The Gateway Cities Economy:
Impacts of Aerospace Restructuring

17 February 1998

ECONOMIC ROUNDTABLE
A Nonprofit, Public Policy Research Organization

The GATEWAY CITIES ECONOMY: *Impacts of Aerospace Restructuring*

Report prepared for the
Gateway Cities
Council of Governments

by the
Economic Roundtable
315 West Ninth Street, Suite 1209
Los Angeles, California 90015
(213) 892-8104
(213) 892-8105 fax

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http://home.earthlink.net/~economicrt

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

EXECUTIVE SUMMARY

EMPLOYMENT TRENDS IN THE GATEWAY CITIES

Between 1992 and 1997, we estimate that the greatest job growth in the Gateway Cities occurred in industries paying low wages and salaries, while the greatest job losses occurred in industries paying above average wages and salaries.

- We estimate that 17,900 jobs were lost in the Gateway Cities aircraft industry between 1992 and 1997. Other industries losing at least 1,000 jobs between 1992 and 1997 were finance (-1,700), food products (-1,500), insurance (-1,300), metals (-1,300), search and navigation equipment (-1,200), and printing and publishing (-1,100). Each of these industries pay above average wages and salaries.

- We estimate that the greatest job growth in the Gateway Cities occurred in business services (+13,900), apparel and textiles (+4,500), and eating and drinking places (+1,200). These industries pay among the lowest wages and salaries in the Gateway Cities.

- In the Gateway Cities economy, the ratio of jobs in low-wage industries to jobs in high-wage industries is growing. Employment in high-wage industries fell from 111,400 to 87,400 (est.) between 1992 and 1997, a decline of 22 percent. On the other hand, employment in low-wage industries grew from 144,700 to 161,900 (est.), a 12 percent increase.

Due to a higher concentration of employment in declining industries and a lower concentration of employment in growing industries, the Gateway Cities lost jobs between 1992 and 1997 while the rest of the county gained jobs.

- Total industry employment in the Gateway Cities was 672,291 in 1992. We estimate that total employment in 1997 was 660,923. This net loss of 11,368 jobs represents a 1.7 percent decline in total employment between 1992 and 1997 in the Gateway Cities. On the other hand, total employment in Los Angeles County grew from 3,813,500 in 1992 to 3,876,613 in 1997, a 1.7 percent increase. Subtracting Gateway Cities employment from total county employment yields an employment increase of 75,111 jobs in the "Rest of Los Angeles County", a 2.4 percent increase.

DEFENSE CONTRACTS AWARDED TO FIRMS IN THE GATEWAY CITIES

Since 1994, the rest of the county has out-performed the Gateway Cities in number of firms awarded contracts. Although the dollar value of defense contracts increased 57 percent between 1987 and 1996, it fell 43 percent between 1994 and 1996.

- Between 1994 and 1996, the number of Gateway Cities firms receiving defense contracts grew by 11 percent. However, the number of firms in Los Angeles County receiving defense contracts grew by 18 percent between 1994 and 1996. This includes a 21 percent increase in Los Angeles County excluding the Gateway Cities.

- The value of defense contracts grew from $2.63 billion in 1987 to $4.12 billion in 1996, a 57 increase. Thus, althougn the number of firms receiving contracts declined, and tens of thousands of workers lost their jobs, the value of defense contracts awarded to Gateway Cities firms increased during the 1987-96 period. However, between 1994 and 1996 the value of defense contracts fell from $7.20 billion to $4.12 billion. a 43 percent decrease.

JOB AND PAYROLL IMPACT OF AEROSPACE RESTRUCTURING

The negative impacts of aerospace restructuring in the Gateway Cities have reverberated throughout the regional economy. As aerospace firms cut output and employment, jobs are lost in industries that supplied inputs to aerospace manufacturers, as well as industries that benefited from the earnings spent by aerospace workers. The regional concentration of aerospace production systems and labor markets ensures that the brunt of the economic impact resulting from aerospace restructuring is felt locally.

- The aerospace industry employed 57,000 workers in the Gateway Cities in 1992. An additional 33,000 were employed in firms producing inputs for aerospace manufacturers, and 58,800 were employed in firms to meet demand generated by aerospace workers for goods and services. A total of 148,800 jobs were created by the Gateway Cities aerospace industry through input-output linkages, creating an employment multiplier of 2.61. For every aerospace job (or unit of work), 1.61 workers (or units of work) were supported throughout the economy by indirect and induced production.

- Based on this data, aerospace employment in the Gateway Cities fell from 76,600 in 1987 to 34,900 in 1997, a loss of 41,700 jobs. The total indirect and induced employment generated by the aerospace industry declined form 123,300 in 1987 to 56,200 in 1997, a loss of 67,100 jobs. Therefore, we

estimate that total employment connected to Gateway Cities aerospace production fell form 199,900 in 1987 to 91,100 in 1997, a loss of 108,900 jobs.

- Based on these calculations, we estimate that the total annual earnings of workers in the Gateway Cities aerospace industry fell from $3.36 billion in 1987 to $1.53 billion in 1997. The total annual earnings of workers in jobs supported by aerospace production fell from $3.55 billion in 1987 to $1.62 billion in 1997. As a result, total annual earnings connected to Gateway Cities aerospace production declined from $6.91 billion in 1987 to $3.15 billion in 1997.

JOB LOSS IN AEROSPACE OCCUPATIONS

- For all occupations represented in the aerospace industry, the 1990-96 job loss was 198,697, of which 117,367, or 59 percent, was concentrated within the aerospace industry group.

- Los Angeles County is estimated to have over 67,000 long-term unemployed high technology workers who lost their jobs before 1994 and have not found new jobs utilizing their skills. The Gateway Cities account for at least 29% of jobs lost in Los Angeles County in the high technology sector, with approximately 20,000 long-term unemployed workers.

A. INDUSTRY EMPLOYMENT TRENDS, 1992-97

A.1 LA County Industry Employment Trends, 1992-97

Employment Trends in Major Industry Sectors

Between 1992 and 1997, total employment in Los Angeles County increased from 3,813,500 to 3,876,600, a 1.7 percent increase. Underlying the overall trend is continued employment growth in the service sector, offset by substantial job loss in manufacturing and finance, insurance, and real estate. Employment trends in major industry sectors are shown in Figure 1.

Between 1992 and 1997 the service industries added 157,900 jobs (+14 percent). By 1997, service sector jobs accounted for one in every three jobs in Los Angeles County. On the other hand, despite adding over 13,000 jobs since 1994, the manufacturing sector lost 57,200 jobs (-8 percent) between 1992 and 1997. The finance, insurance, and real estate industries lost 38,800 jobs during the same period. There was little net employment change in the wholesale and retail trade industries, while transportation industry employment grew by 9,500 workers (+7 percent).

These trends are briefly explained by the following factors:

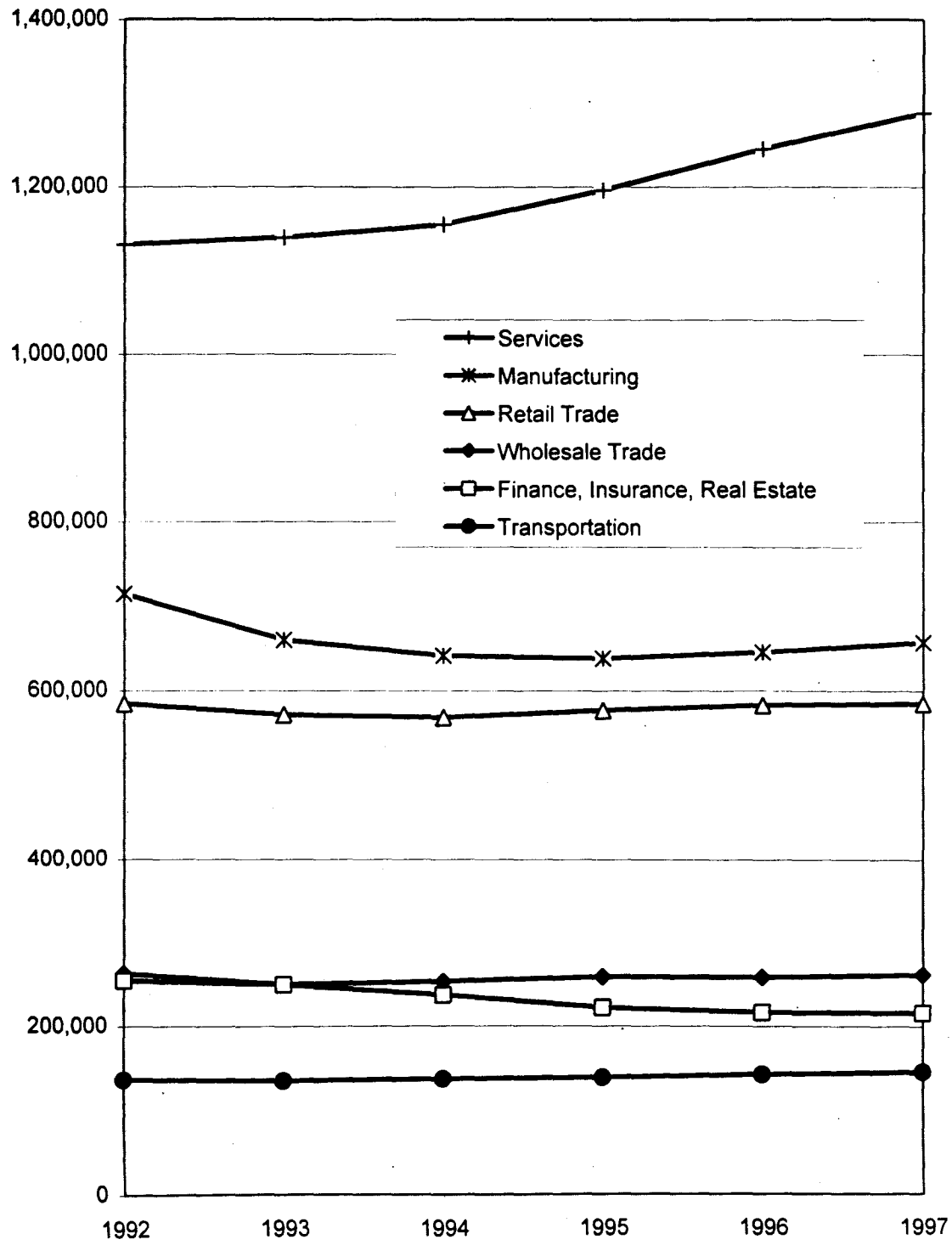
Job Growth in the Service and Transportation Sectors:

Two service industry groups dominate recent job growth in Los Angeles County – business services and motion pictures (see Figure 2). The business services are a diverse group of high-wage and low-wage industries, reflecting the polarized labor market structure of the service sector as a whole. At one end of the spectrum are relatively high-wage professional services, including advertising, commercial photography, graphic design, and data processing and computer services. At the other end are low-wage janitorial, security, and personnel supply services. The business services industries grew from 228,700 workers in 1992 to 314,300 in 1997, a 37 percent employment increase.

The increased demand for business services is connected with the increasingly competitive economic environment. For example, demand for advertising has grown as companies seek to position themselves in national and global marketplaces. Many companies turn to temporary help supply and employment agencies to fill job needs and maintain labor market flexibility. There is increased demand for private security services by businesses and individuals. Finally, the continuing information revolution has created increased demand for computer and data processing services.

Figure 1

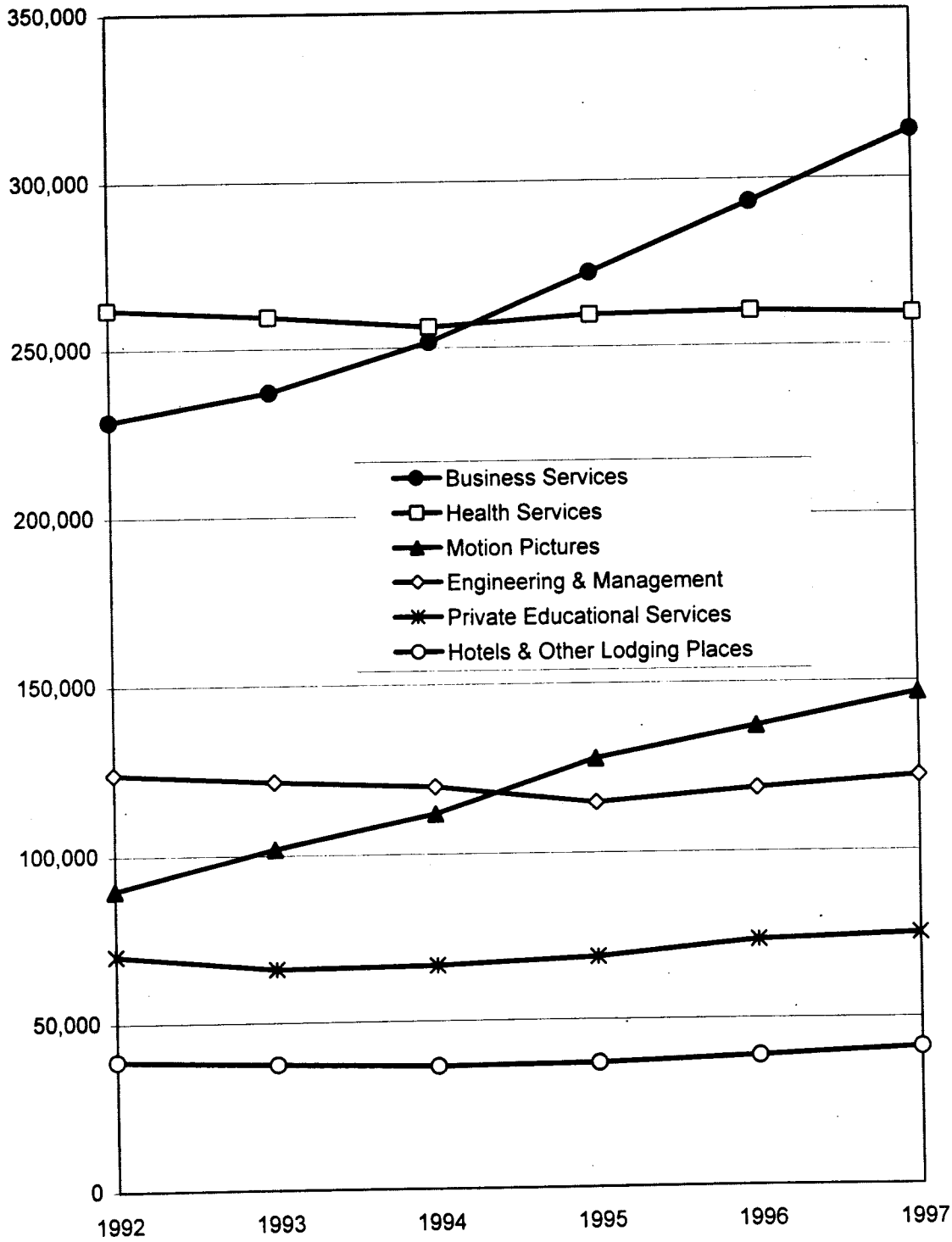
MAJOR INDUSTRY SECTORS
Employment in Los Angeles County, 1992-97



Source: California EDD, Labor Market Information Division

Figure 2

SERVICES
Employment in Los Angeles County, 1992-1997



Source: California EDD, Labor Market Information Division

The motion picture industry was the fastest growing industry in Los Angeles County between 1992 and 1997. The motion pictures industry added 57,000 jobs between 1992 and 1997. Motion pictures employment increased from 89,600 in 1992 to 146,600 in 1997, a 64 percent increase.

