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

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

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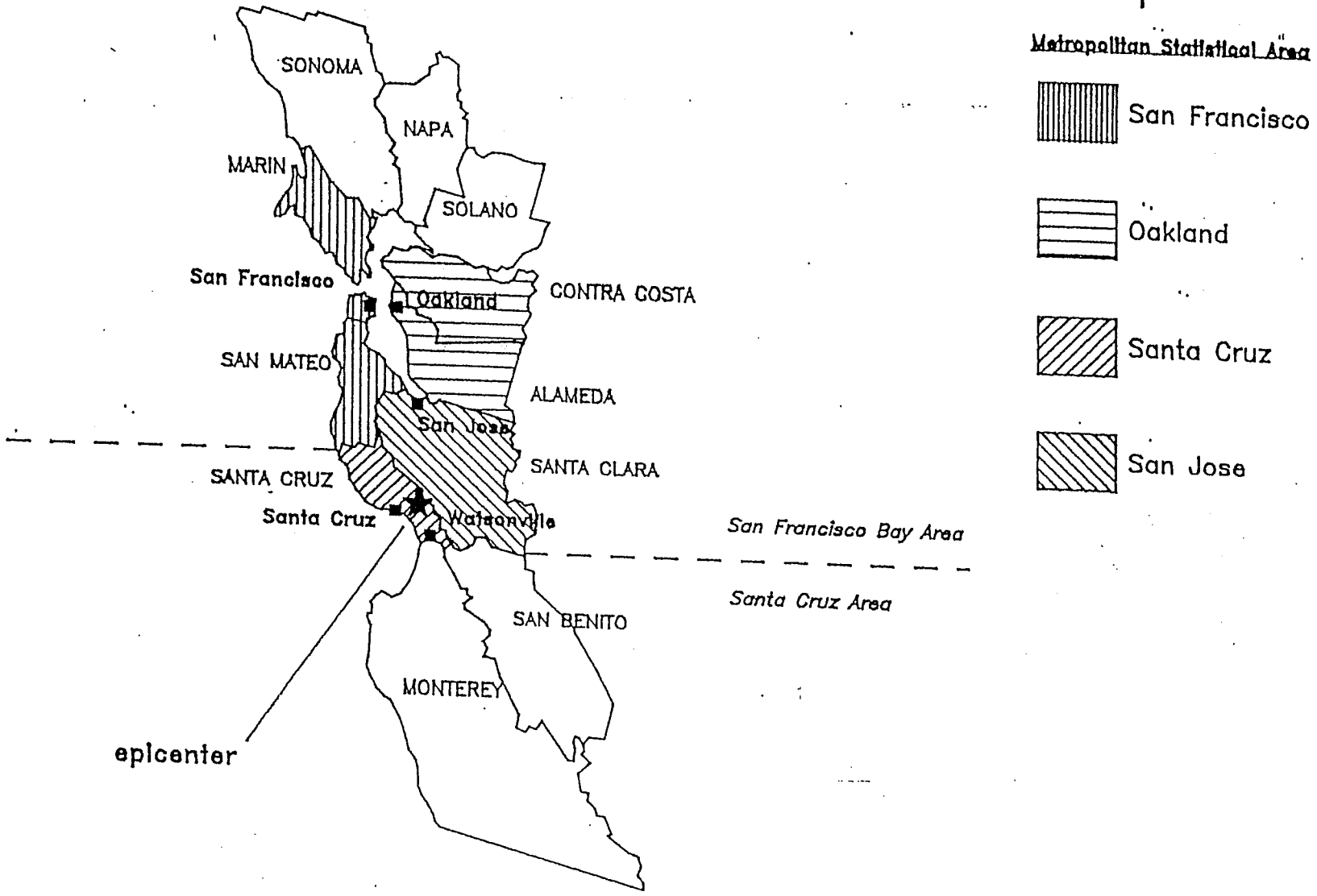
## I. Introduction

On October 17, 1989, an earthquake of 7.1 magnitude on the Richter scale shook northern California. Centered in the Loma Prieta area of the Santa Cruz mountains, south of the San Francisco Bay Area, the quake caused significant damage not only in nearby cities such as Santa Cruz and Watsonville but also in major urban centers such as Oakland and San Francisco (see Figure 1). For a region long aware of earthquake risks, the quake was a sharp reminder of vulnerability. As history has shown, the area faces the potential risk of an earthquake of ten to fifteen times the magnitude of the October 17th quake, possibly centered much closer to urban centers, any time in the next few decades. The most recent major quake, then, has provided an opportunity to examine the region's economic vulnerability to the damage and disruption caused by earthquakes.

This paper focuses on identifying the economic impacts of the Loma Prieta earthquake, for the regional economy as a whole and for small businesses operating in the heart of the impacted areas. The paper looks at both aggregate impacts, through an analysis of published economic data, and individual experiences, through a survey of small businesses in the cities of Oakland and Santa Cruz. Aggregate effects are covered through a discussion of the damage in the context of total economic activity, identification of areas and sectors where economic impacts are evident, measurement of the magnitude and duration of impacts, and analysis of the effects on the housing market. Disaggregated effects and individual experiences are examined through the survey of Oakland and Santa Cruz small businesses. The paper concludes with a discussion of the broader implications of the Loma Prieta earthquake experience for the long term vulnerability of the region's economy to earthquakes.

# Figure 1

# Area Affected by the Loma Prieta Earthquake



## II. The Damage in Context

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. 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 dissimilarity between cost and number of fatalities is not coincidental--the earthquake resistant structures that protected lives may still be very expensive to repair when they incur damage.

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.[1]

In the San Francisco Bay Area, the loss to housing stock was quite minor. Less than 1 percent of the region's housing stock was damaged and less than 1/10,000 of the stock was lost. The largest amount of damage and loss occurred in Santa Clara County, the Bay Area location closest to the quake's epicenter. In Santa Cruz County, the effects were far more severe. Nevertheless, while 15 percent of the county's housing stock was damaged, less than 1 percent of

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[1]The most recent estimates of Loma Prieta quake damage available were released by the California Office of Emergency Services on December 18, 1989.

Table 1: Dollar Value of Physical Damage to Structures from the Loma Prieta Quake By County

| County | Damage Assesment (1000s of $s) Private | Public | Undetermined | Total | Building Permit and Heavy Constr Value, 1989 | Damage as % of Permit Value |
|---|---|---|---|---|---|---|
| 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 | $0 | $0 | | $0 | $648,858 | 0.0% |
| 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 | $328,907 | $66,339 | $37,551 | $432,797 | $249,453 | 173.5% |
| 3-County Total | $430,987 | $66,520 | $154,531 | $652,038 | $688,570 | 94.7% |
| TOTAL, 12-County Area | $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.

homes were destroyed, while housing vacancy was estimated at 9.3 percent in Santa Cruz County the January prior to the earthquake.

The effects on businesses were more severe (Table 2). While modern highrise structures and wood-framed, foundation-bolted, single family homes withstood the earthquake with little damage, some older commercial and industrial buildings (and one modern hotel) proved more vulnerable. More than 1 percent of San Francisco Bay Area firms were in damaged structures, although only 0.015 percent were in structures reported destroyed. Of Bay Area counties, San Mateo County had the largest number of firms experiencing damage, while Alameda County had the largest number destroyed. By far the most severe impacts to firms occurred in Santa Cruz County, where more than one fourth of firms experienced damage and 5 percent were reported in destroyed structures.

One of the most significant aspects of this earthquake for the region was the large amount of damage to the transportation infrastructure (see Figure 2). Damage to the San Francisco Bay Bridge closed the bridge for a month. Freeway structures leading to and from the bridge on both sides of the bay were also severely damaged or destroyed, and several have not yet been replaced. Damage also caused a one month closure of the major freeway route linking Santa Cruz to major job centers in Santa Clara County. The dollar costs to the State of California of the damage to roadways are in addition to the $6 billion reported in Table 1. Our analysis of the impacts of the quake examines the extent to which effects were caused by direct damage to firms and facilities and the extent to which they resulted from disruption to transportation facilities.

## III. Employment and Unemployment Following the Quake

Aggregate statistics on employment and unemployment suggest that the economy was quite resilient to the effects of the quake, but that impacts were significant for limited time

Figure 2: Major Bay Area Highway Facilities Damaged by the Loma Prieta Earthquake

