by small businesses. Such businesses typically lack the financial reserves to manage their own recovery efforts, and, without targeted assistance, can quickly slip out of business in the days and weeks following a natural disaster.

Finally, in the days following the Loma Prieta quake, the most effective response programs were those that were designed and administered locally. In considering how best to respond to a natural disaster, agencies such as FEMA, SBA, and the Economic Development Administration (EDA), as well as state and local disaster-response agencies, should focus on developing flexible programs that emphasize quick and flexible responses to the needs of smaller businesses.

NOTES

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¹The most recent available estimate of damage from the Loma Prieta quake was made by the California Office of Emergency Services in December 1989.

²Employment data is provided by metropolitan statistical area (MSA). MSAs are often an aggregate of several counties. In this study, the San Francisco MSA includes San Francisco, San Mateo, and Marin Counties; the Oakland MSA includes Alameda and Contra Costa Counties; the San Jose MSA is contiguous with Santa Clara County; and the Santa Cruz MSA is contiguous with Santa Cruz County.

³The Santa Cruz response rate was so low in part because the Santa Cruz Downtown Association mailing list used included interested individuals as well as firms. Only businesses were asked to respond to the survey.