Motion pictures has grown steadily in the past decade due to increased domestic and foreign demand for films and television programs, growing demand for animation and special effects, and the emergence of new media outlets for content providers (such as multimedia and the Internet). The motion picture and related industries are expected to experience dramatic growth into the next century.

The transportation sector also experienced a significant rate of job growth between 1992 and 1997 (see Figure 3). The water transportation industry added 1,100 jobs, a 14 percent increase. The "other transportation" industries, including transportation services and public transportation, grew by 2,900 jobs, a 7 percent increase. Between 1992 and 1996, employment in the air transportation industry increased by 2 percent, and employment in the trucking and warehousing industry grew by 7 percent. (Note that 1997 employment data is not shown for these industries due to a break in the time series after 1996).

Job growth in the transportation industries is related to the growing importance of international trade and the strategic position of Los Angeles in the Pacific Rim. The Port of Los Angeles and Los Angeles International Airport support a variety of transportation industries, such as water transportation and freight forwarding.

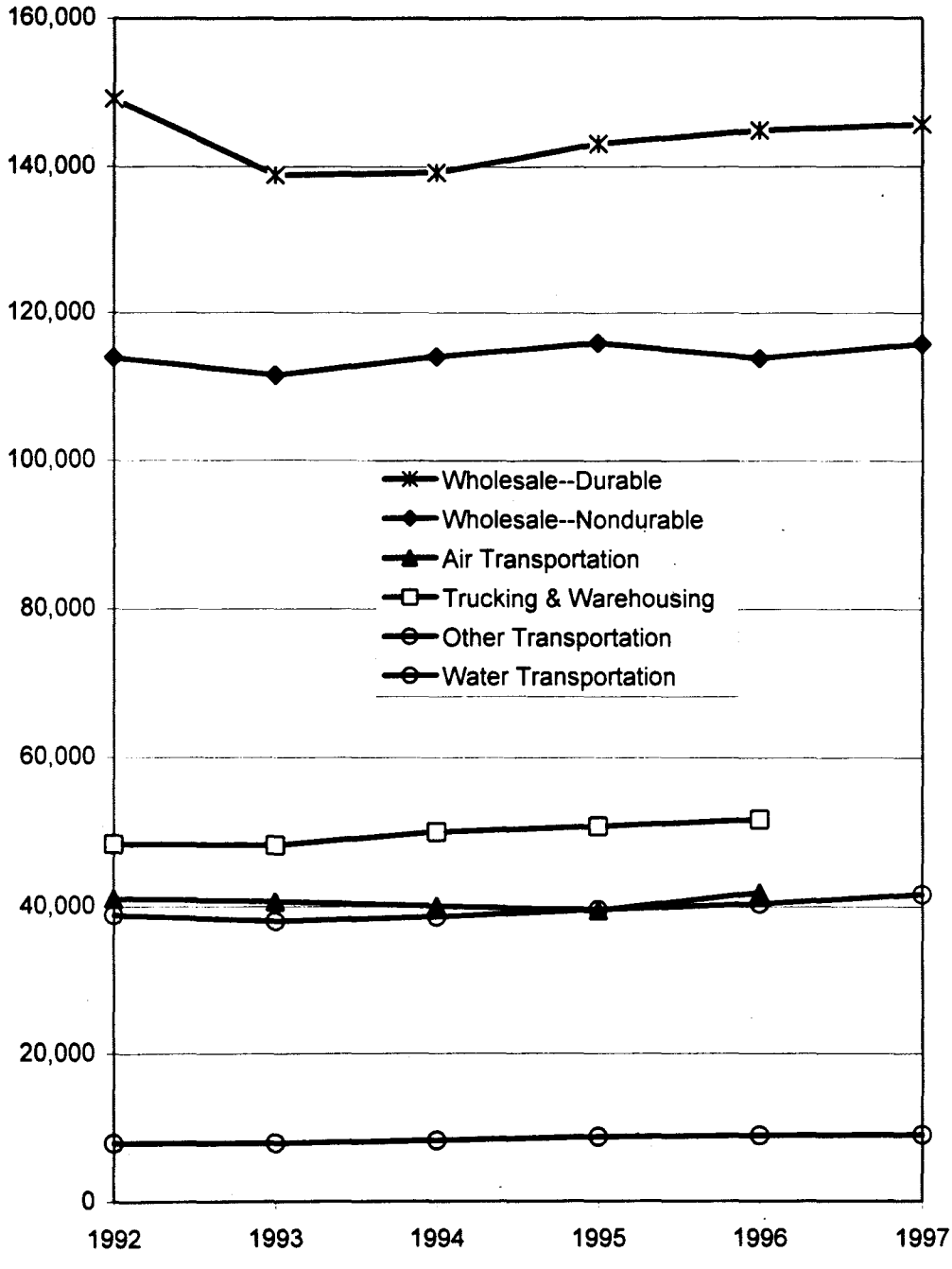
Job Loss in Manufacturing and Finance, Insurance, and Real Estate:

Job loss in the Los Angeles County aerospace industry is shown in Figure 4. Employment in the aerospace industries fell from 154,900 in 1992 to 101,900 in 1997, a 34 percent decline. Most of these jobs were lost in the aircraft industry, in which employment declined from 95,400 in 1992 to 61,900 in 1997, a 35 percent decline. While employment levels have been stable since 1995, they are well below the aerospace industry's peak employment of 224,600 in 1986.

Employment trends in other durable manufacturing industries are shown in Figure 5. The metals industry lost 4,250 jobs between 1992 and 1997, a 6 percent decline. On the other hand, the industrial machinery industry gained 1,100 workers, a 3 percent decline. After slipping between 1992 and 1993, employment in the electronics industries slowly grew over the next four years.

Figure 3

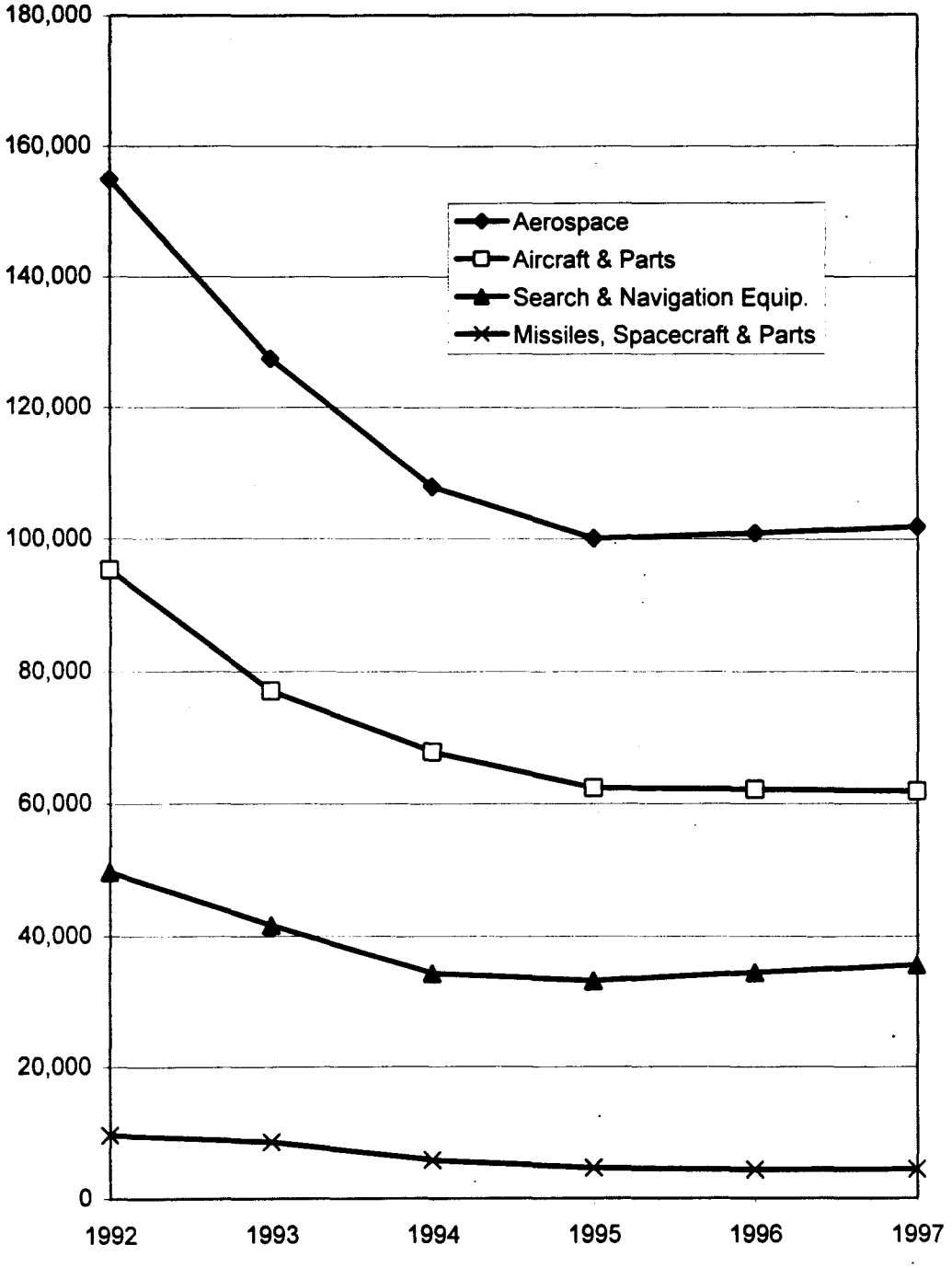
TRANSPORTATION AND WHOLESALE TRADE
Employment in Los Angeles County, 1992-1997



Source: California EDD, Labor Market Information Division

Figure 4

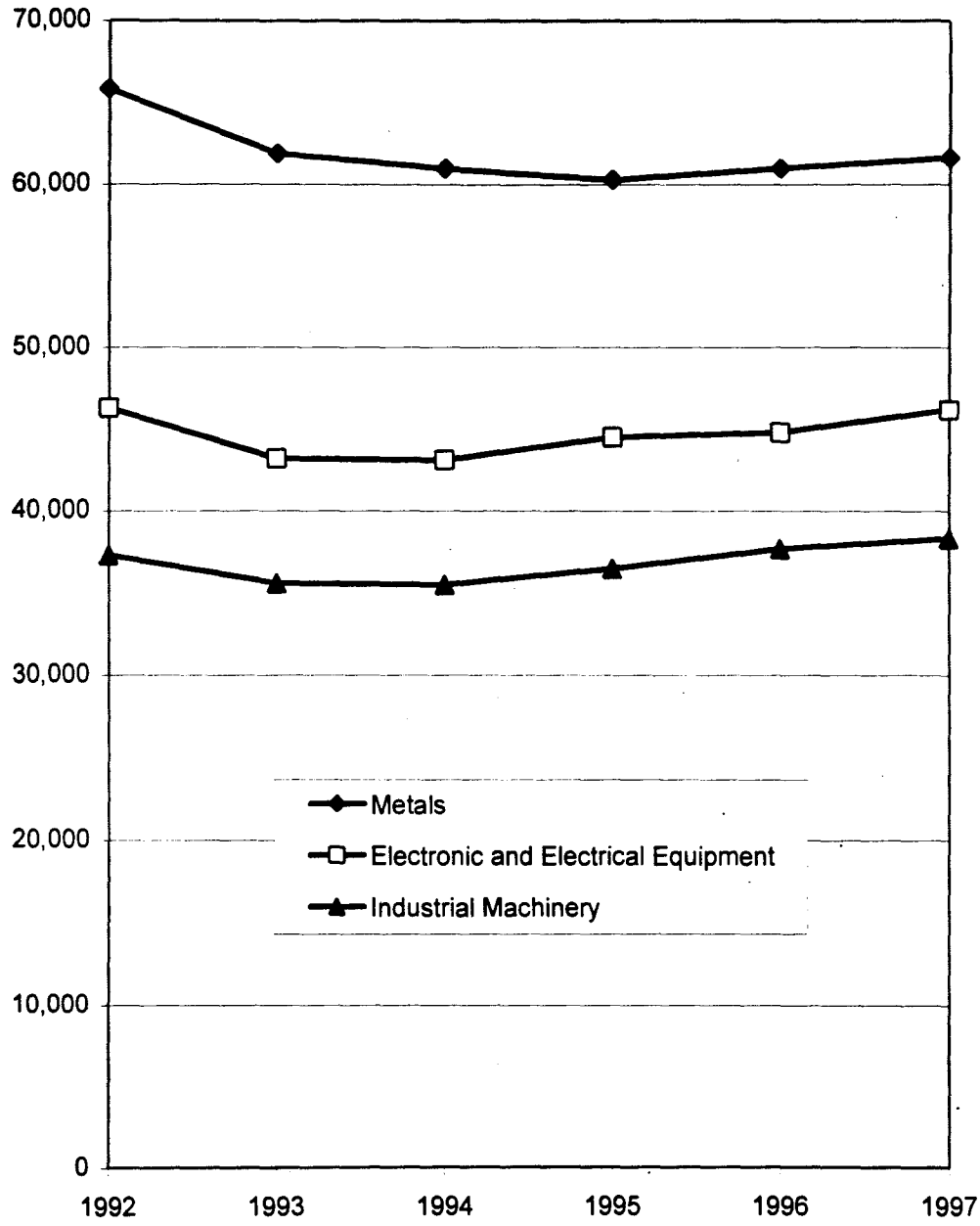
AEROSPACE
Employment in Los Angeles County, 1992-1997



Source: California EDD, Labor Market Information Division

Figure 5

METALS, MACHINERY, AND ELECTRONICS
Employment in Los Angeles County, 1992-1997



Source: California EDD, Labor Market Information Division

The major exception to the trend of job loss in the manufacturing sector was the apparel and textiles industry, which added 24,900 jobs between 1992 and 1997, a 23 percent increase from 108,700 to 133,600 workers (see Figure 6). Most other non-durable manufacturing industries lost jobs between 1992 and 1997. The apparel and textiles industry has surpassed aerospace as the major provider of manufacturing jobs in Los Angeles County.