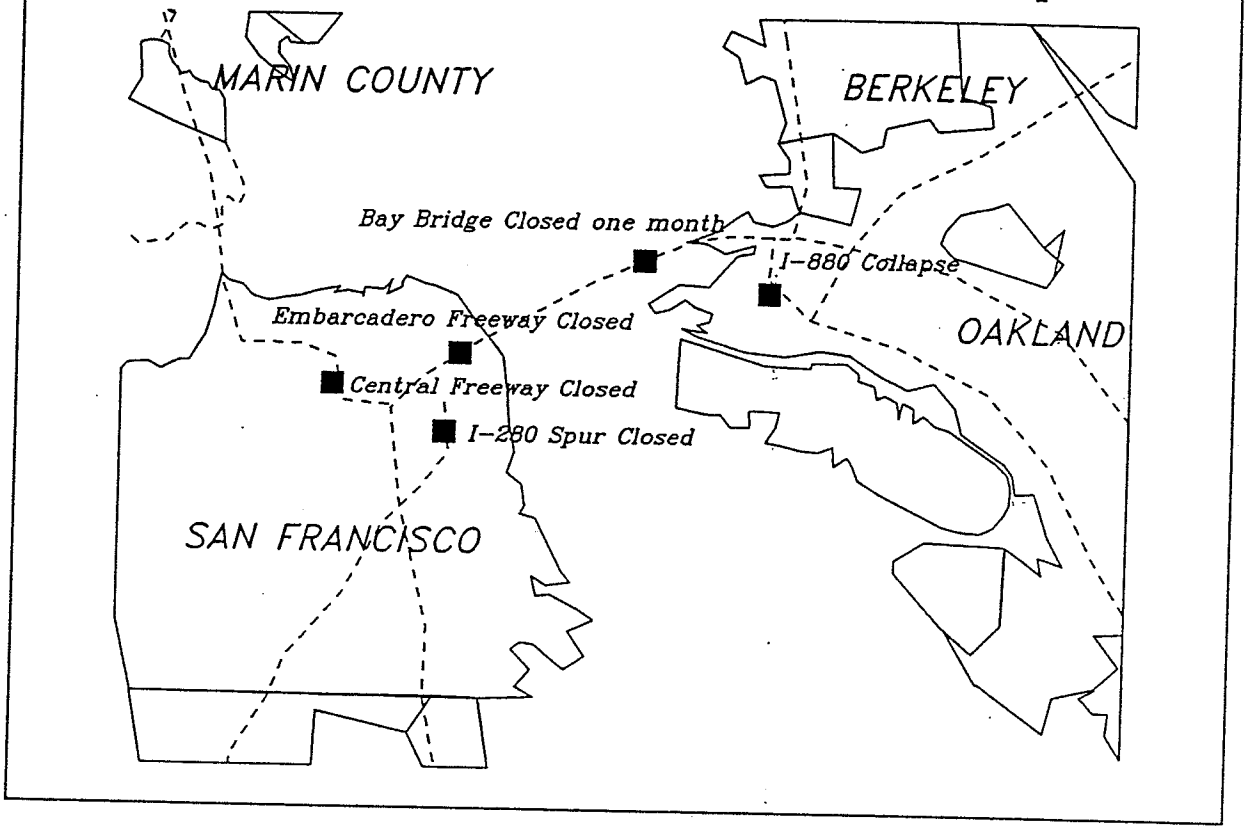


Table 2: Housing and Business Impacts of the Loma Prieta Earthquake
By County

| | Housing Stock Effects | | | | | Business Effects | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number of Housing Units | | | Percent | | Number of Businesses | | | Percent | |
| County | Total | Damaged | Destroyed | Damaged | Destroyed | Total | Damaged | Destroyed | Damaged | Destroyed |
| San Francisco Metropolitan Area | | | | | | | | | | |
| Alameda | 500,620 | 2,763 | 17 | 0.55% | 0.003% | 31,288 | 414 | 17 | 1.32% | 0.054% |
| Contra Costa | 306,458 | 485 | 0 | 0.16% | 0.000% | 18,610 | 124 | 0 | 0.67% | 0.000% |
| Marin | 100,088 | 24 | 0 | 0.02% | 0.000% | 8,895 | 20 | 0 | 0.22% | 0.000% |
| Napa | 44,825 | 0 | 0 | 0.00% | 0.000% | 2,927 | 0 | 0 | 0.00% | 0.000% |
| San Francisco | 327,274 | 382 | 11 | 0.12% | 0.003% | 31,670 | 134 | 0 | 0.42% | 0.000% |
| San Mateo | 250,530 | 782 | 1 | 0.31% | 0.000% | 17,906 | 793 | 1 | 4.43% | 0.006% |
| Santa Clara | 531,534 | 5,124 | 131 | 0.96% | 0.025% | 37,371 | 364 | 6 | 0.97% | 0.016% |
| Solano | 112,223 | 2 | 0 | 0.00% | 0.000% | 5,318 | 0 | 0 | 0.00% | 0.000% |
| Sonoma | 154,948 | 0 | 0 | 0.00% | 0.000% | 10,740 | 0 | 0 | 0.00% | 0.000% |
| 9-County Total | 2,328,500 | 9,562 | 160 | 0.41% | 0.007% | 164,725 | 1,849 | 24 | 1.12% | 0.015% |
| Santa Cruz/Monterey Area | | | | | | | | | | |
| Monterey | 118,809 | 341 | 19 | 0.29% | 0.016% | 7,792 | 48 | 11 | 0.62% | 0.141% |
| San Benito | 12,068 | 174 | 62 | 1.44% | 0.514% | 664 | 35 | 22 | 5.27% | 3.313% |
| Santa Cruz | 91,439 | 13,329 | 774 | 14.58% | 0.846% | 6,224 | 1,615 | 310 | 25.95% | 4.981% |
| 3-County Total | 222,316 | 13,844 | 855 | 6.23% | 0.385% | 14,680 | 1,698 | 343 | 11.57% | 2.337% |

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

periods and for specific locations and sectors. The duration of some of the impacts suggest that the transportation damage may have been particularly significant in producing short-term effects on the economy.

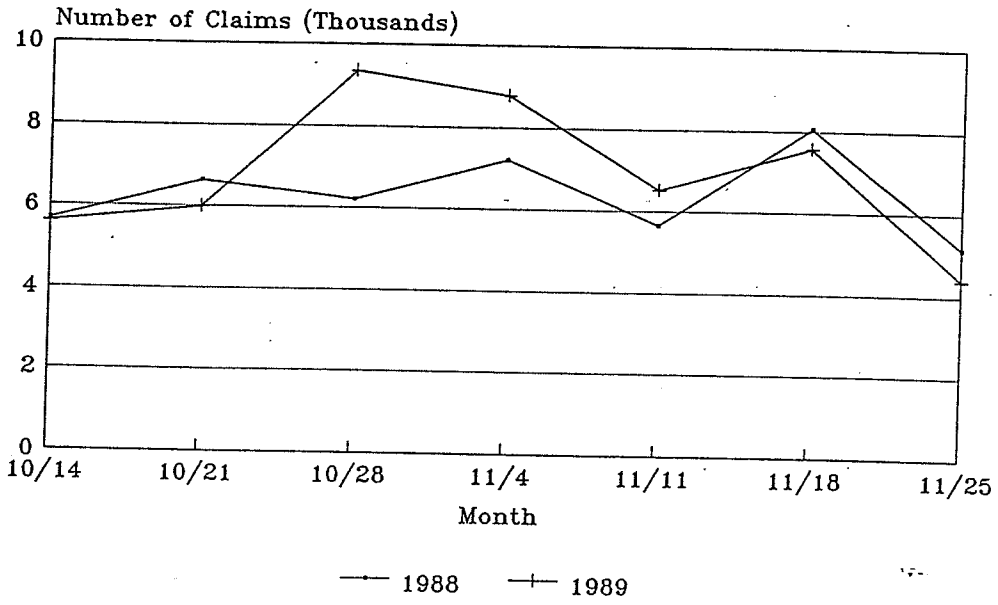
Unemployment insurance claims jumped up sharply in the week following the quake (see Figure 3). Even the San Francisco Bay Area's northernmost counties had a large increase in unemployment insurance claims for the week immediately following the quake, although these counties experienced little physical damage (see Figure 4). The cities of Oakland and San Francisco reported unusually high numbers of unemployment insurance claims for the entire period of the Bay Bridge closure (Figure 5). Santa Cruz County unemployment claims followed a similar pattern, returning to close to normal levels within a month (Figure 6).

A long enough trend for the period following the quake is not yet available to allow reliable statistical tests on the employment impacts of the quake. Instead, we used a simple descriptive comparison of employment level in the current year compared to the previous year to assess apparent effects. For example, a measure 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. We compared relative employment levels by location and sector before and after the October 1989 quake.

Effects on total (nonagricultural) employment appear minor for most parts of the San Francisco Bay Area, as shown in Figure 7. Employment growth had begun to slow in California in the third quarter of 1989, apart from any impacts of the earthquake. In fourth quarter 1989 and early 1990, the San Francisco and Oakland MSAs show no worse a slowdown in growth than was experienced for the state as a whole.[2] In fact, employment trends in the East Bay (Oakland

[2]Employment 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

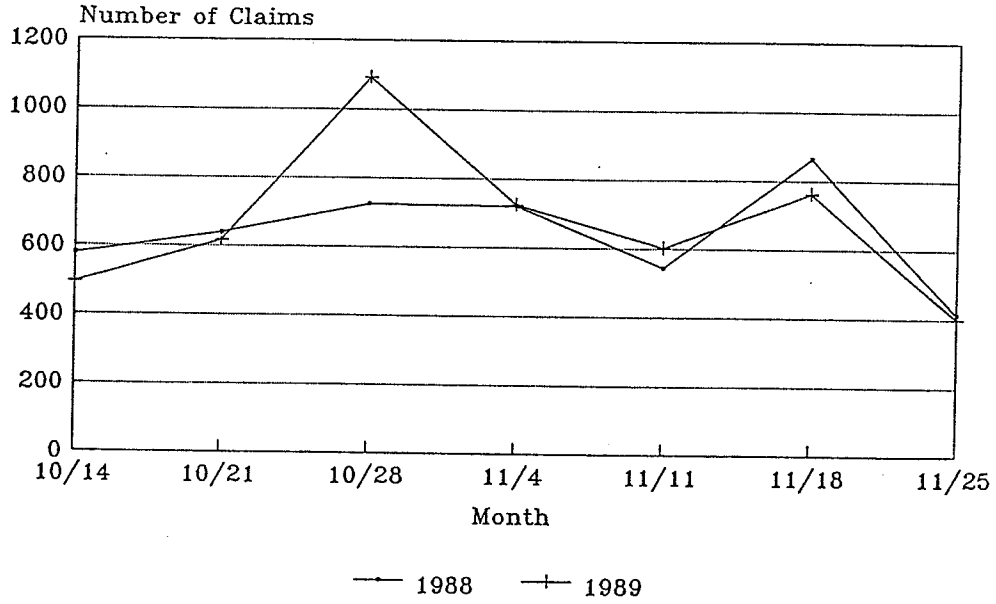
COMPARISON OF UNEMPLOYMENT CLAIMS
SAN FRANCISCO BAY AREA
1988 AND 1989




Source: Employment Development Dept.

FIGURE 3

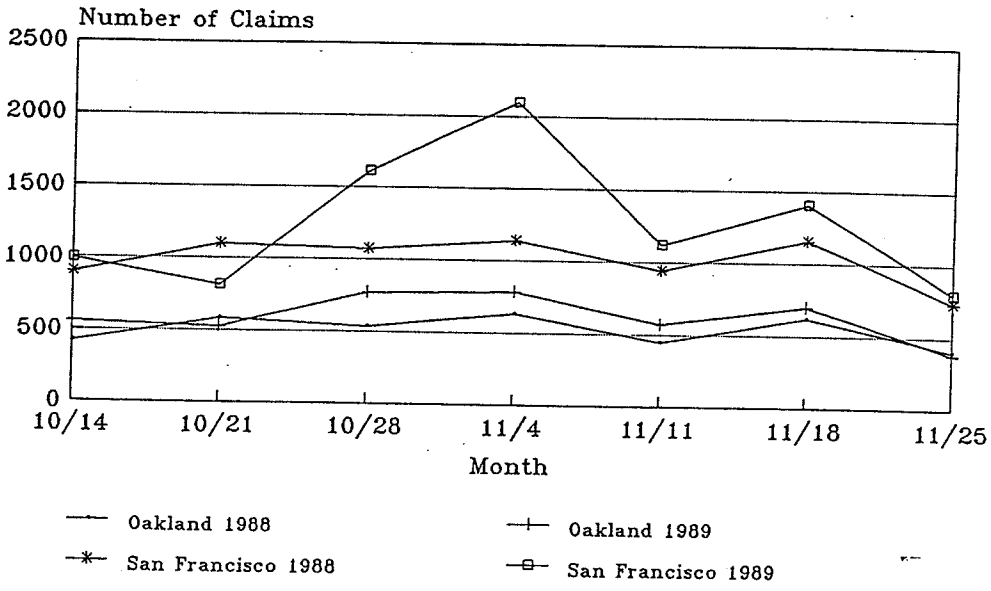
COMPARISON OF UNEMPLOYMENT CLAIMS
NORTHERN BAY AREA COUNTIES
1988 AND 1989




Source: Employment Development Dept.