Job loss was substantial in the finance and insurance industries (Figure 7). Finance industry employment fell from 118,900 in 1992 to 107,900 in 1997, a 9 percent decline. The insurance industry lost 16,300 jobs during the same period, experiencing a 22 percent employment decline from 73,400 to 57,100. The recent consolidation of finance and insurance companies has contributed to job loss in these industries.

A.2 Comparison of LA County and US Industry Employment Trends, 1992-97

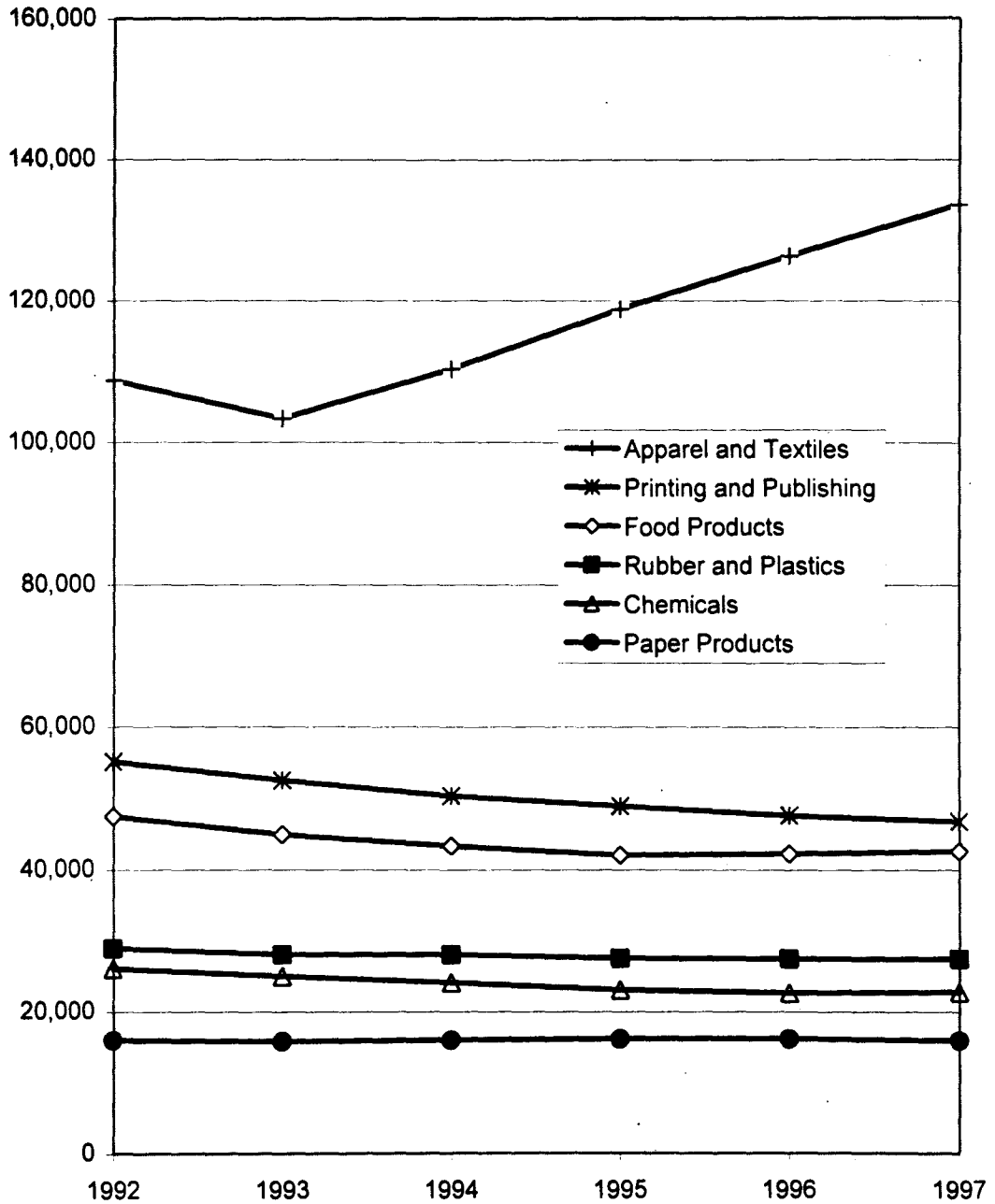
The prolonged recession in California resulted in a four-year period of employment decline in Los Angeles County between 1990 and 1994. Although total employment grew by 4.5 percent between 1994 and 1997, an increase of 166,200 jobs, there were 270,500 *fewer* jobs in Los Angeles County in 1997 than in 1990. As a result, in almost every industry sector, national employment trends were more positive than county employment trends.

Figure 8 compares employment trends in manufacturing industries in Los Angeles County and the United States between 1992 and 1997. Of the 11 manufacturing industries shown, the United States experienced employment growth in 7 industries, while the county saw job growth in only 3 industries – apparel and textiles, machinery, and furniture. The growth of jobs in Los Angeles County apparel in textiles, driven by the availability of immigrant labor that can be hired cheaply, is counter to employment decline in the apparel and textiles industry in the United States. Unfortunately, this low-wage industry is the only manufacturing industry in which the county is a faster rate of job growth than the nation. United States job growth in machinery and furniture is significantly higher than the limited job growth in these industries in Los Angeles County.

In several industries, jobs are declining in the county but growing in the nation. These include printing and publishing, food products, metals, rubber and plastics, and electrical and electronic products. In other industries, the rate of job loss in Los Angeles County has been significantly greater than the rate of job loss in the United States. For example, employment in the aircraft industry fell by 35 percent in the county, compared to an 18 percent decline in the United States. The rate of job loss in Los Angeles County was also greater than the national rate of job loss in the chemicals industry.

Figure 6

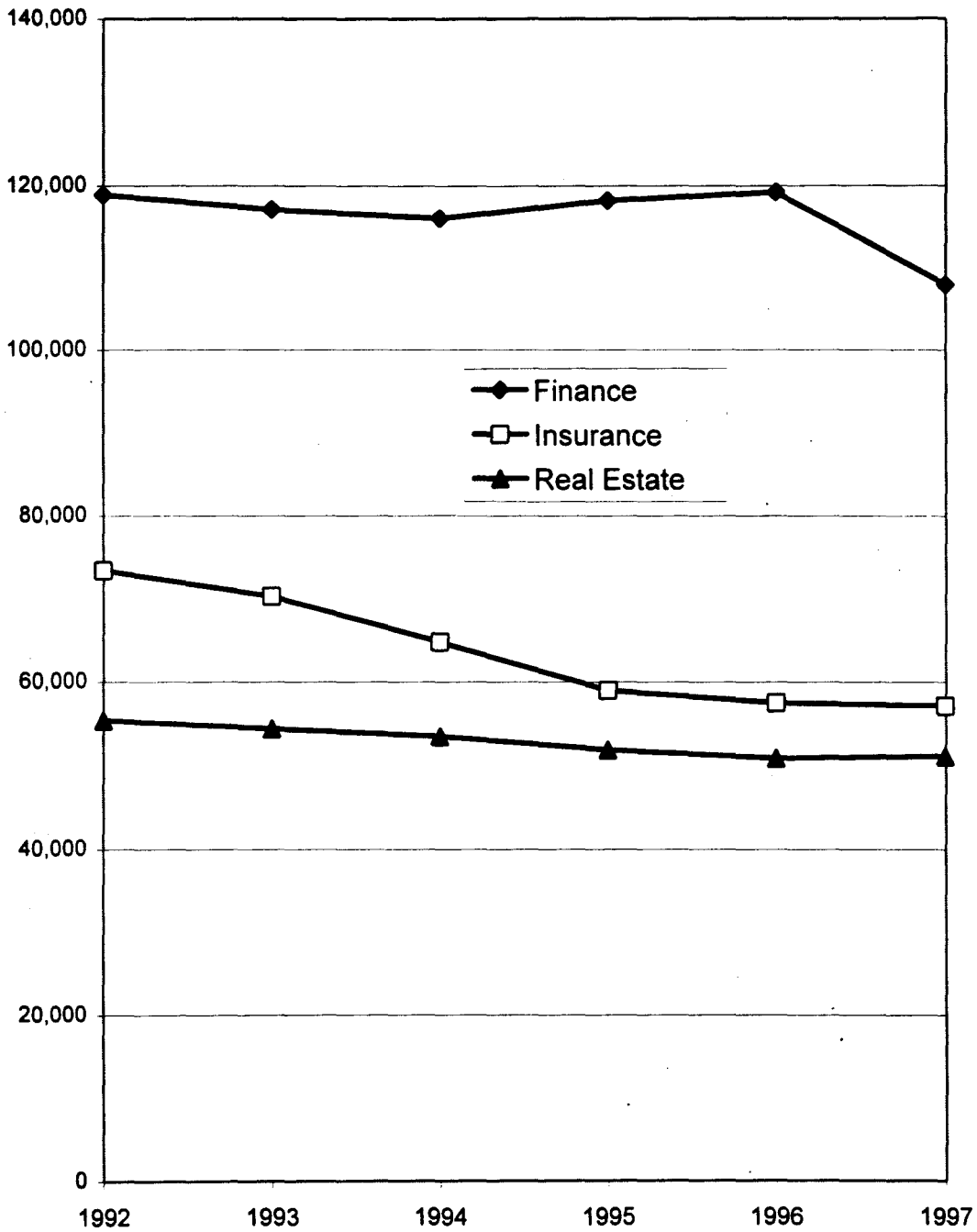
NON-DURABLE MANUFACTURING
Employment in Los Angeles County, 1992-1997



Source: California EDD, Labor Market Information Division

Figure 7

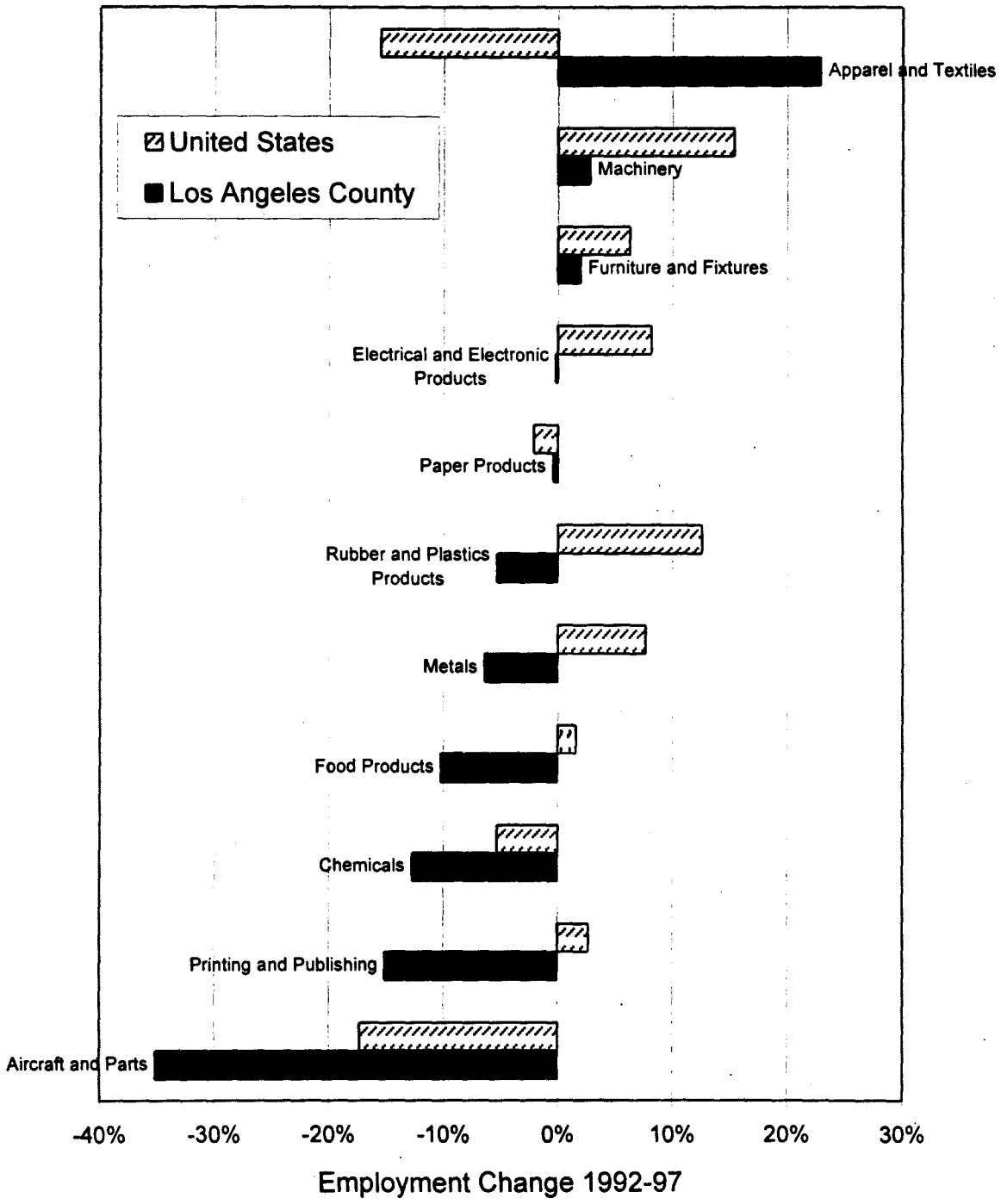
FINANCE, INSURANCE, AND REAL ESTATE
Employment in Los Angeles County, 1992-1997



Source: California EDD, Labor Market Information Division

Figure 8

EMPLOYMENT CHANGE IN MANUFACTURING INDUSTRIES
Los Angeles County and United States, 1992-97



Source: US Department of Labor; California EDD

Figure 9 compares LA County and US employment trends in 15 transportation, trade, finance, and service industries. National employment grew in each of these industries between 1992 and 1997. On the other hand, employment in Los Angeles County increased in 8 industries, but declined in 7 industries.

Only in the motion pictures and water transportation industries did jobs grow at a faster rate in Los Angeles County than in the nation. The national employment growth rate exceeded the county growth rate in several industries, including business services, transportation services, auto dealers and service stations, hotels and other lodging places, eating and drinking places, wholesale trade (non-durable goods), and food stores. In the remaining industries, jobs grew nationally but declined in Los Angeles County. This group includes insurance, finance, real estate, general merchandise stores, wholesale trade (durable goods), engineering and management services, and health services.