FIGURE 4

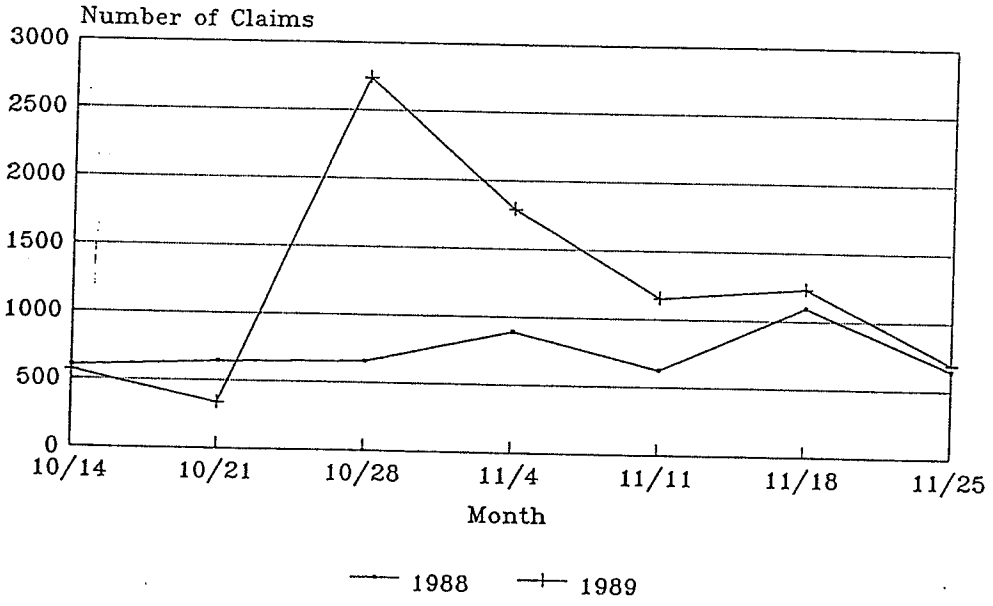
## COMPARISON OF UNEMPLOYMENT CLAIMS
## OAKLAND AND SAN FRANCISCO
### 1988 AND 1989




Source: Employment Development Dept.

FIGURE 5

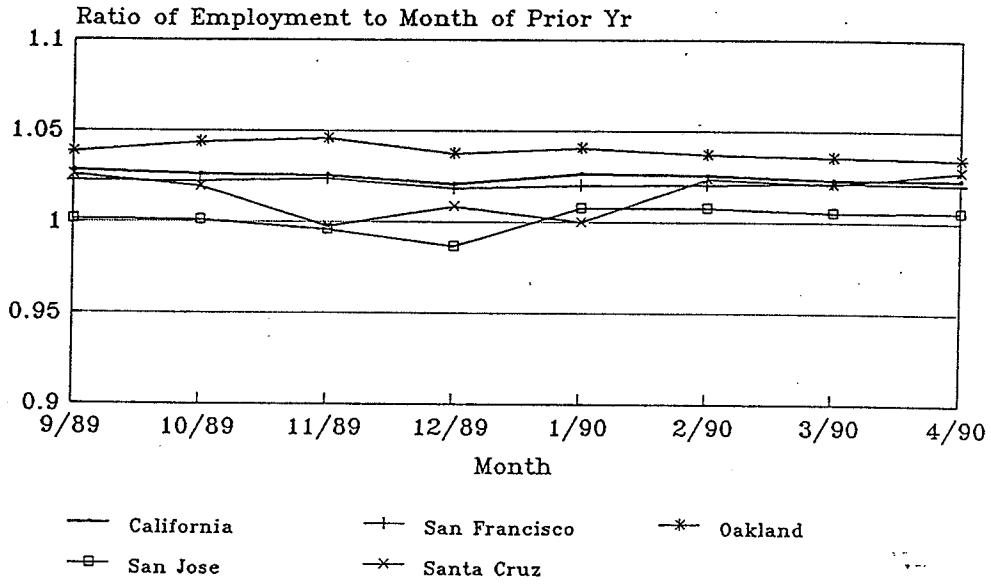
## COMPARISON OF UNEMPLOYMENT CLAIMS
## SANTA CRUZ COUNTY
### 1988 AND 1989




Source: Employment Development Dept.

FIGURE 6

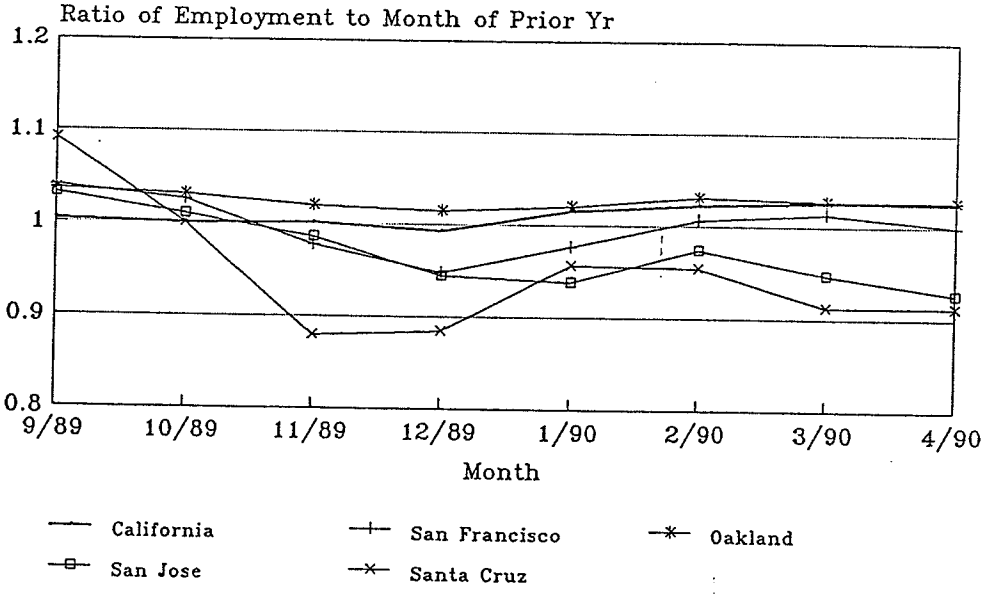
TOTAL NONAGRICULTURAL EMPLOYMENT
1989-90 RELATIVE TO 1988-89
BAY AREA AND SANTA CRUZ COUNTIES




Source: Employment Devp. Dept.

FIGURE 7

EMPLOYMENT IN GENERAL MERCHANDISE
1989-90 RELATIVE TO 1988-89
BAY AREA AND SANTA CRUZ COUNTIES




Source: Employment Devp. Dept.



FIGURE 8

MSA) suggest that the earthquake may have induced a mini boom for the end of October and the month of November in some sectors, in portions of Alameda and Contra Costa counties undamaged by the earthquake. Santa Clara County had already begun to experience a slowdown due to conditions in the electronics industry prior to the earthquake, but by January 1990 showed recovery from both any earthquake effects and from the broader economic slowdown. Santa Cruz County showed the most evidence of employment effects as a result of the October quake. 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 growth.

Impacts on employment varied considerably by sector as well as by location. Manufacturing sectors throughout the Bay Area showed no sign of impacts on employment levels as a result of the earthquake. Employment in general merchandise stores (a major retail category) dropped slightly in the Oakland MSA and more sharply in Santa Cruz and the San Francisco MSA following the quake (see Figure 8). Employment levels in general merchandise had largely recovered in the Oakland and San Francisco MSAs by early 1990 but remained below the previous year's level in Santa Cruz throughout the first four months of 1990. Hotel employment dropped sharply in Santa Cruz and slightly in San Francisco for a few months following the quake, but drops were mirrored by increases in hotel employment in the Oakland and San Jose MSAs for the same period (Figure 9). The quake boosted construction employment throughout the affected area.

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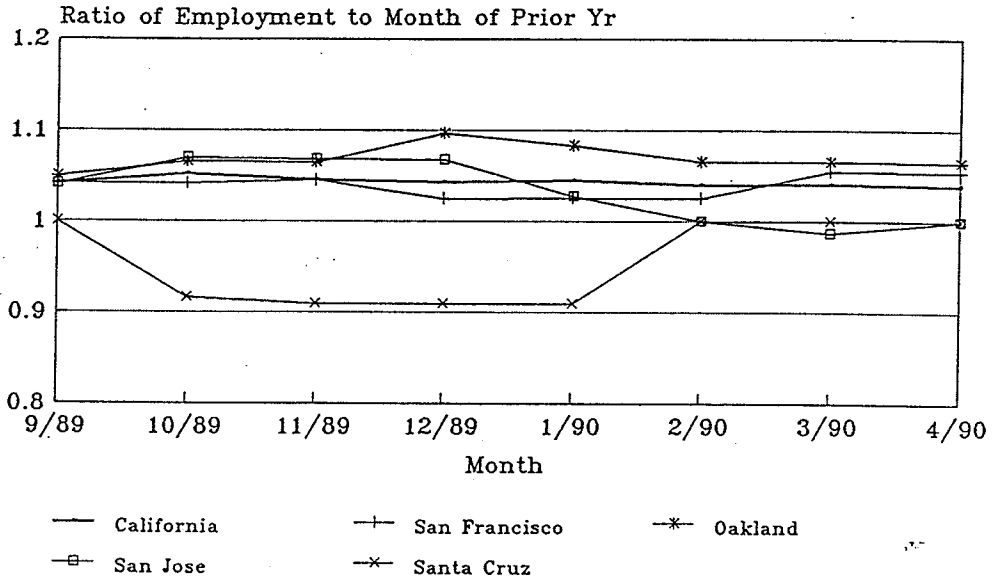
Jose MSA is contiguous with Santa Clara County and the Santa Cruz MSA is contiguous with Santa Cruz County.

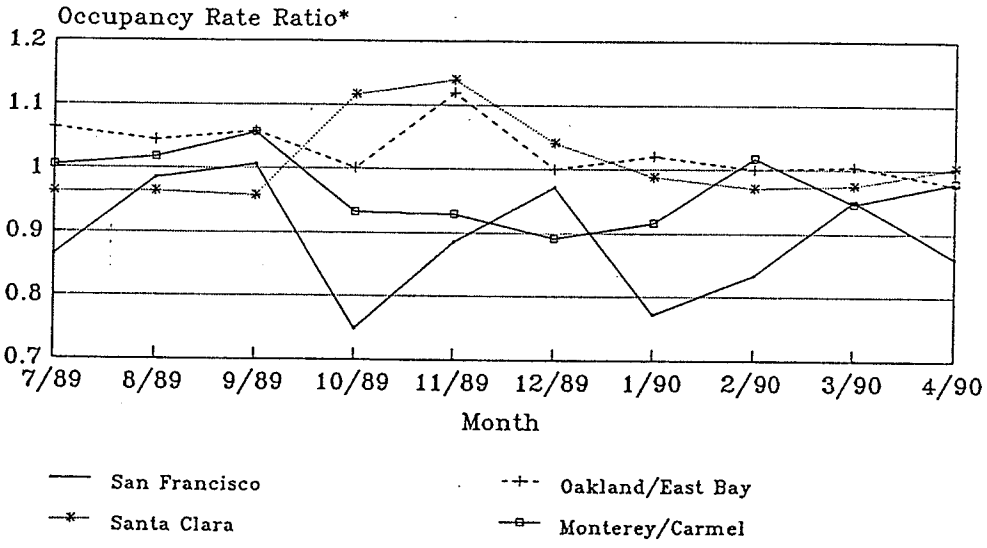
EMPLOYMENT IN HOTELS
1989–90 RELATIVE TO 1988–89
BAY AREA AND SANTA CRUZ COUNTIES




Source: Employment Devp. Dept.

FIGURE 9

CHANGE IN HOTEL OCCUPANCY
1989–90 RELATIVE TO 1988–89
SELECTED CALIFORNIA MARKETS




Source: Pannel Kerr Forster, Trends in the Hotel Industry
* Month's rate divided by prior year.

FIGURE 10

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

## IV. Tourism and Retail Trade

The Loma Prieta earthquake has been blamed for slowdowns in tourism and retail sales activity, especially in the City of San Francisco. Data available to date suggest that some short term effects occurred. These impacts may have lasted only a few months in most areas, however.

As noted above, employment drops in hotel employment appear to have been temporary and limited to the San Francisco and Santa Cruz areas. Data available on hotel occupancy supports this finding. Hotel occupancy was down relative to the previous year in San Francisco and Santa Cruz for four or five months following the Loma Prieta quake. The Oakland/East Bay area showed an unusually high level of occupancy in November of 1989, and Santa Clara County had unusually high occupancy levels in October, November and December 1989 (see Figure 10). All four areas have had occupancy at or below the previous year's level in March and April 1990. However, it is not clear that the 1990 slowdown is a result of the quake. Similar drops have occurred in major Southern California markets, such as Orange County and Los Angeles, and likely reflect the effects of a weaker U.S. economy.

Taxable sales data available for the fourth quarter of 1989 and first quarter 1990 allow a general examination of the immediate effects of the earthquake and of the beginning recovery period in 1990. Earthquake impacts are explored by a comparison of taxable sales levels in fourth quarter 1989 and first quarter 1990 to levels for the same quarter of the previous year. Some impacts are evident in this comparison. These appear to be confined to local areas affected by damage, with recovery beginning by early 1990.

Of the major Bay Area and Santa Cruz area counties affected by the quake, only San Francisco shows relatively weak fourth quarter 1989 sales activity (see Tables 3 and 4). Alameda County shows fourth quarter sales at 5 percent above 1988 levels, while Santa Cruz County as a whole reported taxable sales at 6 percent above 1988 levels.

At the city level, greater effects appear. In addition to lower sales for the City of San Francisco, Oakland had weaker sales in fourth quarter 1989 compared to the previous two quarters. Sales in Oakland in fourth quarter 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) evidence the most severe effects. Santa Cruz sales dropped from a level 3 percent above 1988 sales in the third quarter to a level 4 percent below 1988 sales in the fourth quarter. The Watsonville area saw sales drop from 21 percent above 1988 sales in third quarter to 4 percent below in the fourth quarter. The differential is even greater for sales only from retail outlets, as shown in Table 4. Each of these three cities appears to have lost the benefit of higher sales levels normally experienced by merchants in the fourth quarter (holiday-related sales). Indeed, rather than experiencing a fourth quarter holiday surge in retail sales, Oakland, Santa Cruz City, and Watsonville had sales levels below third quarter levels.

Within these cities, fourth quarter sales were particularly weak for certain types of retail activity, while other sectors were little affected. General merchandise sales were down 7 percent in San Francisco, 6 percent in Oakland, 63 percent in Santa Cruz and 50 percent in Watsonville in fourth quarter 1989 compared to fourth quarter 1988 (see Figure 11). In eating and drinking establishments, only Santa Cruz City appears to have been strongly affected, with 1989 fourth quarter sales down 10 percent from the previous year. San Francisco may also have experienced a smaller percentage loss, with 1989 fourth quarter activity no higher than the previous year. Sales activity in building materials, in contrast, was up in all cities but Oakland in fourth quarter

Table 4A: Retail Taxable Sales for Selected Counties and Cities: 1988-1 through 1990-1

| | Taxable Sales in Billions by Year and Quarter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COUNTY & CITY | 88-1 | 88-2 | 88-3 | 88-4 | 89-1 | 89-2 | 89-3 | 89-4 | 90-1 |
| Alameda | $1.64 | $1.73 | $1.81 | $2.00 | $1.73 | $1.88 | $2.02 | $2.13 | $1.85 |
| Oakland | $0.37 | $0.39 | $0.42 | $0.43 | $0.38 | $0.41 | $0.44 | $0.43 | $0.39 |
| Contra Costa | $1.02 | $1.11 | $1.14 | $1.31 | $1.08 | $1.17 | $1.24 | $1.39 | $1.20 |
| San Francisco | $1.07 | $1.14 | $1.18 | $1.33 | $1.13 | $1.20 | $1.31 | $1.36 | $1.21 |
| Santa Clara | $2.18 | $2.37 | $2.37 | $2.65 | $2.30 | $2.51 | $2.56 | $2.79 | $2.40 |
| Santa Cruz | $0.27 | $0.30 | $0.31 | $0.32 | $0.28 | $0.32 | $0.34 | $0.33 | $0.30 |
| Hollister | N/A | N/A | N/A | N/A | $0.02 | $0.02 | $0.02 | $0.03 | $0.00 |
| Santa Cruz | $0.09 | $0.10 | $0.10 | $0.10 | $0.09 | $0.11 | $0.11 | $0.09 | $0.09 |
| Watsonville | $0.04 | $0.05 | $0.05 | $0.06 | $0.05 | $0.05 | $0.06 | $0.05 | $0.05 |
| CALIFORNIA | $36.81 | $39.96 | $40.93 | $44.82 | $39.34 | $43.38 | $45.06 | $47.99 | $41.97 |

Table 4B: Quarter-by-Quarter Retail Taxable Sales Comparisons

| | Ratio of 1989 Quarter to 1988 Quarter | | | | |
|---|---|---|---|---|---|
| COUNTY & CITY | 1st Q | 2nd Q | 3rd Q | 4th Q | 1990-1/1989-1 |
| Alameda | 1.06 | 1.09 | 1.11 | 1.07 | 1.07 |
| Oakland | 1.05 | 1.06 | 1.06 | 1.01 | 1.02 |
| Contra Costa | 1.05 | 1.06 | 1.09 | 1.06 | 1.12 |
| San Francisco | 1.05 | 1.05 | 1.11 | 1.02 | 1.07 |
| Santa Clara | 1.05 | 1.06 | 1.08 | 1.05 | 1.04 |
| Santa Cruz | 1.01 | 1.05 | 1.08 | 1.02 | 1.09 |
| Hollister | | | | | |
| Santa Cruz | 0.95 | 1.09 | 1.04 | 0.93 | 1.01 |
| Watsonville | 1.08 | 1.03 | 1.20 | 0.95 | 1.04 |
| CALIFORNIA | 1.07 | 1.09 | 1.10 | 1.07 | 1.07 |

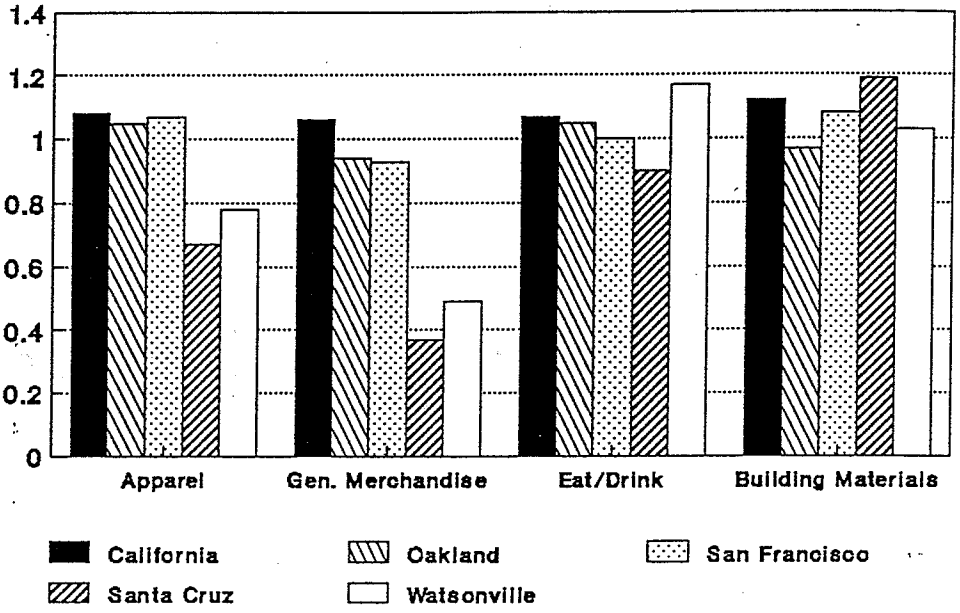
Source: California State Board of Equalization, Taxable Sales in California, Quarterly Reports and press releases.