A.3 Employment Trends in the Gateway Cities

Estimating 1992-97 Employment Change and 1997 Employment by Industry in the Gateway Cities

We used the following procedure to estimate 1997 employment in Gateway Cities industries. First, 1992 employment in the Gateway Cities was used as a benchmark (see Table 1). This data is taken from the comprehensive Industrial and Commercial Employer (ICE) database compiled by the Employment Development Department (EDD) from employer payroll tax returns in the third quarter of 1992. Then, we used 1992-97 employment change for each industry in Los Angeles County to estimate 1997 employment and the number of jobs lost or gained between 1992 and 1997 in Gateway Cities industries.

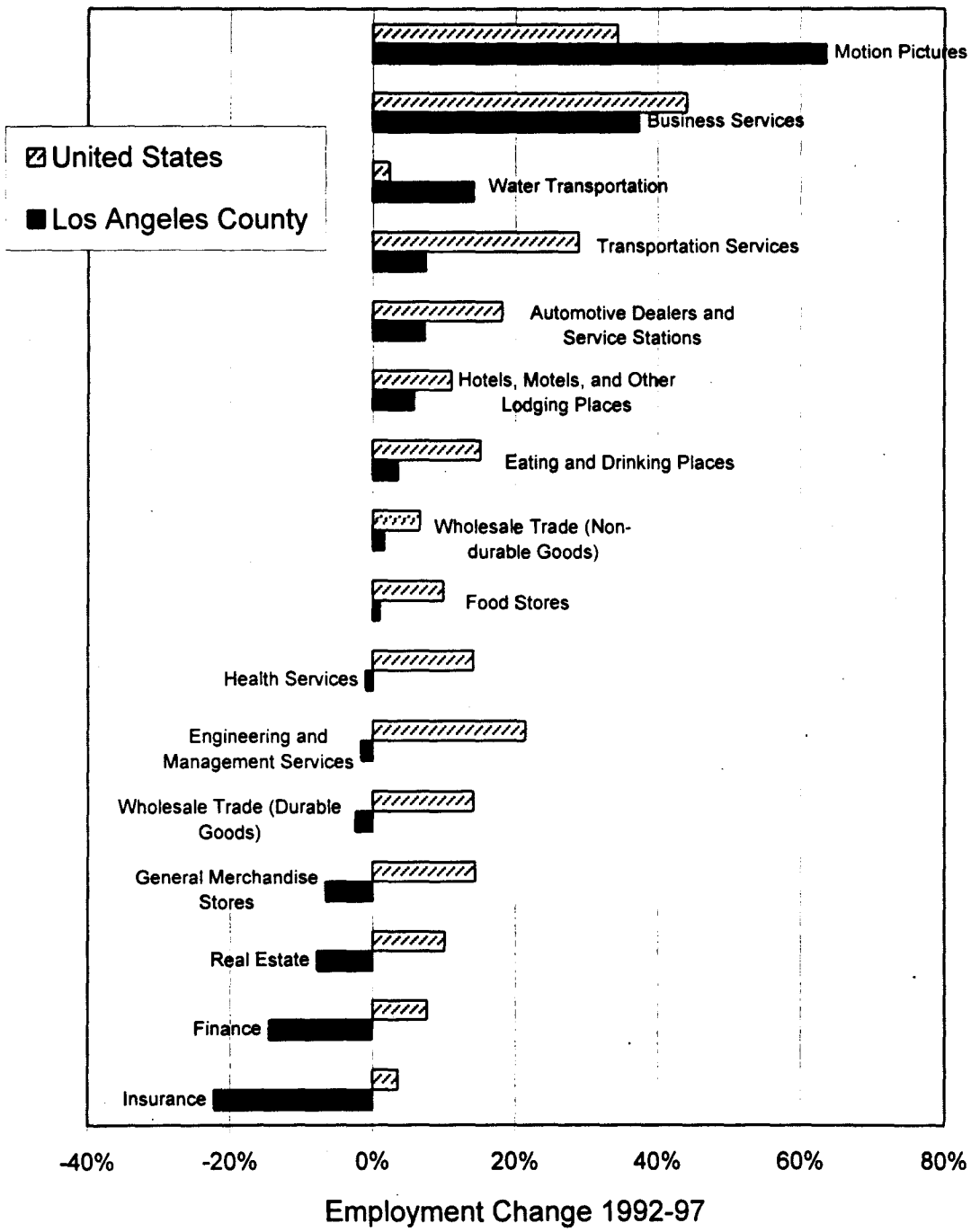
Industry Employment Change in the Gateway Cities, 1992-1997

Table 2 shows estimated employment change and 1997 employment in Gateway Cities industries. Job loss was greatest in the aerospace industries. We estimate that 17,900 jobs were lost in the aircraft industry. Other industries losing at least 1,000 jobs between 1992 and 1997 were finance (-1,700), food products (-1,500), insurance (-1,300), metals (-1,300), search and navigation equipment (-1,200), and printing and publishing (-1,100).

Each of these industries paid above average wages and salaries. In 1992, the average annual earnings of workers in the Gateway Cities aircraft industry was $43,600, 51 percent higher than average annual payroll of $28,800 in all Gateway Cities industries. Workers in the search and navigation industry earned

Figure 9

EMPLOYMENT CHANGE IN TRANSPORTATION, TRADE, FINANCE, AND SERVICE INDUSTRIES
Los Angeles County and United States, 1992-97



Source: US Department of Labor; California EDD

Table 1

GATEWAY CITIES

1992 Employment in Major Industry Groups

SIC	Industry Group	Employment	Percent of Gateway Cities Employment	Employment Concentration
	MANUFACTURING	*185,487*	*27.5%*	*1.40*
20	Food Products	14,878	2.2%	1.70
22, 23	Apparel and Textiles	19,502	2.9%	0.85
24	Lumber and Wood Products	2,290	0.3%	1.55
25	Furniture and Fixtures	6,778	1.0%	1.44
26	Paper Products	7,325	1.1%	2.72
27	Printing and Publishing	7,029	1.0%	0.69
28	Chemicals	6,179	0.9%	1.53
29	Petroleum Products	3,672	0.5%	2.35
30	Rubber and Plastics Products	6,618	1.0%	1.40
32	Stone, Clay, and Glass Products	4,571	0.7%	1.89
33, 34	Metals	20,549	3.0%	1.79
35 (exc. 357)	Machinery	10,962	1.6%	1.63
36	Electrical and Electronic Products	6,779	1.0%	0.77
371	Motor Vehicles and Parts	3,438	0.5%	1.38
373	Ship and Boat Building and Repairing	4,285	0.6%	4.27
372	Aircraft and Parts	51,104	7.6%	2.71
376	Guided Missiles, Space Vehicles, and Parts	835	0.1%	0.41
381	Search and Navigation Equipment	2,190	0.3%	0.27
	Aerospace	54,129	8.0%	1.87
39	Miscellaneous Manufacturing	2,648	0.4%	0.89
	TRANSPORTATION	*30,246*	*4.5%*	*1.18*
42	Trucking and Warehousing	19,679	2.9%	2.43
44	Water Transportation	2,089	0.3%	1.55
47	Transportation Services	4,086	0.6%	1.01
	WHOLESALE TRADE	*72,433*	*10.7%*	*1.58*
50	Wholesale Trade (Durable Goods)	41,063	6.1%	1.65
51	Wholesale Trade (Non-durable Goods)	31,370	4.7%	1.45
	RETAIL TRADE	*103,093*	*15.3%*	*0.99*
53	General Merchandise Stores	12,664	1.9%	1.17
54	Food Stores	16,935	2.5%	1.14
55	Automotive Dealers and Service Stations	11,698	1.7%	1.24
58	Eating and Drinking Places	33,081	4.9%	0.86
	FINANCE, INSURANCE, AND REAL ESTATE	*23,440*	*3.5%*	*0.53*
60-62, 67	Finance	11,903	1.8%	0.52
63, 64	Insurance	6,059	0.9%	0.50
65	Real Estate	5,478	0.8%	0.58

Source: California EDD, Labor Market Information Division

Table 1

SIC	Industry Group	Employment	Percent of Gateway Cities Employment	Employment Concentration
	SERVICES	*192,401*	*28.5%*	*0.77*
70	Hotels, Motels, and Other Lodging Places	4,429	0.7%	0.66
72	Personal Services	5,954	0.9%	0.95
73	Business Services	37,098	5.5%	0.79
75	Auto Repair, Services, and Parking	6,580	1.0%	0.85
76	Miscellaneous Repair Services	4,034	0.6%	1.54
78	Motion Pictures	1,656	0.2%	0.14
79	Amusement and Recreation Services	6,502	1.0%	0.60
80	Health Services	54,125	8.0%	0.99
87	Engineering and Management Services	7,657	1.1%	0.42
	ALL INDUSTRIES	**674,368**		

Source: California EDD, Labor Market Information Division

Table 2

GATEWAY CITIES

Estimated 1992-97 Employment Change and 1997 Employment by Industry

SIC	Industry Group	Employment 1992	Estimated Job Change 1992-97 *Percent*	Estimated Job Change 1992-1997 *Number*	Estimated Employment 1997
	MANUFACTURING				
20	Food Products	14,878	-10.2%	-1,518	13,360
22, 23	Apparel and Textiles	19,502	22.9%	4,466	23,968
24	Lumber and Wood Products	2,290	18.6%	426	2,716
25	Furniture and Fixtures	6,778	2.0%	136	6,914
26	Paper Products	7,325	-0.4%	-29	7,296
27	Printing and Publishing	7,029	-15.1%	-1,061	5,968
28	Chemicals	6,179	-12.7%	-785	5,394
29	Petroleum Products	3,672	-28.3%	-1,039	2,633
30	Rubber and Plastics Products	6,618	-5.3%	-351	6,267
32	Stone, Clay, and Glass Products	4,571	-11.3%	-517	4,054
33, 34	Metals	20,549	-6.4%	-1,315	19,234
35 (exc. 357)	Machinery	10,962	2.8%	307	11,269
36	Electrical and Electronic Products	6,779	-0.2%	-14	6,765
371	Motor Vehicles and Parts	3,438	-3.8%	-131	3,307
373	Ship and Boat Building and Repairing	4,285	-49.3%	-2,113	2,172
372	Aircraft and Parts	51,104	-35.1%	-17,938	33,166
376	Guided Missiles, Space Vehicles, and Parts	835	-28.6%	-239	596
381	Search and Navigation Equipment	2,190	-54.6%	-1,196	994
39	Miscellaneous Manufacturing	2,648	6.9%	183	2,831
	TRANSPORTATION				
42	Trucking and Warehousing	19,679	6.8%*	1,338	21,017
44	Water Transportation	2,089	14.2%	297	2,386
47	Transportation Services	4,086	7.4%	302	4,388
	WHOLESALE TRADE				
50	Wholesale Trade (Durable Goods)	41,063	-2.4%	-986	40,077
51	Wholesale Trade (Non-durable Goods)	31,370	1.6%	502	31,872
	RETAIL TRADE				
53	General Merchandise Stores	12,664	-6.6%	-836	11,828
54	Food Stores	16,935	1.0%	169	17,104
55	Automotive Dealers and Service Stations	11,698	7.3%	854	12,552
58	Eating and Drinking Places	33,081	3.5%	1,158	34,239
	FINANCE, INSURANCE, AND REAL ESTATE				
60-62, 67	Finance	11,903	-14.5%	-1,726	10,177
63, 64	Insurance	6,059	-22.2%	-1,345	4,714
65	Real Estate	5,478	-7.8%	-427	5,051

Source: California EDD, Labor Market Information Division

Table 2

SIC	Industry Group	Employment 1992	Estimated Job Change 1992-97 *Percent*	Estimated Job Change 1992-1997 *Number*	Estimated Employment 1997
	SERVICES				
70	Hotels, Motels, and Other Lodging Places	4,429	5.8%	257	4,686
72	Personal Services	5,954	-0.1%	-6	5,948
73	Business Services	37,098	37.4%	13,875	50,973
78	Motion Pictures	1,656	63.6%	1,053	2,709
79	Amusement and Recreation Services	6,502	3.6%	234	6,736
80	Health Services	54,125	-1.0%	-541	53,584
87	Engineering and Management Services	7,657	-1.6%	-123	7,534

*1992-96 employment change

Source: California EDD, Labor Market Information Division

an average of $51,000 per year, 77 percent higher than the Gateway Cities average. Average annual earnings in the other industries ranged from $29,500 in finance, to $33,900 in insurance.

We estimate that the greatest job growth occurred in business services (+13,900), apparel and textiles (+4,500), and eating and drinking places (+1,200). These industries pay among the lowest wages and salaries in the Gateway Cities. The average annual earnings of workers in business services were only $21,500 in 1992, 25 percent lower than the Gateway Cities average. The Gateway Cities had much higher employment in the low-wage business services (including employment supply agencies, building services, and miscellaneous business services), than in the high-wage business services (including advertising, and data processing and other computer services). Average annual earnings were also very low in the apparel and textiles industry ($18,400) and the eating and drinking industry ($9,900). The former industry depends on immigrant labor, while the latter industry is dominated by insecure part-time employment.

Figure 10 plots Gateway Cities manufacturing industries by employment change and average annual earnings. Average annual earnings were calculated from the 1992 ICE data (see Table 3). The earnings index is based on the average annual earnings of all Gateway Cities workers in 1992 ($28,757=1.00). This graph displays a disturbing pattern for the region: there was a direct relationship between average annual earnings and employment decline. Industries that paid the best wages and salaries experienced the greatest employment decline (e.g. the aerospace industries, petroleum, chemicals, and shipbuilding). On the other hand, most manufacturing industries adding workers between 1992 and 1997 paid below-average wages and salaries (e.g. apparel and textiles, furniture, lumber and wood products, and miscellaneous manufacturing[1]).

[1] Miscellaneous Manufacturing (SIC 39) includes manufacturers of toys, sporting goods, jewelry, office supplies, and other products not classified elsewhere.

Table 3

GATEWAY CITIES
1992 Average Annual Earnings by Industry Group

SIC	Industry Group	Average Annual Earnings 1992	Earnings Index (Gateway Cities=100)
	MANUFACTURING	*$32,872*	*114*
20	Food Products	$30,863	107
22, 23	Apparel and Textiles	$18,412	64
24	Lumber and Wood Products	$22,881	80
25	Furniture and Fixtures	$21,066	73
26	Paper Products	$32,733	114
27	Printing and Publishing	$30,274	105
28	Chemicals	$34,546	120
29	Petroleum Products	$48,619	169
30	Rubber and Plastics Products	$22,559	78
32	Stone, Clay, and Glass Products	$28,750	100
33, 34	Metals	$30,002	104
35 (exc. 357)	Machinery	$32,282	112
36	Electrical and Electronic Products	$27,753	97
371	Motor Vehicles and Parts	$27,606	96
373	Ship and Boat Building and Repairing	$38,678	134
372	Aircraft and Parts	$43,597	152
376	Guided Missiles, Space Vehicles, and Parts	$38,503	134
381	Search and Navigation Equipment	$50,978	177
	Aerospace	*$43,817*	*152*
39	Miscellaneous Manufacturing	$21,859	76
	TRANSPORTATION	*$30,661*	*107*
42	Trucking and Warehousing	$29,090	101
44	Water Transportation	$43,964	153
47	Transportation Services	$29,782	104
	WHOLESALE TRADE	*$33,670*	*117*
50	Wholesale Trade (Durable Goods)	$34,547	120
51	Wholesale Trade (Non-durable Goods)	$32,591	113
	RETAIL TRADE	*$17,294*	*60*
53	General Merchandise Stores	$14,751	51
54	Food Stores	$23,935	83
55	Automotive Dealers and Service Stations	$27,916	97
58	Eating and Drinking Places	$9,855	34

Source: California EDD, Labor Market Information Division

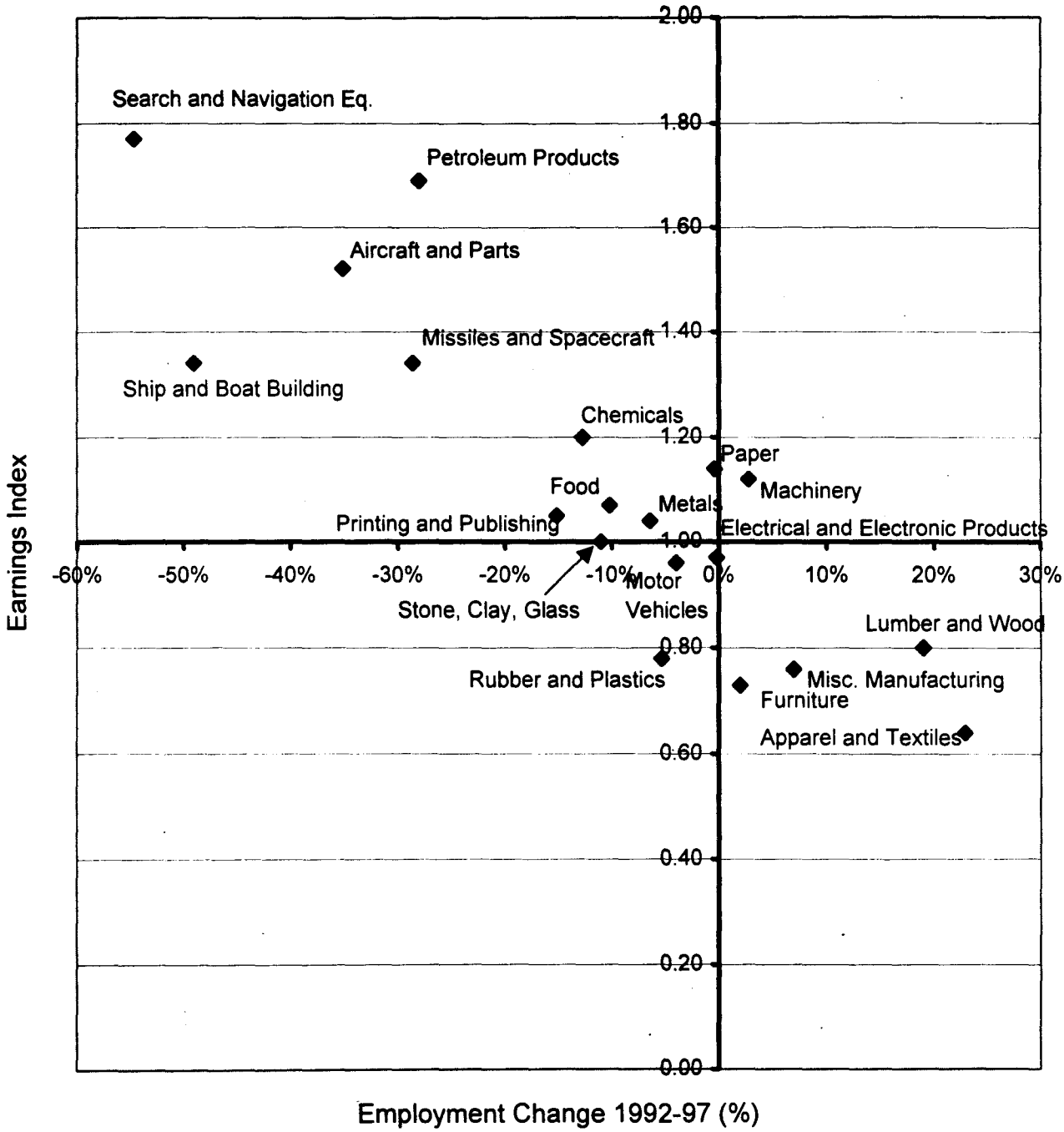
Table 3

SIC	Industry Group	Average Annual Earnings 1992	Earnings Index (Gateway Cities=100)
	FINANCE, INSURANCE, AND REAL ESTATE	*$28,683*	*100*
60-62, 67	Finance	$29,516	103
63, 64	Insurance	$33,925	118
65	Real Estate	$21,074	73
	SERVICES	*$26,937*	*94*
70	Hotels, Motels, and Other Lodging Places	$12,691	44
72	Personal Services	$15,757	55
73	Business Services	$21,454	75
75	Auto Repair, Services, and Parking	$24,795	86
76	Miscellaneous Repair Services	$28,825	100
78	Motion Pictures	$13,151	46
79	Amusement and Recreation Services	$16,604	58
80	Health Services	$34,130	119
87	Engineering and Management Services	$30,327	105
	ALL INDUSTRIES	**$28,757**	

Source: California EDD, Labor Market Information Division

Figure 10

GATEWAY CITIES MANUFACTURING INDUSTRIES
Employment Change and Average Earnings



Source: California EDD, Labor Market Information Division

has been found in the manufacturing sector, the attrition of jobs in high-wage manufacturing leaves the Gateway Cities with a shrinking number of high-wage jobs.

Figure 11 plots Gateway Cities transportation, trade, finance, and service industries by employment change and average annual earnings. Most growing industries paid relatively low wages and salaries (e.g. eating and drinking places, hotels and motels, amusement and recreation, motion pictures[2], and business services). The transportation and wholesale trade industries paid average to above average wages and salaries. However, these sectors accounted for only 15 percent of Gateway Cities employment in 1992, compared to the 25 percent employment share of low-wage retail trade and service industries.

In the Gateway Cities economy, the ratio of jobs in low-wage industries to jobs in high-wage industries is growing. Assume that "high-wage" industries are those with an earnings index greater than or equal to 1.20 ($34,500), and "low-wage" industries are those with an earnings index less than or equal to 0.80 ($23,000). Based on these criteria, high-wage industries in the Gateway Cities include:

- Chemicals
- Petroleum
- Shipbuilding
- Aircraft and Parts
- Guided Missiles and Space Vehicles
- Search and Navigation Equipment
- Water Transportation
- Wholesale Trade (Durable Goods)

Low-wage industries include:

- Apparel and Textiles
- Lumber and Wood Products
- Furniture
- Rubber and Plastics
- Miscellaneous Manufacturing
- General Merchandise Stores
- Eating and Drinking Places

[2] The average annual earnings of motion picture industry workers in the Gateway Cities were only $13,151 in 1992, compared to average Los Angeles County earnings in the industry of $54,241. The motion pictures industry (SIC 78) consists of two high-wage industries – motion picture production and motion picture distribution – and two low-wage industries – motion picture theaters and video stores. In Los Angeles County, 85 percent of motion pictures employment was in the high-wage industries. However, only 20 percent motion pictures employment in the Gateway Cities was found in the high-wage industries, which are concentrated in the Burbank-Hollywood-Westside areas of the county.

- Real Estate
- Hotels and Motels
- Personal Services
- Business Services
- Motion Pictures
- Amusement and Recreation Services

Note that most high-wage industries are found in the manufacturing sector, while most low-wage industries are found in the retail and service sectors.

Employment in high-wage industries fell from 111,400 to 87,400 (est.) between 1992 and 1997, a decline of 22 percent. On the other hand, employment in low-wage industries grew from 144,700 to 161,900 (est.), a 12 percent increase.

Thus, between 1992 and 1997, we estimate that the greatest job growth in the Gateway Cities occurred in industries paying low wages and salaries, while the greatest job losses occurred in industries paying average or high wages and salaries. In the Gateway Cities economy, skilled aircraft engineers, mechanics, and assemblers have been replaced by janitors, security guards, restaurant workers and sewing machine operators.

Estimated 1997 Employment in Gateway Cities Industries

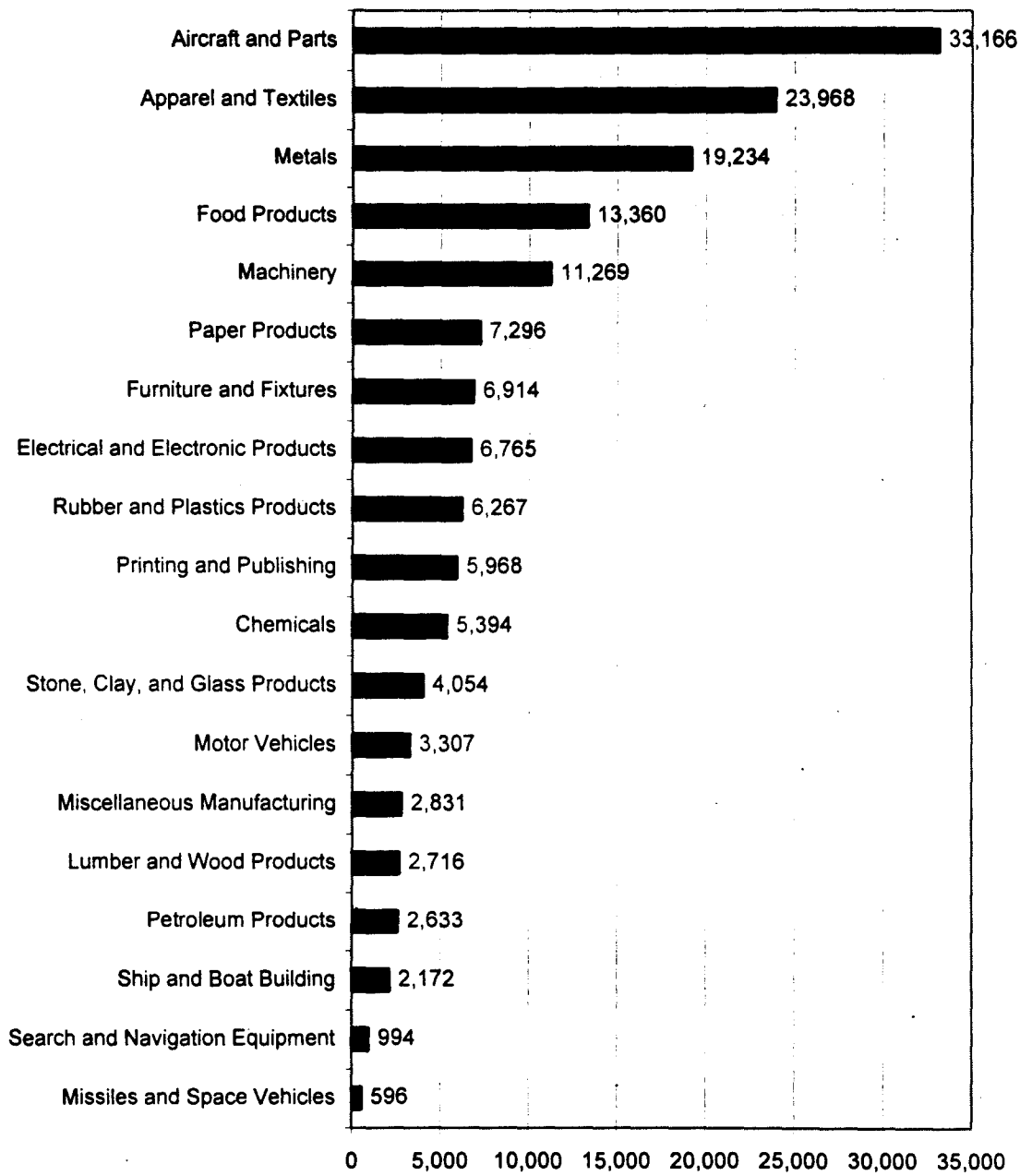
Figure 12 shows estimated 1997 employment in Gateway Cities manufacturing industries. Industries employing the most workers were aircraft and parts (33,200), apparel and textiles (24,000), metals (19,200), food products (13,400), and machinery (11,300).

Figure 13 plots Gateway Cities manufacturing industries based on employment change and employment concentration. For each industry, employment concentration is based on the ratio of the industry's employment share in the Gateway Cities in 1992 to the industry's share of Los Angeles County employment in 1992. A high employment concentration indicates regional specialization in the industry.

The upper-right quadrant shows growing industries that have a high employment concentration in the Gateway Cities. Only the machinery and furniture industries are included in this group. Apparel and textiles is a fast-growing industry in which the Gateway Cities have an average employment concentration. The upper-left quadrant shows declining industries with a high employment concentration in the Gateway Cities. These industries include aircraft and parts, metals, food products, chemicals, and rubber and plastics products.