Table 3: Taxable Sales Activity, 1988 TO 1ST QUARTER 1990
Areas Affected by the Loma Prieta Earthquake

| Geographic Area | Quarter 88-1 | 88-2 | 88-3 | 88-4 | 89-1 | 89-2 | 89-3 | 89-4 | 90-1 | Ratio, 1989/1988 1st Q | 2nd Q | 3rd Q | 4th Q | Ratio, 1990/1989 1st Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| California | 57,055,910 | 61,992,317 | 63,148,105 | 67,558,855 | 60,585,475 | 67,586,226 | 69,536,003 | 73,166,487 | 65,568,664 | 1.06 | 1.09 | 1.10 | 1.08 | 1.08 |
| County | | | | | | | | | | | | | | |
| Alameda | 2,668,575 | 2,867,901 | 2,977,641 | 3,262,119 | 2,811,728 | 3,135,628 | 3,278,511 | 3,419,011 | 3,078,487 | 1.05 | 1.09 | 1.10 | 1.05 | 1.09 |
| Contra Costa | 1,456,392 | 1,522,173 | 1,576,605 | 1,808,420 | 1,513,069 | 1,613,210 | 1,724,962 | 1,925,200 | 1,708,948 | 1.04 | 1.06 | 1.09 | 1.06 | 1.13 |
| San Francisco | 1,754,003 | 1,895,676 | 1,964,129 | 2,212,269 | 1,860,564 | 1,949,452 | 2,072,723 | 2,207,363 | 1,968,584 | 1.06 | 1.03 | 1.06 | 1.00 | 1.06 |
| Santa Clara | 3,672,784 | 4,009,730 | 4,001,657 | 4,336,711 | 4,003,179 | 4,319,786 | 4,354,871 | 4,636,042 | 4,251,949 | 1.09 | 1.08 | 1.09 | 1.07 | 1.06 |
| Santa Cruz | 365,661 | 395,437 | 413,913 | 429,803 | 366,767 | 421,028 | 443,343 | 456,946 | 422,296 | 1.00 | 1.06 | 1.07 | 1.06 | 1.15 |
| Selected Cities | | | | | | | | | | | | | | |
| Hollister | 23,757 | 29,138 | 30,045 | 28,821 | 25,249 | 29,817 | 31,426 | 32,171 | NA | 1.06 | 1.02 | 1.05 | 1.12 | NA |
| Oakland | 577,350 | 615,347 | 635,431 | 644,387 | 570,790 | 634,132 | 671,828 | 644,949 | 585,820 | 0.99 | 1.03 | 1.06 | 1.00 | 1.03 |
| Santa Cruz | 116,539 | 120,939 | 127,491 | 124,456 | 109,622 | 131,473 | 131,875 | 118,969 | 112,047 | 0.94 | 1.09 | 1.03 | 0.96 | 1.02 |
| Watsonville | 58,540 | 69,064 | 66,324 | 71,394 | 61,119 | 69,972 | 80,347 | 68,880 | 65,721 | 1.04 | 1.01 | 1.21 | 0.96 | 1.08 |

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

## TAXABLE SALES ACTIVITY, SELECTED CITIES
## 4TH QUARTER RATIO, 1989/1988




Source: California State Board of Equilization,
Taxable Sales in California Quarterly Repoerts.

FIGURE 11

1989, with Santa Cruz City, in particular, experiencing unusually high sales. In Watsonville, while sales were up 3 percent from 1988 fourth quarter, the level was still quite low compared to the previous 3 quarters. Oakland and Alameda County building materials sales were not as strong as in the previous quarter, but may reflect an overall downturn in the building industry more than the immediate effects of the earthquake.

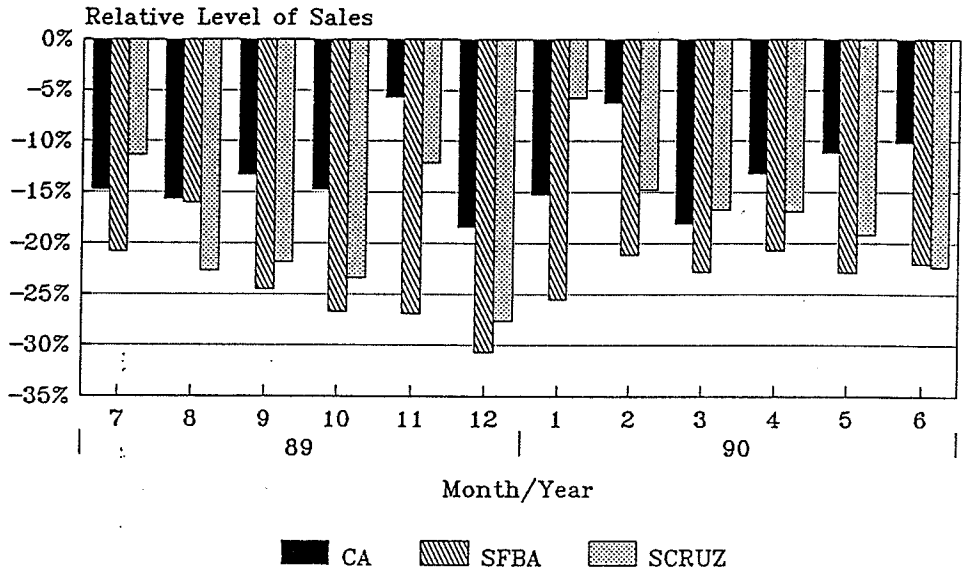
Data on total sales activity for 1990 suggest that the overall impact of the earthquake on retail sales was temporary, for most locations and most sectors. Alameda, Contra Costa and Santa Cruz counties show strong levels of first quarter sales in 1990, and even San Francisco and Watsonville appear to have returned to pre-quake levels of activity (see Table 3). Only Santa Cruz City continued to show relatively low 1990 sales compared to the quarters preceding the earthquake. Even in Santa Cruz City, the first quarter 1990 sales levels, at only 2 percent above 1989 levels, were an improvement over the 4 percent sales decrease shown for fourth quarter 1989.

## V. The Residential Real Estate Sector

By the fourth quarter of 1989, the California economy had begun to experience a significant slowdown in real estate activity, making the isolation of earthquake impacts difficult. To examine effects of the earthquake on the real estate markets, we compared changes in the number of sales and median sales price in the San Francisco Bay Area and the Monterey-Santa Cruz area with statewide trends. We also drew a sample of sales for the City of Santa Cruz and selected parts of Oakland and San Francisco, to examine effects on a disaggregated basis.

As shown in Figure 12, in the September preceding the earthquake, San Francisco and Monterey-Santa Cruz area markets had already begun to slow more sharply than the California

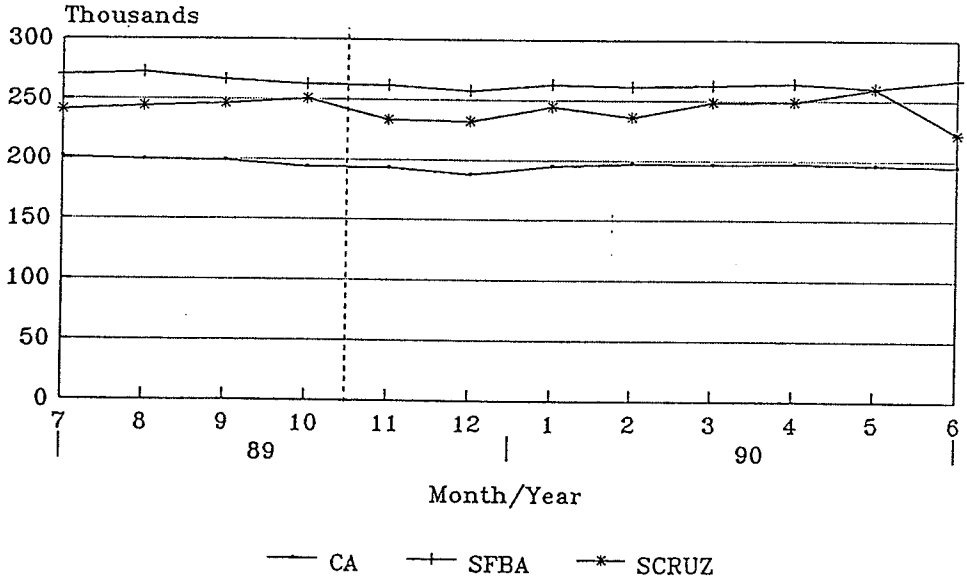
CHANGES IN SALES OF EXISTING HOMES
CURRENT YEAR COMPARED TO PRIOR YEAR
INDEX: 1 = SAME AS PRIOR YEAR




Source: CREUE from California Association of Realtors

Figure 12

MEDIAN HOME PRICES
EXISTING HOMES, 1/89 - 6/90
STATE, SF BAY AREA AND SANTA CRUZ




Source: California Association of Realtors

Figure 13

market as a whole.[3] The San Francisco Bay Area experienced its lowest sales levels, relative to the previous year and to the California slowdown, in the months of October 1989 through January 1990. This drop may in part be attributable to uncertainty following the earthquake, although other economic factors are likely to have played a role as well. In the Monterey-Santa Cruz area, sales dropped sharply relative to trends prior to the earthquake and in other parts of the state only in December 1989. Poor weather conditions during the period may have had as great an effect on the slowdown in that month as the earthquake.

Figure 13 shows trends in median home prices in the Santa Cruz area, the San Francisco Bay Area, and the state from July 1989 through June 1990. The median price of homes in the San Francisco Bay Area relative to the rest of the state held quite steady during this period, with no suggestion of a dip following the earthquake. The Monterey-Santa Cruz area may have been affected, although if so, the impact (for the area as a whole) appears mild. In July 1989, Monterey-Santa Cruz median home prices were 20 percent above California median home prices, with the differential widening through October. In November, the differential dropped from an October level of 29 percent above the California median back to the 20 percent level of the previous July. By March 1990, however, the differential once again began to widen, suggesting that the effects on the Monterey-Santa Cruz market, if any, were mild and short-lived.

An analysis of individual home sales for the period immediately following the earthquake and the following spring gives findings consistent with these aggregate results. Using the DAMAR data base, we drew sales data for Santa Cruz City and for selected San Francisco and Oakland neighborhoods for fall 1988 and 1989 and spring 1989 and 1990. The number of sales in

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[3]The data on the San Francisco Bay Area and Monterey-Santa Cruz area markets are from statistics published by the California Association of Realtors. The San Francisco Bay Area market covers data reported by boards of realtors in Berkeley, Contra Costa County, Los Altos-Los Gatos-Saratoga-Mountain View-Sunnyvale, Marin County, Palo Alto, San Jose, southern Alameda County, Oakland and San Francisco. The Monterey-Santa Cruz market covers data reported by boards of realtors in Carmel, Monterey, Salinas and Santa Cruz.

the post earthquake period for these selected areas was 35 percent below sales for the pre earthquake period, with the percentage drop greatest for San Francisco markets and least for Santa Cruz markets (see Table 5).