Figure 12

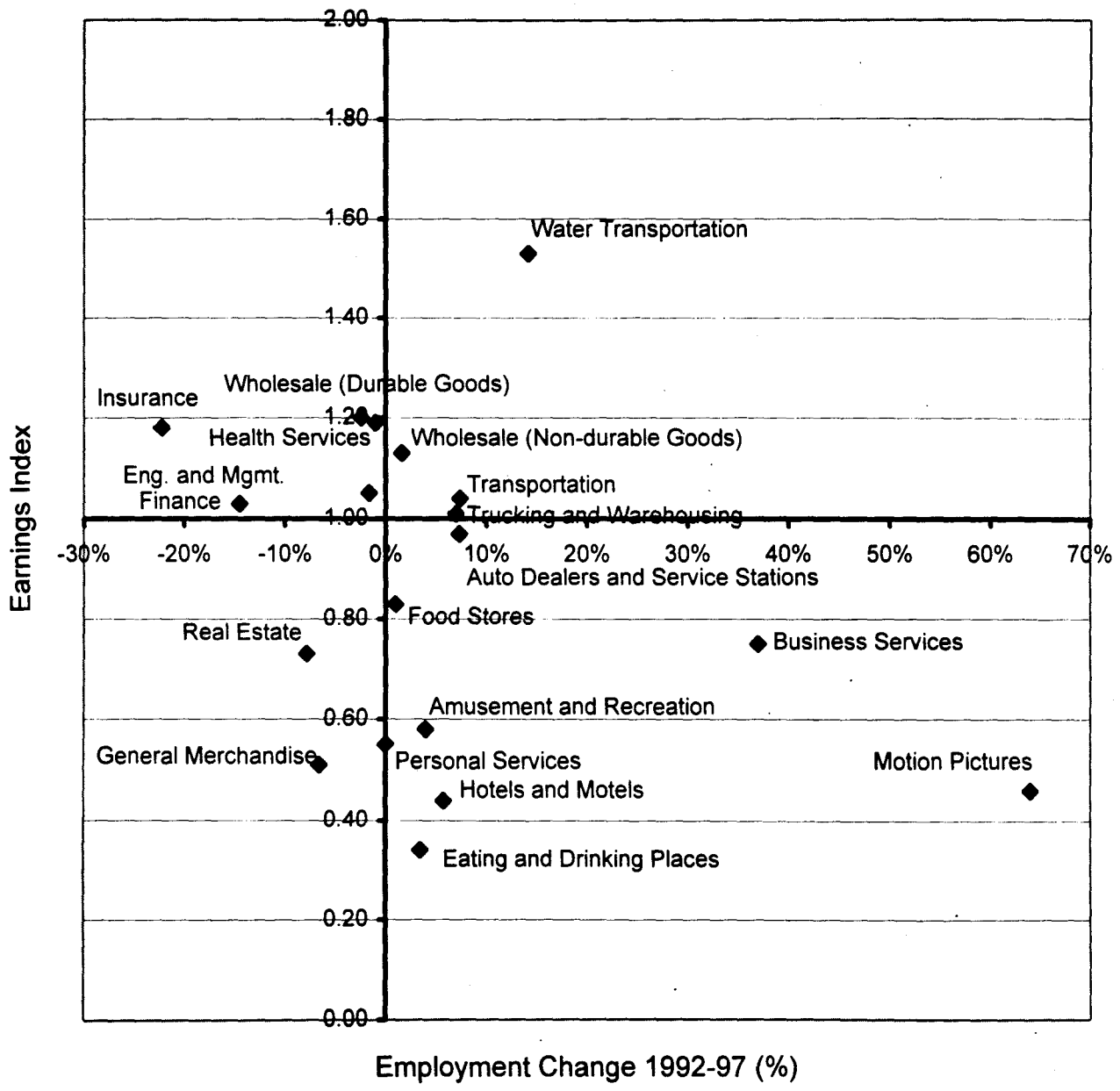
ESTIMATED 1997 EMPLOYMENT
Manufacturing Industries
Gateway Cities



Source: Derived by Economic Roundtable from California EDD data

Figure 11

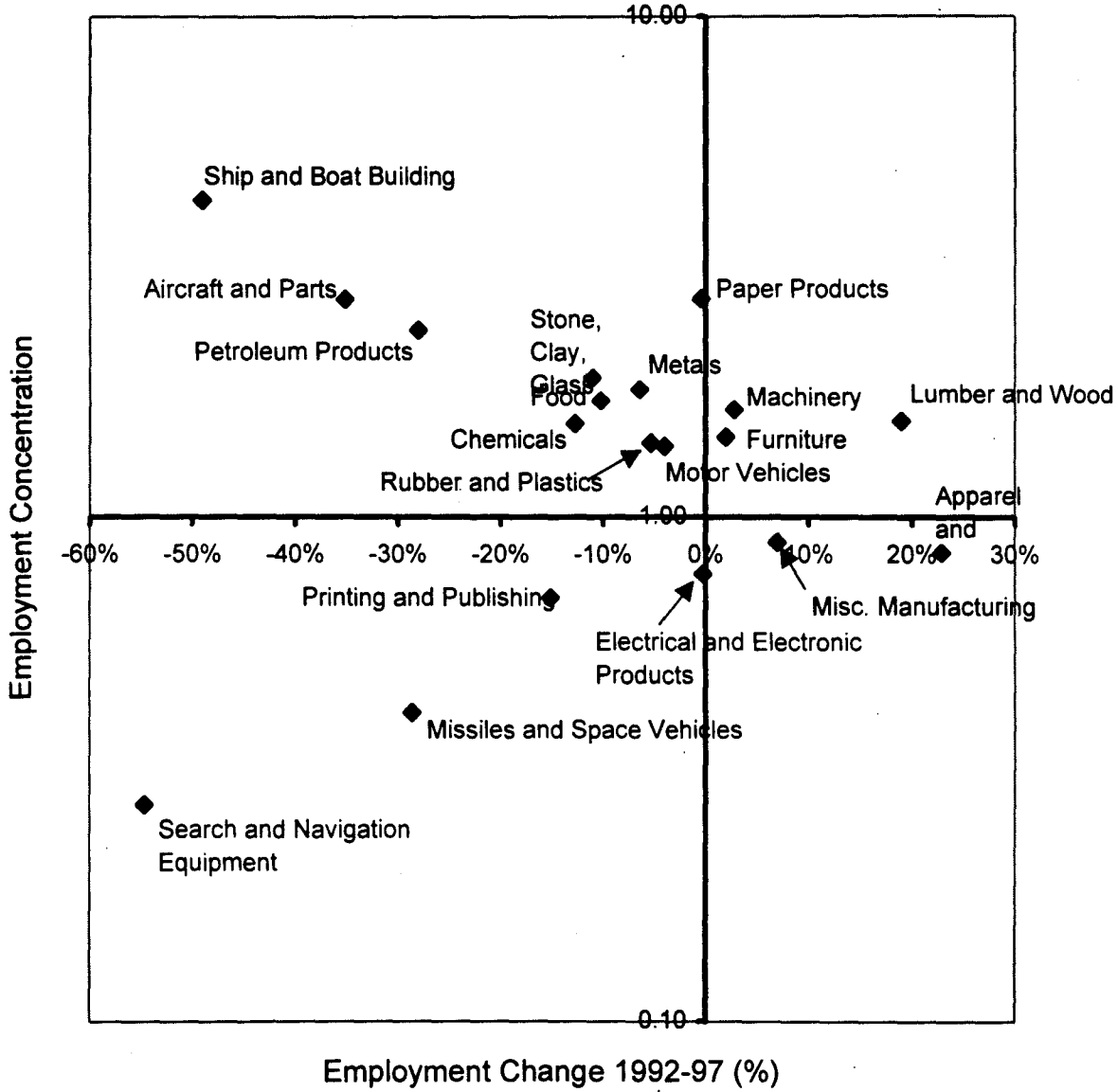
GATEWAY CITIES TRANSPORTATION, TRADE, FINANCE, AND SERVICE INDUSTRIES
Employment Change and Average Annual Earnings



Source: California EDD, Labor Market Information Division

Figure 13

GATEWAY CITIES MANUFACTURING INDUSTRIES
Employment Change and Employment Concentration



Source: Derived by Economic Roundtable from California EDD data

Figure 14 shows estimated 1997 employment in Gateway Cities transportation, trade, finance, and service industries. Industries with the highest employment were health services (53,600), business services (51,000), wholesale trade (durable goods) (40,100), eating and drinking places (34,200), and wholesale trade (non-durable goods) (31,900). Figure 15 plots these industries by employment change and employment concentration.

Estimated Total Employment in the Gateway Cities in 1997

Based on these industry employment trends, how has total employment changed in the Gateway Cities between 1992 and 1997? How does this compare with employment trends in the rest of Los Angeles County?

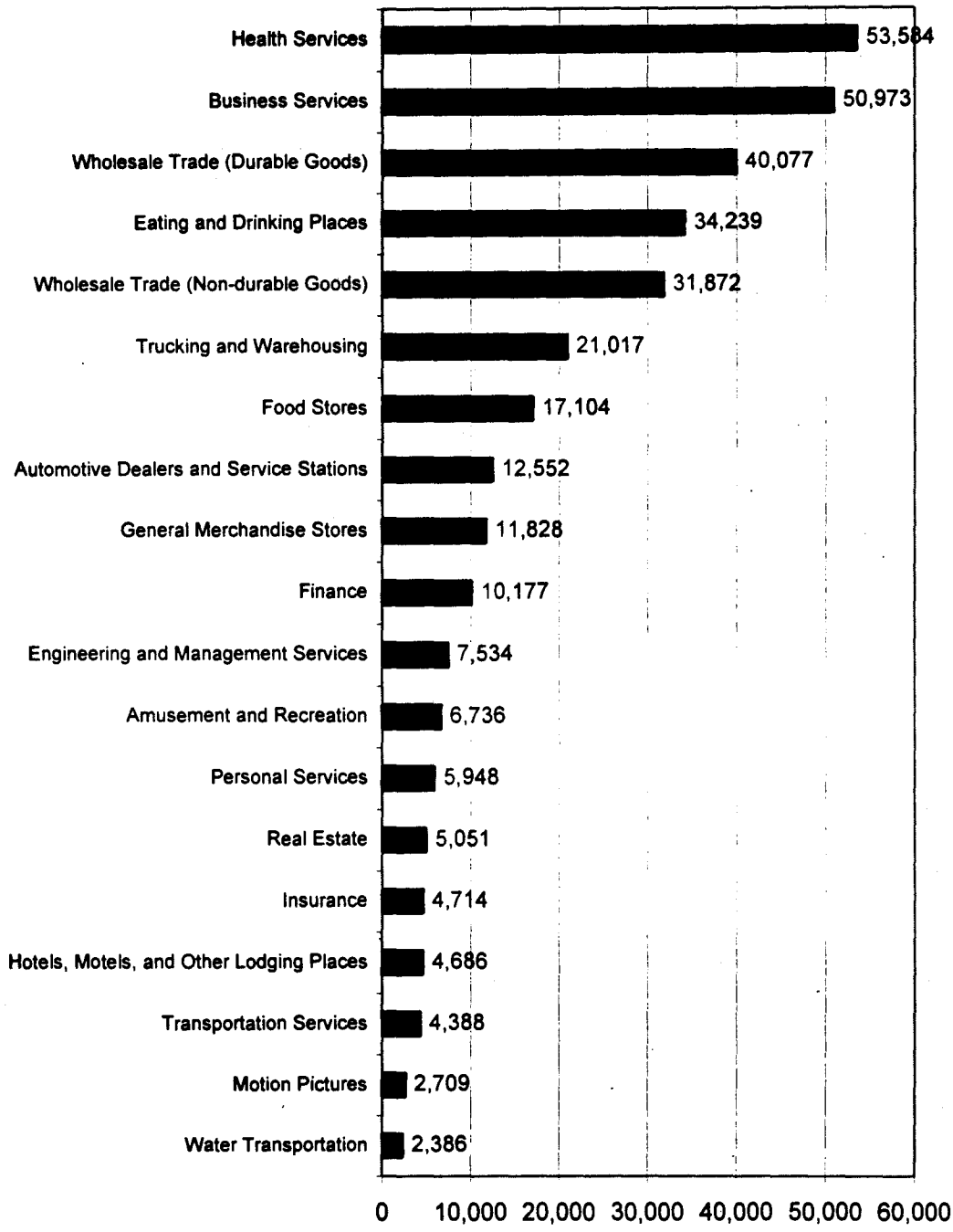
To estimate total employment in the Gateway Cities in 1997, we summed the estimated employment for each industry in 1997. Comparing the rate of employment change in the Gateway Cities with the rate of employment change in Los Angeles County shows the impact of different industry structures on overall employment trends. For example, if the Gateway Cities has a higher concentration of employment in growing industries than the county, we can expect its rate of employment change to be greater than that of the county. On the other hand, if the Gateway Cities has a higher concentration of employment in declining industries, we can expect a lower rate of employment change. This comparison assumes that industry employment has changed at the same rate both the Gateway Cities and Los Angeles County, and thus shows the effect of a different industry mix on total employment change.

Total industry employment in the Gateway Cities was 672,291 in 1992[3]. This figure is based on the comprehensive ICE data for the Gateway Cities compiled by the EDD. We estimate that total employment in 1997 was 660,923. This net loss of 11,368 jobs represents a 1.7 percent decline in total employment between 1992 and 1997 in the Gateway Cities. On the other hand, total employment in Los Angeles County grew from 3,813,500 in 1992 to 3,876,613 in 1997, a 1.7 percent increase. Subtracting Gateway Cities employment from total county employment yields an employment increase of 75,111 jobs in the "Rest of Los Angeles County", a 2.4 percent increase. Therefore, due to a higher concentration of employment in declining industries and a lower concentration of employment in growing industries, the Gateway Cities lost jobs between 1992 and 1997 while the rest of the county gained jobs.

[3] This includes all employees in establishments classified by industry. This figure is 2,077 (0.3%) below the total employment of 674,368 reported above for all Gateway Cities establishments, including those not classified by industry. The lower figure is used here to be consistent with the Los Angeles County industry employment data.

Figure 14

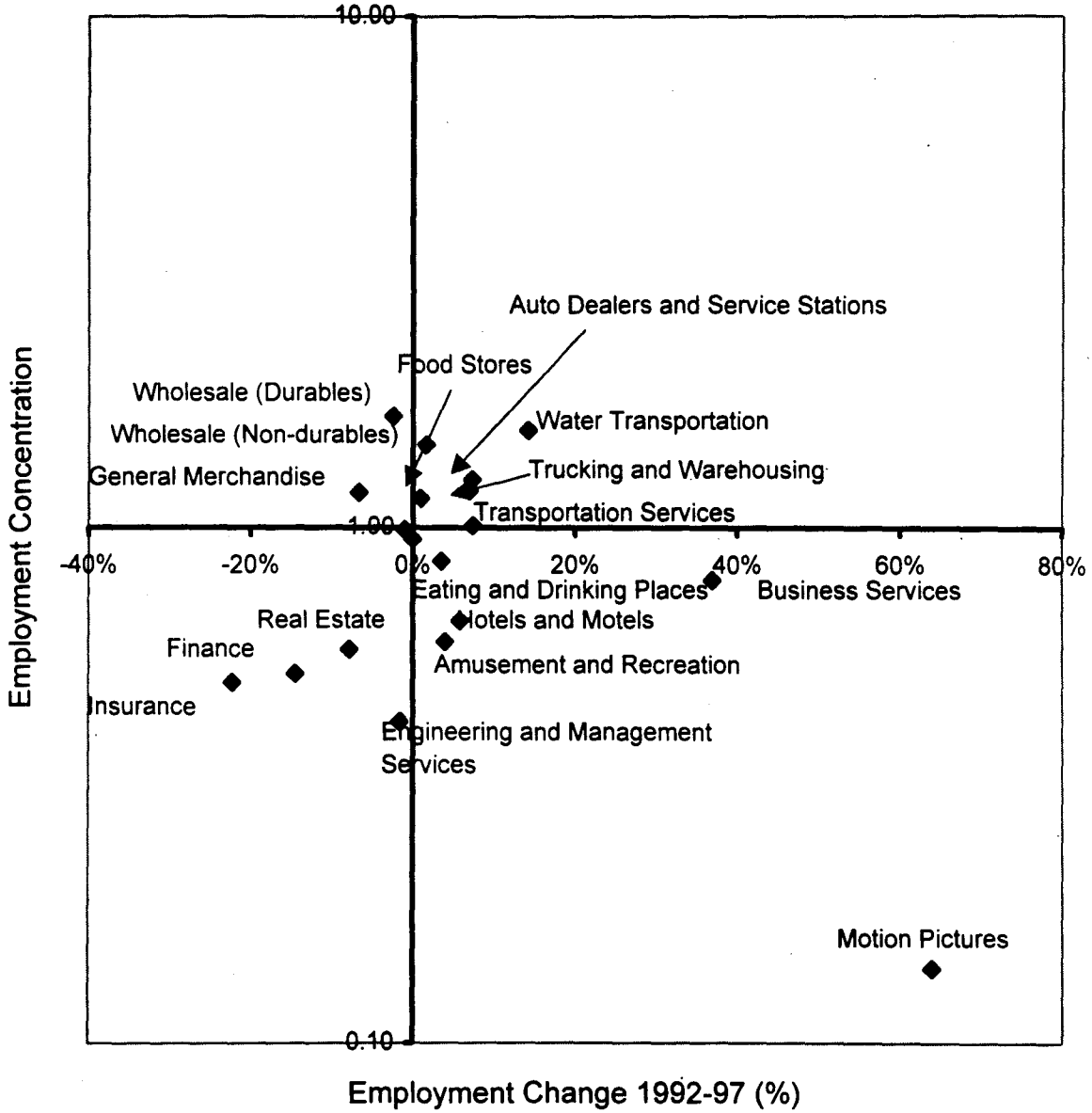
ESTIMATED 1997 EMPLOYMENT
Trade, Transportation, Finance, and Service Industries
Gateway Cities



Source: Derived by Economic Roundtable from California EDD data

Figure 15

GATEWAY CITIES TRANSPORTATION, TRADE, FINANCE, AND SERVICE INDUSTRIES
Employment Change and Employment Concentration



Source: Derived by Economic Roundtable from California EDD data

Tables 3 and 4 show Gateway Cities employment concentration in the fastest growing and fastest declining industry groups in Los Angeles County between 1992 and 1997. The Gateway Cities had a high concentration of employment in the declining aircraft and parts industry, but low employment concentrations in the fast-growing business services and motion pictures industries. For the county as a whole, 2.8 jobs were created in these industries for every one job lost in the aircraft industry. However, we estimate that only 0.9 jobs were created in business services and motion pictures in the Gateway Cities for every job lost in the aircraft industry. Due to the different regional geographies of growing and declining industries in Los Angeles County, the Gateway Cities was harder hit by aircraft industry layoffs, and did not reap the level of job growth experienced by areas of the county with higher employment concentrations in business services and motion pictures.

Summary

Since the 1970s, two episodes of industrial restructuring have had a serious impact on the health of the Gateway Cities economy. The closure of automobile, steel, and tire factories in the late 1970s and early 1980s resulted in the loss of thousands of jobs paying good wages and salaries. The recent restructuring of the aerospace industry has likewise left thousands of workers without good jobs. Growing industries such as business services and apparel manufacturing tend to pay below average wages and salaries. The fastest growing industry in the region – motion pictures – employs relatively few workers in the Gateway Cities. Because the Gateway Cities has a high concentration of employment in industries experiencing employment decline in Los Angeles County, we estimate that total employment in the Gateway Cities declined by 11,400 jobs (1.7 percent) between 1992 and 1997, but grew in Los Angeles County. To compound the problem, the employment share of high-wage industries has fallen considerably, while the employment share of low-wage industries has grown.

Table 4

Gateway Cities Employment and Employment Concentration in Fastest Growing and Declining Industries in Los Angeles County

Fastest-declining industries	*Percent Job Loss in LA County 1992-97*	*Gateway Cities Jobs and Employment Concentration in 1992*	*Fastest-Growing Industries*	*Percent Job Gain in LA County 1992-97*	*Gateway Cities Jobs and Employment Concentration in 1992*
Missiles and Space Vehicles	-54.6%	835 (0.32)	Motion Pictures	63.6%	1,656 (0.14)
Ship and Boat Building	-49.3%	4,285 (4.27)	Other Transportation Equipment*	60.0%	305 (1.67)
Aircraft and Parts	-35.1%	51,104 (2.72)	Business Services	37.4%	38,510 (0.82)
Measuring and Controlling Devices	-29.0%	1,870 (1.08)	Textiles	36.8%	3,822 (1.97)
Search and Navigation Eq.	-28.6%	2,190 (0.24)	Air Transportation	25.2%	1,837 (0.25)
Petroleum Products	-28.3%	3,672 (2.35)	Apparel	21.4%	15,680 (0.76)
Mining	-25.5%	1,844 (1.42)	Lumber and Wood Products	18.6%	2,290 (1.50)
Depository Institutions	-23.6%	8,850 (0.56)	Water Transportation	14.2%	2,089 (1.30)
Insurance	-22.2%	6,080 (0.51)	Investment Offices	12.5%	1,165 (0.74)
Printing and Publishing	-15.1%	7,354 (0.74)	General Construction	10.0%	2,584 (0.62)

*Includes Railroad Equipment (SIC 374), Motorcycles, Bicycles, and Parts (SIC 375), and Miscellaneous Transportation Equipment (SIC 379).

Table 5

Gateway Cities Employment and Employment Concentration in Industries with Greatest Job Growth and Job Loss in Los Angeles County

Industries with Greatest Job Loss 1992-97	*Job Loss in LA County 1992-97*	*Gateway Cities Jobs and Employment Concentration in 1992*	*Industries with Greatest Job Gain 1992-97*	*Job Gain in LA County 1992-97*	*Gateway Cities Jobs and Employment Concentration in 1992*
Aircraft and Parts	-33,463	51,104 (2.72)	Business Services	85,625	38,510 (0.82)
Depository Institutions	-20,213	8,850 (0.56)	Motion Pictures	56,988	1,656 (0.14)
Insurance	-16,275	6,080 (0.51)	Apparel	21,075	15,680 (0.76)
Government	-15,188	23,913 (0.93)	Education	17,950	48,835 (0.88)
Search and Navigation Eq.	-14,238	2,190 (0.24)	Other Services*	11,100	32,647 (0.72)
Printing and Publishing	-8,338	7,354 (0.74)	Air Transportation	10,375	1,837 (0.25)
Apparel Stores	-6,138	5,809 (0.85)	Eating and Drinking Places	7,400	34,013 (0.87)
Missiles and Space Vehicles	-5,300	835 (0.32)	Auto Dealers and Gas Stations	3,913	12,144 (1.29)
Food Products	-4,850	15,315 (1.77)	Textiles	3,825	3,822 (1.97)
Trucking and Warehousing	-4,788	20,768 (2.50)	Other Transportation Services**	2,888	6,649 (0.90)

*Includes Auto Repair, Services, and Parking (SIC 75), Miscellaneous Repair Services (SIC 76), Amusement and Recreation (SIC 79), Legal Services (SIC 81), Social Services (SIC 83), Museums, Botanical and Zoological Gardens (SIC 84), Membership Organizations (SIC 86), and Private Households (SIC 88), and Services Not Elsewhere Classified (SIC 89).

**Includes Local and Interurban Passenger Transit (SIC 41), Pipelines (SIC 46), and Transportation Services (SIC 47).

B. DEFENSE CONTRACTS

Trends in defense contracts to companies located in the Gateway Cities are shown in Figures 16, 17, and 18. Figure 16 shows the number of firms receiving Department of Defense contacts in the Gateway Cities and Los Angeles County between 1987 and 1996. In the Gateway Cities, the number of firms receiving defense contracts fell from 385 in 1987 to 261 in 1996, a 32 percent decline. The number of firms in Los Angeles County receiving defense contracts fell from 1,551 in 1987 to 1,103 in 1996, a 29 percent decline.

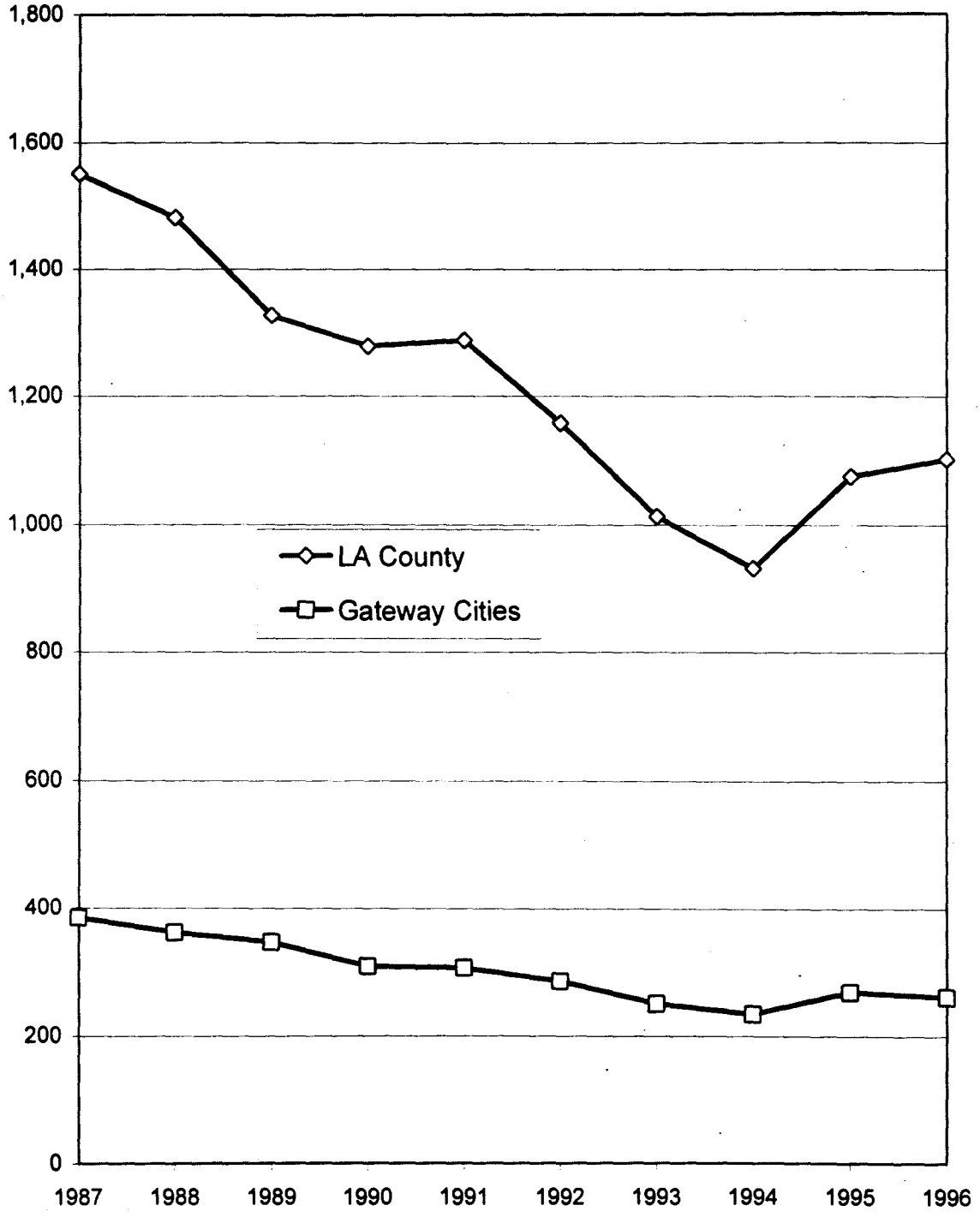
Since 1994, the rest of the county has out-performed the Gateway Cities in number of firms awarded contracts. Between 1994 and 1996, the number of Gateway Cities firms receiving defense contracts grew by 11 percent. However, the number of firms in Los Angeles County receiving defense contracts grew by 18 percent between 1994 and 1996. This includes a 21 percent increase in Los Angeles County excluding the Gateway Cities.

Figure 17 shows the value of defense contracts awarded to firms in the Gateway Cities between 1987 and 1996. The value of defense contracts grew from $2.63 billion in 1987 to $4.12 billion in 1996, a 57 increase. Thus, although the number of firms receiving contracts declined, and tens of thousands of workers lost their jobs, the value of defense contracts awarded to Gateway Cities firms increased during the 1987-96 period. However, between 1994 and 1996 the value of defense contracts fell from $7.20 billion to $4.12 billion, a 43 percent decrease.

Two firms dominated defense contacts in the Gateway Cities: McDonnell Douglas (Long Beach) and Northrop Grumman (Pico Rivera) (Figure 18). The value of McDonnell Douglas contracts increased from $1.32 billion in 1987 to $2.74 in 1996, a 108 percent increase. However, the value of McDonnell Douglas contracts fell from a peak of $3.33 billion in 1994 to $2.74 billion in 1996, an 18 percent decrease. The value of Northrop Grumman contracts fell from $3.07 billion in 1991 to $0.98 billion in 1996, a 68 percent decline. The peak value of Northrop Grumman contracts in the Gateway Cities was $4.90 billion in 1992.