Using multiple regression analysis in the form of a hedonic price model, we tested several models to compare sales prices in the pre quake period with prices in the post quake period, as summarized in Table 6. A model of the entire market showed that homes in late 1989 and spring 1990 were selling, on average, when size an neighborhood were accounted for, at a price almost $15,000 above home sales prior to the earthquake (see Table 6A, Model I). During this post-earthquake period, the median price of homes was dropping statewide. Separating out home sales in late fall 1989 from sales in spring 1990, Model II shows that even in the immediate post-quake period, home prices continued to rise, for the combined market as a whole.

Calculation of separate models for each city market (Table 6B: Models III and IV) and separate post-quake parameters for each sub-market (Table 6C: Model V) suggest that housing prices in some submarkets may have been affected by the earthquake. In Oakland and Santa Cruz, homes sold following the earthquake were at substantially higher prices than those sold prior to the earthquake. In San Francisco, in contrast, there was no significant difference in the price of homes sold prior to the earthquake and those sold after.

In Model V, a combined model with separate neighborhood post-quake parameters, several San Francisco neighborhoods showed negative values for the post-quake period (the Marina, Sunset, and Southwest areas) although none are statistically significant. Two Oakland neighborhoods, on San Francisco neighborhood, and the city of Santa Cruz show statistically significant positive parameters (i.e. higher housing prices) for the period following the earthquake.

These results must be interpreted with great caution. The San Francisco market, because it is the highest priced of the three areas, may be reflecting the market slowdown in the higher end of the housing market that was occurring statewide, rather than earthquake impacts.

TABLE 5: TRENDS IN HOME SALES TRACKED BY DAMAR IN BAY AREA COMMUNITIES COMPARED TO CALIFORNIA ASSOCIATION OF REALTORS DATA

| MARKET AREA/ SUBMARKET | 10/88- 12/88 | 4/89- 6/89 | 10/89- 12/89 | 4/90- 6/90 | PERCENT CHANGE Fall 88- Fall 89 | Spring 89- Spring 90 |
|---|---|---|---|---|---|---|
| OAKLAND | 183 | 194 | 138 | 141 | -24.6% | -27.3% |
| East Hills | 99 | 111 | 85 | 74 | -14.1% | -33.3% |
| Fruitvale | 36 | 35 | 32 | 32 | -11.1% | -8.6% |
| Grand Lake | 15 | 9 | 6 | 7 | -60.0% | -22.2% |
| Rockridge | 33 | 39 | 15 | 28 | -54.5% | -28.2% |
| SAN FRANCISCO | 179 | 201 | 88 | 109 | -50.8% | -45.8% |
| Marina | 3 | 6 | 1 | 1 | -66.7% | -83.3% |
| Richmond | 16 | 13 | 7 | 10 | -56.3% | -23.1% |
| South East | 47 | 35 | 20 | 23 | -57.4% | -34.3% |
| Sunset | 36 | 39 | 24 | 26 | -33.3% | -33.3% |
| Southwest | 61 | 72 | 24 | 29 | -60.7% | -59.7% |
| Twin Peaks | 16 | 36 | 12 | 20 | -25.0% | -44.4% |
| SANTA CRUZ | 37 | 25 | 22 | 31 | -40.5% | 24.0% |
| CALIFORNIA* | 593,923 | 523,543 | 515,354 | 462,872 | -13.2% | -11.6% |
| SF Bay Area | | | | | -28.1% | -21.9% |
| Montery Area+ | | | | | -21.0% | -19.5% |

* California figures are annualized rates, rather than actual number of sales.

\+ Market area tracked by the California Association of Realtors that includes Santa Cruz.

Source: CREUE analysis of raw data from DAMAR and data from California Association of Realtors, California Real Estate Trends Newsletter.

TABLE 6A: REGRESSION RESULTS OF EARTHQUAKE IMPACTS ON HOME SALES PRICES: Combined-Market Model

| Independent Variables | MODEL I: Combined Markets Single Post-Quake Estimate | | MODEL II: Combined Markets: Immediate Effects vs. later Time Periods | |
|---|---|---|---|---|
| | Coefficient | t-value | Coefficient | t-value |
| HOUSE CHARACTERISICS | | | | |
| Square Feet | 125 | 22.84 | 124 | 22.43 |
| Age | 207 | 1.71 | 202 | 1.65 |
| Baths | 8,311 | 1.71 | 8,980 | 1.83 |
| CITY/NEIGHBORHOOD LOCATION | | | | |
| Oakland: East Hills | (75,931) | -10.66 | (74,586) | -10.34 |
| Oakland: Fruitvale | (136,140) | -15.42 | (134,580) | -15.06 |
| Oakland: Grand Lake | (51,158) | -3.97 | (52,281) | -5.46 |
| Oakland: Rockridge | ++ | ++ | ++ | ++ |
| SF: Marina Dist. | 309,961 | 13.28 | 309,287 | 13.11 |
| SF: Richmond Dist. | 141,762 | 11.92 | 141,854 | 11.80 |
| SF: South East | (22,285) | -2.55 | (21,959) | -2.48 |
| SF: Sunset Dist. | 55,631 | 6.56 | 54,903 | 6.41 |
| SF: South West | 28,810 | 3.63 | 30,288 | 3.77 |
| SF: Twin Peaks | 114,536 | 11.68 | 116,572 | 11.77 |
| Santa Cruz | (9,430) | -1.07 | (10,097) | -1.14 |
| POST-QUAKE DUMMY VARIABLES | | | | |
| a) Full Period | 14,827 | 3.60 | na | na |
| b) Immediately After | na | na | 12,623 | 2.10 |
| c) Following Spring | na | na | 26,198 | 5.46 |
| Model Statistics | | | | |
| Adjusted r-squared | 0.71 | | 0.71 | |
| Observations | | | | |

++ Variable omitted from equation to avoid overspecifying the model.

TABLE 6B: REGRESSION RESULTS OF EATHQUAKE IMPACTS ON HOME SALES PRICES: Separate Markets

| Independent Variables | MODEL III: Separate Markets: Single Post-Quake Estimate | | | MODEL IV: Separate Markets: Immediate Effects vs. Later Time Periods | | |
|---|---|---|---|---|---|---|
| | Oakland Coefficient Estimate | San Francisco Coefficient Estimate | Santa Cruz Coefficient Estimate | Oakland Coefficient Estimate | San Francisco Coefficient Estimate | Santa Cruz Coefficient Estimate |
| HOUSE CHARACTERISICS | | | | | | |
| Square Feet | 96.23 * | 163.61 * | 90.48 * | 97.09 * | 163.66 * | 91.06 * |
| Age | (297.77) | 356.15 * | (197.68) | (291.88) | 356.40 * | (204.73) |
| Baths | 12,767.49 * | (1,759.17) | 2,426.95 | 12,474.01 * | (1,794.54) | 1,629.76 |
| CITY/NEIGHBORHOOD LOCATION | | | | | | |
| Oakland: East Hills | (77,928)* | na | na | (76,600)* | na | na |
| Oakland: Fruitvale | (134,702)* | na | na | (133,431)* | na | na |
| Oakland: Grand Lake | (37,672)* | na | na | (36,996)* | na | na |
| Oakland: Rockridge | * | na | na | * | na | na |
| SF: Marina Dist. | na | 223,937 * | na | na | 223,791 * | na |
| SF: Richmond Dist. | na | 71,346 * | na | na | 71,236 * | na |
| SF: South East | na | (70,433)* | na | na | (70,490)* | na |
| SF: Sunset Dist. | na | ++ | na | na | ++ | na |
| SF: South West | na | (23,438)* | na | na | (23,476)* | na |
| SF: Twin Peaks | na | 55,179 * | na | na | 55,144 * | na |
| POST-QUAKE DUMMY VARIABLES | | | | | | |
| a) Full Period | 26,424 * | 4,381 | 65,028 * | na | na | na |
| b) Immediately After | na | na | na | 12,590 | 2,750 | 69,488 * |
| b) Following Spring | na | na | na | 35,474 * | 5,230 | 62,971 * |
| Model Statistics | | | | | | |
| Adjusted r-squared | 0.66 | 0.70 | 0.29 | 0.67 | 0.70 | 0.28 |
| Observations | | | | | | |

* indicates statistically significant at the .05 level of a two-tailed t-test

++ variable excluded to guarantee a unique solution

TABLE 6C: REGRESSION RESULTS OF EARTHQUAKE IMPACTS ON HOME SALES PRICES:
Combined Market Model: Post-quake Price Impacts by City and Neighborhood

| | MODEL V: Combined Market Model | |
|---|---|---|
| Independent Variables | Coefficent | t-value |
| HOUSE CHARACTERISICS | 122.51 | 22.36 |
| Square Feet | 180.35 | 1.48 |
| Age | 8,134.90 | 1.67 |
| Baths | | |
| CITY/NEIGHBORHOOD LOCATION | | |
| Oakland: East Hills | (70,890) | -8.50 |
| Oakland: Fruitvale | (129,802) | -12.38 |
| Oakland: Grand Lake | (46,694) | -3.13 |
| Oakland: Rockridge | ++ | ++ |
| SF: Marina Dist. | 327,261 | 13.15 |
| SF: Richmond Dist. | 129,527 | 9.55 |
| SF: South East | (12,750) | -1.26 |
| SF: Sunset Dist. | 67,034 | 6.81 |
| SF: South West | 41,969 | 4.62 |
| SF: Twin Peaks | 120,832 | 10.59 |
| Santa Cruz | (20,922) | -1.99 |
| POST-QUAKE DUMMY VARIABLES | | |
| Full Period by Neighborhood | | |
| Oakland: East Hills | 23,183 | 3.15 |
| Oakland: Fruitvale | 19,672 | 1.64 |
| Oakland: Grand Lake | 20,155 | 0.79 |
| Oakland: Rockridge | 41,629 | 3.08 |
| SF: Marina Dist. | (87,928) | -1.19 |
| SF: Richmond Dist. | 99,661 | 4.33 |
| SF: South East | 1,946 | 0.14 |
| SF: Sunset Dist. | (7,834) | -0.62 |
| SF: South West | (14,094) | -1.20 |
| SF: Twin Peaks | 24,127 | 1.47 |
| Santa Cruz | 65,687 | 5.05 |
| Model Statistics | | |
| Adjusted r-squared | 0.72 | |
| Observations | | |

++ Variable omitted from equation to avoid overspecifying the model.

Nevertheless, the negative parameter for the Marina district (an area very vulnerable to shaking), although significant only at the 25 percent level, may suggest that home prices and the number of sales were reduced in areas where localized earthquake risk was visibly apparent because of structural damage.[4]

The Santa Cruz results are particularly surprising and suggest that the model is not capturing an adequate picture of market forces in the area. The adjusted R-squared for the Santa Cruz city model (see Models III and IV), at 0.29, is far lower than for the Oakland or San Francisco models (which were at 0.66 and 0.70). These statistics suggest that the Santa Cruz model explained less than 30 percent of the variation in home prices, while the Oakland model explained two-thirds of the variation and the San Francisco model explained 70 percent of the variation in home prices. The high post-quake parameter for Santa Cruz may further suggest that some post-quake selection occurred in the homes going onto the market. It is possible, for example, that homes in the most vulnerable areas were kept off of the market following the earthquake, because of repair needs or uncertainty over liabilities, building permission, and insurance, leaving buyers to choose from a different, possibly more expensive pool of homes.

In summary, the aggregate findings indicate that much of the housing market continued to operate at close to normal levels following the earthquake. Any price effects appear to have been mild and temporary, particularly in relation to the more widespread slowdown in the statewide for-scale housing market. Within the limitations described above, the statistical analysis suggests that home prices may have been affected on a localized basis, in some neighborhoods where damage was evident and well publicized. On average, however, many parts of the region appear to have been unaffected by the earthquake.

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[4]Additional models, not reported in Table 6, included the median home price statewide as a dependent variable, to normalized the results to overall trends in the California market. Even with this variable in the model, San Francisco showed less of a tendency for prices to rise than did either Oakland or Santa Cruz markets in the period following October 1989.

## VI. Small Businesses in Oakland and Santa Cruz

The data reported in earlier sections is useful in understanding how well the economy fared in aggregate 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 businesses gained rather than lost from the quake, and how transportation system damage versus building damage affected operations. In the immediate days following the earthquake, little funding was available to launch a survey of firms in affected areas. However, with cooperation of the Oakland Chamber of Commerce and the Santa Cruz Downtown Association, we were able to distribute surveys to approximately 1200 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.[5]

### *A. Survey Coverage and Biases*

The surveys were directed at firms with 100 employees or fewer. 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 aggregate findings are somewhat biased. In addition, no attempt was made to track down firms that may have closed and were no longer receiving mail sent to their original address. Thus, the number of destroyed firms may be underestimated in the sample.

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[5]The 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 business were asked to respond to the survey.

Nevertheless, with careful interpretation, the timeliness of the sample offers a useful snapshot of perceptions of impacts in the period immediately following the earthquake.

*Incidence of Damage among Small Businesses*

One of the most striking features of the earthquake was the localized incidence of impacts. Heavily damaged areas could be separated from areas showing 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 (see Figure 14). Even in the City of Santa Cruz, very close to the epicenter of the earthquake, where the downtown area was destroyed, 27 percent of 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 uninhabitable following the earthquake, while only 5 percent of Oakland firms were in uninhabitable buildings.

*Business Losses--Days Lost and Inventory and Income Losses*

The differential impact of the earthquake is apparent in business days lost. 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 cities, the number of business days lost increased sharply with the amount of building damaged 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 for 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 (see Figure 15). 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 for Oakland, of 2.4 and 2.1. Santa Cruz firms, 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 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 7. 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.

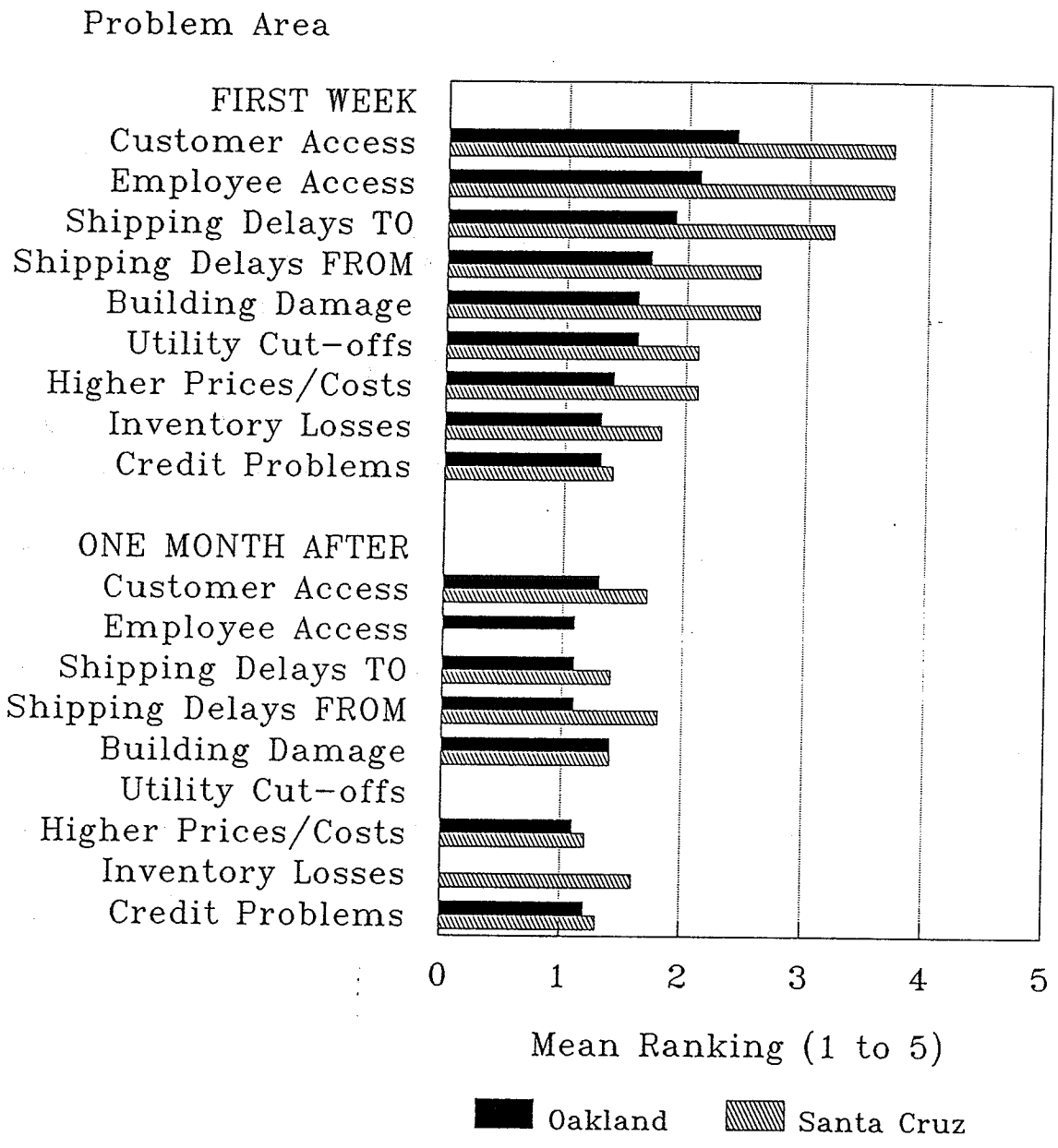
In Oakland, trade and service firms were particularly vulnerable to larger, longer lasting business losses, while the greatest share of losses were incurred by trade firms in Santa Cruz. Not

Table 7: Business Losses and Gains after the Loma Prieta Earthquake: Oakland and Santa Cruz Firms

| | First Week: Business Losses and Gains | | | | | | After Nov. 18: Business Losses and 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% | 18% | 47% | 8% | 2% | 279 | 6% | 13% | 72% | 6% | 3% |
| BY ECONOMIC SECTOR | | | | | | | | | | | | |
| Construction | 9 | 11% | 0% | 56% | 33% | 0% | 9 | 0% | 0% | 78% | 22% | 0% |
| Manufacturing | 22 | 23% | 9% | 68% | 0% | 0% | 21 | 5% | 19% | 71% | 5% | 0% |
| Trade | 78 | 27% | 27% | 33% | 10% | 3% | 78 | 14% | 17% | 58% | 8% | 4% |
| FIRE | 34 | 9% | 21% | 65% | 3% | 3% | 35 | 3% | 11% | 77% | 6% | 3% |
| Services | 130 | 32% | 15% | 45% | 7% | 1% | 130 | 4% | 11% | 78% | 5% | 3% |
| Other | 6 | 17% | 17% | 50% | 0% | 17% | 6 | 0% | 0% | 100% | 0% | 0% |
| BY BUSINESS SIZE | | | | | | | | | | | | |
| 1-5 employees | 87 | 31% | 14% | 46% | 7% | 2% | 87 | 11% | 11% | 70% | 5% | 2% |
| 6-10 employees | 54 | 30% | 24% | 41% | 4% | 2% | 54 | 6% | 17% | 74% | 2% | 2% |
| 11-20 employees | 41 | 20% | 12% | 54% | 15% | 0% | 41 | 5% | 2% | 78% | 10% | 5% |
| 21-50 employees | 52 | 31% | 19% | 38% | 12% | 0% | 52 | 2% | 17% | 65% | 13% | 2% |
| 50+ employees | 30 | 10% | 10% | 73% | 0% | 7% | 30 | 3% | 17% | 77% | 0% | 3% |
| Other | 9 | 11% | 67% | 22% | 0% | 0% | 9 | 0% | 11% | 78% | 0% | 11% |
| BY BUILDING DAMAGE | | | | | | | | | | | | |
| None | 114 | 18% | 17% | 53% | 12% | 0% | 114 | 4% | 9% | 79% | 7% | 2% |
| Minor | 130 | 25% | 22% | 45% | 5% | 4% | 130 | 7% | 13% | 71% | 5% | 5% |
| Severe | 15 | 67% | 13% | 20% | 0% | 0% | 15 | 27% | 27% | 47% | 0% | 0% |
| Unoccupiable | 14 | 71% | 14% | 14% | 0% | 0% | 14 | 7% | 14% | 71% | 7% | 0% |
| Other | 6 | 67% | 17% | 17% | 0% | 0% | 6 | 0% | 33% | 33% | 33% | 0% |
| SANTA CRUZ RESPONDENTS | | | | | | | | | | | | |
| ALL RESPONSES | 55 | 67% | 7% | 24% | 0% | 2% | 55 | 18% | 9% | 47% | 15% | 11% |
| BY ECONOMIC SECTOR | | | | | | | | | | | | |
| Trade | 30 | 80% | 3% | 13% | 0% | 3% | 30 | 23% | 10% | 23% | 27% | 17% |
| FIRE | 8 | 38% | 25% | 0% | 38% | 0% | 8 | 13% | 0% | 75% | 0% | 13% |
| Services | 17 | 59% | 6% | 35% | 0% | 0% | 17 | 12% | 12% | 76% | 0% | 0% |
| BY BUSINESS SIZE | | | | | | | 56 | 18% | 11% | 46% | 14% | 11% |
| 1-5 employees | 30 | 57% | 10% | 30% | 0% | 3% | 30 | 17% | 7% | 50% | 13% | 13% |
| 6-10 employees | 5 | 100% | 0% | 0% | 0% | 0% | 5 | 0% | 40% | 20% | 0% | 40% |
| 11-20 employees | 6 | 67% | 0% | 33% | 0% | 0% | 6 | 17% | 0% | 50% | 33% | 0% |
| 21-50 employees | 6 | 83% | 0% | 17% | 0% | 0% | 6 | 33% | 0% | 33% | 33% | 0% |
| 50+ employees | 3 | 67% | 33% | 0% | 0% | 0% | 3 | 67% | 33% | 0% | 0% | 0% |
| Other | 5 | 80% | 0% | 20% | 0% | 0% | 6 | 0% | 17% | 83% | 0% | 0% |
| BY BUILDING DAMAGE | | | | | | | 55 | 18% | 9% | 47% | 15% | 11% |
| None | 15 | 67% | 0% | 33% | 0% | 0% | 15 | 7% | 7% | 53% | 27% | 7% |
| Minor | 19 | 47% | 21% | 26% | 0% | 5% | 19 | 11% | 16% | 58% | 5% | 11% |
| Severe | 6 | 83% | 0% | 17% | 0% | 0% | 6 | 17% | 0% | 67% | 0% | 17% |
| Unoccupiable | 13 | 85% | 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.

# MAJOR PROBLEMS FOLLOWING THE EARTHQUAKE FIRST WEEK COMPARED TO ONE MONTH LATER OAKLAND AND SANTA CRUZ SMALL BUSINESSES




Source: Survey, January 1990.
Note: 1-no problem, 5-very severe.

FIGURE 15

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).

While the earthquake was a disaster for some firms, it proved a stimulus for other firms. 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.

*Accommodating to Changing Business Conditions*

Businesses found means of coping with physical damage to buildings and roadways (Table 8). More than one third of Oakland firms and over one fifth of Santa Cruz firms allowed employees to work more flexible 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. Large firms overall appeared more likely to make specific adjustments to keep the business in operation, while manufacturing firms in Oakland were the most likely to concentrate particularly on transport related responses (carpooling and shipping schedules).

*Use of Public and Private Assistance*

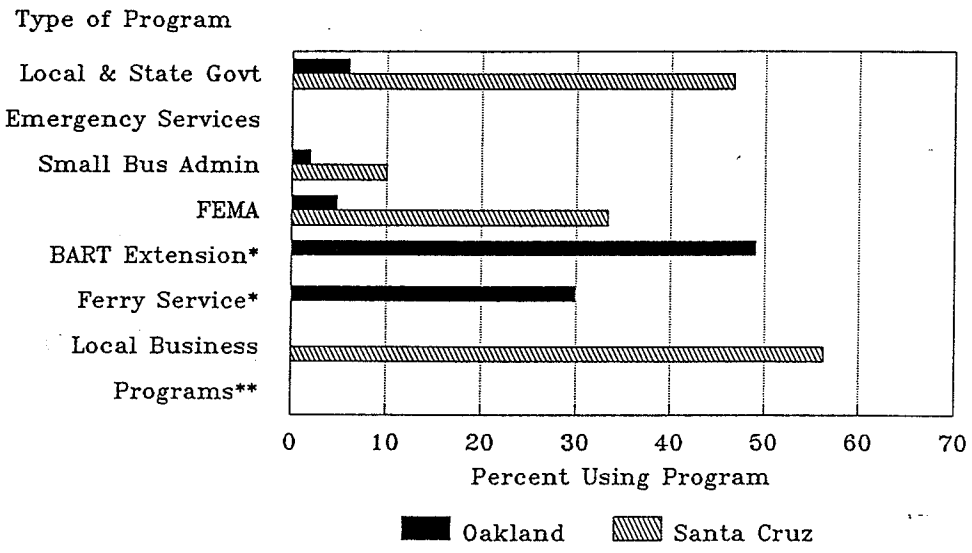
Assistance came to the earthquake stricken areas from all levels of government and from the private sector as well (see Figure 16). Overall, Federal (national government) assistance

Table 8: Oakland and Santa Cruz Business Adjustments to the Earthquake

| | | Type of Business Adjustment | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total Responses | Encourage Carpooling | Adopt Employee Flextime | Encourage Working at Home | Expanded Business Hours | Change Receiving Hours | Change Shipping Hours | Special Sales | Consol-idate Oper. | Move Location |
| 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% |
| SANTA CRUZ: All | 51 | 2% | 22% | 18% | 8% | 10% | 20% | 10% | 12% | 20% |
| SANTA CRUZ By Sector | | | | | | | | | | |
| Trade | 29 | 0% | 17% | 14% | 7% | 10% | 24% | 10% | 10% | 24% |
| FIRE | 6 | 0% | 0% | 17% | 0% | 17% | 33% | 17% | 33% | 17% |
| Services | 16 | 6% | 38% | 25% | 13% | 6% | 6% | 6% | 6% | 13% |
| SANTA CRUZ by Business Size | | | | | | | | | | |
| 1-5 employees | 28 | 0% | 25% | 25% | 11% | 14% | 11% | 11% | 11% | 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 | 17% | 33% | 17% | 0% | 0% | 17% | 17% | 50% | 17% |
| 50+ employees | 3 | 0% | 33% | 0% | 33% | 0% | 33% | 33% | 0% | 67% |
| Other | 4 | 0% | 0% | 0% | 0% | 0% | 25% | 0% | 0% | 0% |

Source: Survey of Oakland and San Francisco small businesses, January 1990.

USE OF PUBLIC AND PRIVATE PROGRAMS
IN RECOVERING FROM THE EARTHQUAKE
OAKLAND AND SANTA CRUZ SMALL BUSINESSES




Source: Survey, January 1990.
* Asked of Oakland firms only.
** Asked of Santa Cruz firms only.

FIGURE 16

showed the lowest level of usage and generated the least amount of satisfaction among businesses. In Oakland, less than 5 percent of firms received assistance from the Small Business Administration (SBA) or from the Federal Emergency Management Administration (FEMA). In Santa Cruz, 10 percent of firms used SBA programs and one third of firms worked with FEMA. Both Oakland and Santa Cruz firms expressed dissatisfaction with FEMA services in particular. In contrast, businesses had generally favorable comments to offer on the response of state and local agencies.

Local government programs were used more heavily than Federal programs. In Oakland, 6 percent of firms used state or local government emergency services, almost half of firms profited from extended service on the Bay Area Rapid Transit system (BART), and 30 percent felt they benefitted from expanded ferry services.[6] In Santa Cruz, 47 percent of firms used local and state emergency services. An even larger number--56 percent --used the recovery services offered by public and private local business programs, such as the Downtown Association.

Although not covered specifically in the survey, other local government programs appeared less well prepared to respond to the quake. In Oakland, many government offices were displaced because of damage to public buildings. In Santa Cruz, offices such as the building and planning departments faced new issues with no backing policy framework. The city had to address issues such as whether permits should be issued in places that had proved to be geologically unsound. As a result, issuance of building permits was down sharply in the city following the earthquake.

*Small Business Perspective on the Earthquake*

[6]Expanded BART and ferry service were the primary means used to cope with the impacts of the Bay Bridge closure on travel patterns in the San Francisco Bay Area.

The immediate and longer term experience of small businesses following the Loma Prieta earthquake depended very much on where the business was located and how much damage occurred to the building housing the business and to the firm's inventory. Outside the areas of most intense shaking, firms were able to resume operations quickly and within a month were back to pre-quake levels of business. In the area where physical damage was most intense, however, recovery has been slower. While over 80 percent of Santa Cruz firms had returned to normal levels of operations within a month of the earthquake, close to 20 percent have faced a longer and more costly recovery period.

## VII. Interpretation and Implications

An evaluation of the economic impacts of the Loma Prieta quake is both encouraging and informative. 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 major reasons for the region's quick economic recovery from the quake are:

1) The fact that the earthquake was centered away from the most populous portions of Northern California.

2) The economic diversity and geographic dispersal of the region's economy--the region relies on no single industrial sector (such as tourism in San Francisco), and there are many economic activity centers throughout the San Francisco and Santa Cruz areas.

3) The strong performance of communications and utilities systems, which functioned again very quickly following the quake.

4) Redundancy in the transportation system. Many were surprised by the degree of impact to major transportation facilities from an earthquake of this magnitude and

location, but the existence of alternative routes and facilities made it possible for most businesses to continue to operate normally.

These factors enabled a quick recovery for most firms. Preparedness was a major element in the factors mentioned above as well as in the overall level of impact of the earthquake. While some structures failed, the very great majority of structures designed to survive a major quake came through with little damage. Communications and utility systems became operational again quickly because of basic design and planning for emergency response.

The weaknesses that appeared were in the preparedness level of individual small businesses and to some extent of the general purpose public agencies (as opposed to emergency related services). Small businesses in general had few resources to prepare for an earthquake. Large firms implemented a greater number of responses quickly in part because they had made plans in advance to do so. Firms such as Bank of America, for example, had diverse locations throughout the region to which they could relocate operations as necessary. Single location retail businesses and some finance, insurance, real estate, and service businesses were particularly vulnerable not only to the immediate impacts of building damage but also to the access effects of surrounding damage and disrupted transportation routes. Assistance from Federal agencies also was problematic. At the least, there was a great deal of confusion among potential recipients as to the type of aid available and eligibility requirements.

Concern for the future should also focus on the greater vulnerability of the economy to a quake centered closer to San Francisco or Oakland. While many businesses would again be largely unharmed, the proportion experiencing severe damage would be much greater than that experienced on October 17, 1990. In addition, disruption to the transportation system could be much worse. Small businesses generally do not have the resources to prepare for the recovery period to a major natural disaster. Thus, for the Bay Area economy to be able to operate again

quickly after another major earthquake, some attention is needed in advance to the likely needs of small business.