Figure 16

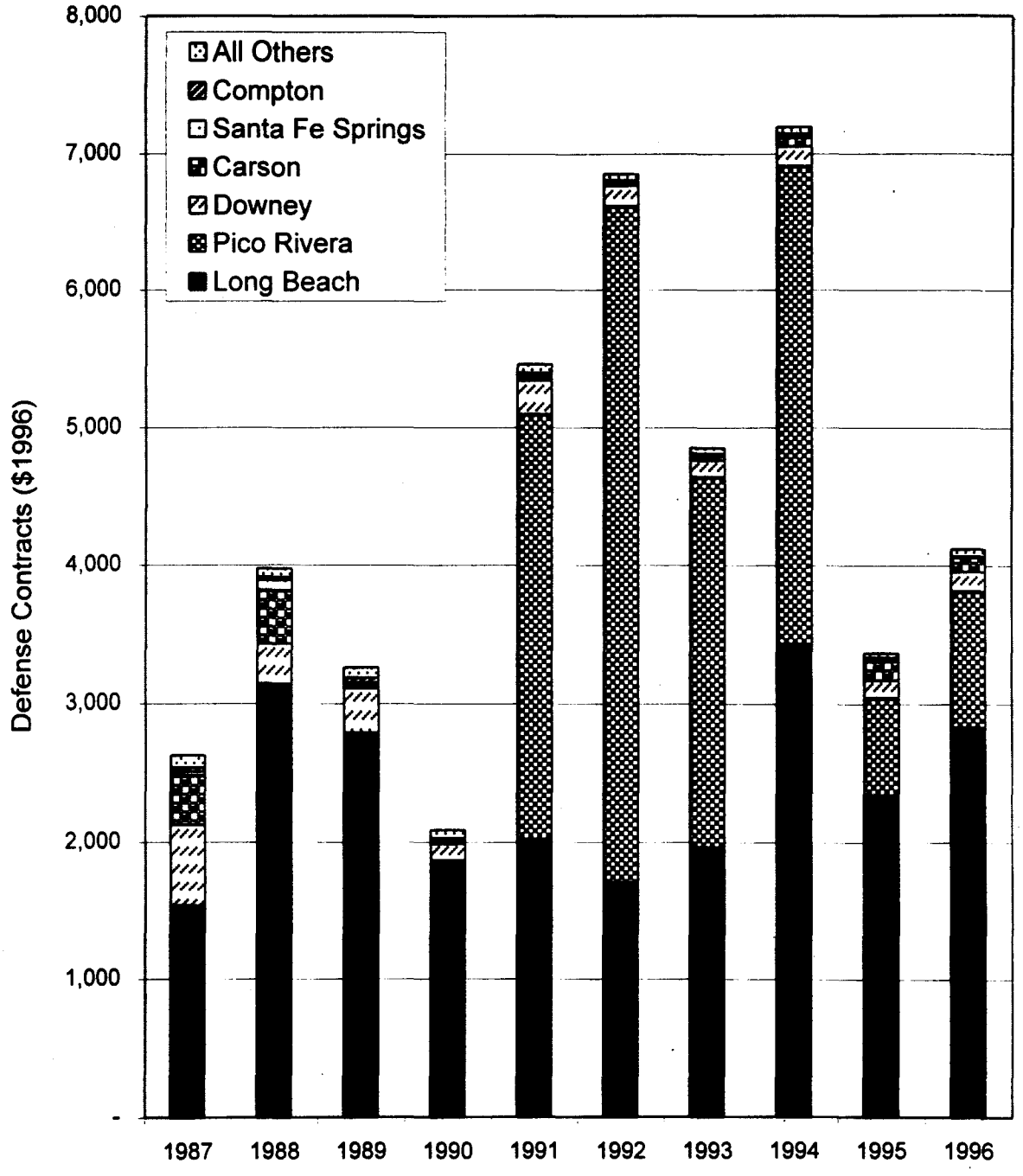
NUMBER OF FIRMS RECEIVING CONTRACTS
Los Angeles County and Gateway Cities, 1987-1996



Source: Derived from Department of Defense data by Beltramo and Associates

Figure 17

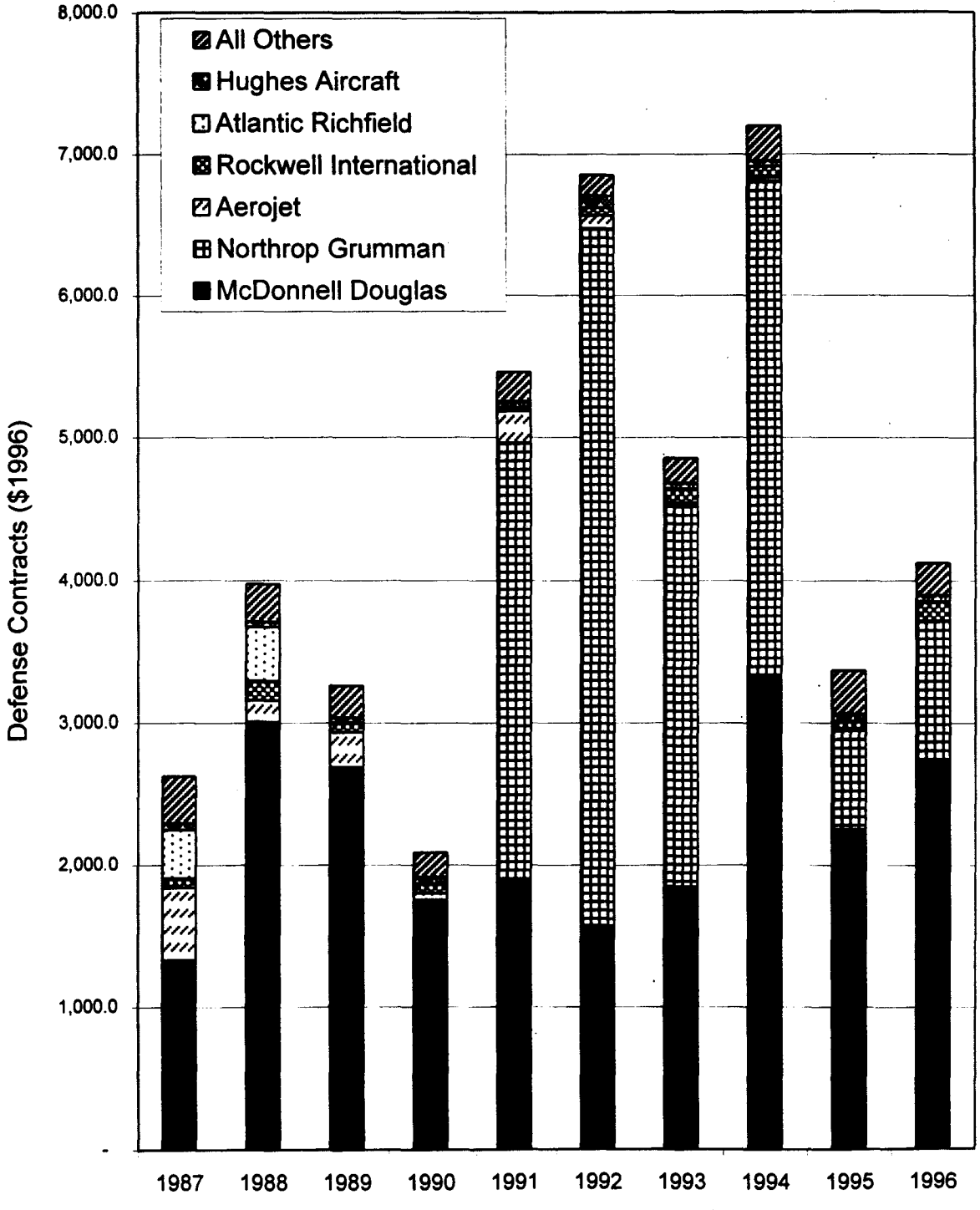
DEFENSE CONTRACTS TO GATEWAY CITIES
1987-1996



Source: Derived from Department of Defense data by Beltramo and Associates

Figure 18

DEFENSE CONTRACTS TO FIRMS IN GATEWAY CITIES 1987-1996



Source: Derived from Department of Defense data by Beltramo and Associates

C. INPUT-OUTPUT ANALYSIS

C.1 Introduction to Input-Output Analysis

This section of the report presents results of an input-output study of the Gateway Cities economy. The purpose of this analysis is to determine the impacts of production in three Gateway Cities industry groups -- aerospace, machinery, and metals -- on employment and output throughout the economy.

Multipliers were determined by conducting an input-output analysis of the Gateway Cities economy. Input-output analysis provides a general theory of production based on the interdependence between industries within an economy. The technique is based on the fundamental notion that the production of any commodity requires inputs from many different sectors within the economy. Input-output analysis traces the interconnections between sectors by recording all the purchases and sales between them over a given period, typically a year. These flows of goods and services are then used to construct a detailed picture of inter-industry relationships. Combining industrial linkages with other information on employment and output allows a wide variety of diagnostic measures of the economy to be derived. Some of the most useful such measures are multipliers.

C.2 Multipliers

Multiplier analysis is used to estimate the regional economic impacts resulting from a specified change in demand for a commodity or group of commodities. Typically, three types of economic "effects" are identified:

- *Direct Effects* are production changes associated with the immediate effects of final demand changes. For example, if consumer spending on commodity A increases by one million dollars, then the industry producing commodity A must expand output by one million dollars.

- *Indirect Effects* are production changes in industries that make inputs consumed by sectors experiencing direct effects. For example, if the output of commodity A expands by one million dollars, and if commodities B and C are used as inputs in the production of commodity A, then the output of commodities B and C will also increase with an expansion in demand for commodity A. The production of commodities B and C also consumes inputs that have to be produced, and so this multiplier process continues across many sectors and rounds of production.

- *Induced Effects* are production changes that result from increased consumer spending throughout the regional economy. Labor is an input in all sectors of the economy. As direct and indirect effects demand greater volumes of output be produced within the economy, so additional labor is used. A portion of the

wages received by workers performing this labor is spent within the region, thus stimulating further demand.

These three types of economic impacts may be summed together to reveal the Total Effect of a change in final demand on the regional economy.

Two common multipliers used in input-output analysis are the output and employment multipliers. These multipliers are defined as Total Effects divided by Direct Effects, where Total Effects are the sum of Direct, Indirect, and Induced Effects, and thus show how much a change in economic activity in one industry impacts the rest of the economy. For example, an output multiplier of 3.5 for industry A means that every $1.00 of output in industry A requires the output of an additional $2.50 of output in the economy as a whole. An employment multiplier of 14.3 in industry B means that each job (or unit of employment) in the industry is supported by an additional 13.3 jobs (units of employment) throughout the economy as a whole.

C.3 The Gateway Cities Aerospace Industry: Output and Employment Multipliers

Output Multipliers

The aerospace industry includes aircraft and parts (SIC 372), guided missiles and space vehicles (SIC 376), and search and navigation equipment (SIC 381). In the Gateway Cities, 94 percent of aerospace employment in 1992 was in the aircraft and parts industry.

The aerospace industry generated an estimated $10.64 billion of output in the Gateway Cities in 1992. An additional $3.10 billion of indirect output was produced in firms providing inputs to Gateway Cities aerospace firms, and $3.75 billion of output was created in industries to meet the demand for goods and services by aerospace workers employed in the Gateway Cities. The direct, indirect, and induced output of the Gateway Cities aerospace industry was $17.50 billion, yielding an output multiplier of 1.64. For every dollar of output in the Gateway Cities aerospace industry, an additional $.64 of output was generated throughout the economy.

Table 6 ranks industries by total output effect. Of the $17.50 billion of total output produced by the Gateway Cities aerospace industry, 59.8 percent was produced directly by aerospace firms. After aerospace, the industries in which the most output was created through input-output linkages included scientific instruments, retail trade, real estate, wholesale trade, health services, and electronic equipment.

Table 6

Aerospace Output Multipliers
Industries Ranked by Total Output Effect

Industry	*Total Output Generated by the Gateway Cities Aerospace Industry ($million)*	*Percent of Total Output Generated by the Gateway Cities Aerospace Industry*
Aircraft, Missiles, and Space Vehicles	10,464.0	59.8%
Scientific Instruments	1,016.2	5.8%
Retail Trade	648.8	3.7%
Real Estate	590.8	3.4%
Wholesale Trade	484.7	2.8%
Health Services	454.9	2.6%
Electronic Equipment	422.1	2.4%
Business Services	314.7	1.8%
Banking	186.4	1.1%
Utilities	172.2	1.0%
ALL INDUSTRIES	**17,499.3**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 7 ranks industries by indirect output effect. This table highlights the major production linkages among aerospace firms, and between aerospace firms and firms in other industries producing inputs for aerospace production. A total of $593 million of inputs were produced by the scientific instruments industry, representing 19.1 percent of total indirect inputs to the Gateway Cities aerospace industry. Other major providers of inputs were the electronic equipment industry, wholesale trade, aircraft, and business services.

Employment Multipliers

The aerospace industry employed 57,000 workers in the Gateway Cities in 1992[4]. An additional 33,000 were employed in firms producing inputs for aerospace manufacturers, and 58,800 were employed in firms to meet demand generated by aerospace workers for goods and services. A total of 148,800 jobs were created by the Gateway Cities aerospace industry through input-output linkages, creating an employment multiplier of 2.61. For every aerospace job (or unit of work), 1.61 workers (or units of work) were supported throughout the economy by indirect and induced production.

Table 8 shows industries in which the greatest total employment was created by aerospace production in the Gateway Cities. A total of 56,100 jobs were created in the aircraft industry, representing 37.7 percent of total employment generated by the Gateway Cities aerospace industry. Other industries in which the greatest number of jobs were supported by the aerospace industry included retail trade (19,100 jobs), health services (8,700 jobs), business services (8,600 jobs), wholesale trade (7,300 jobs), and scientific instruments (5,800 jobs).

Table 9 shows industries in which the greatest most jobs were created indirectly by aerospace production, by firms producing inputs for aerospace firms. The most indirect jobs generated by aerospace production were found in business services (5,600 jobs, 17.0 percent of total indirect employment). Other industries in which the most indirect jobs were created included wholesale trade (4,000 jobs), scientific instruments (3,500 jobs), electronic equipment (2,200), hotels and other lodging places (1,900) jobs), and industrial machinery (1,300 jobs).

[4] This figure is higher than the 54,129 aerospace employees tallied by the EDD's ICE files. The employment figures shown here are derived from the input-output model, while the ICE employment data shown in Section A is based in employer payroll returns in the third quarter of 1992.

Table 7

Aerospace Output Multipliers
Industries Ranked by Indirect Output Effect

Industry	*Indirect Output Generated by the Gateway Cities Aerospace Industry ($million)*	*Percent of Total Indirect Output Generated by the Gateway Cities Aerospace Industry*
Scientific Instruments	593.1	19.1%
Electronic Equipment	398.7	12.8%
Wholesale Trade	267.5	8.6%
Aircraft, Missiles, and Space Vehicles	226.2	7.3%
Business Services	211.7	6.8%
Air Transportation	112.9	3.6%
Fabricated Metal Products	85.5	2.8%
Printing and Publishing	84.5	2.7%
Industrial Machinery	83.4	2.7%
Real Estate	81.5	2.6%
ALL INDUSTRIES	**3,104.9**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 8

Aerospace Employment Multipliers
Industries Ranked by Total Employment Effect

Industry	*Total Employment Generated by the Gateway Cities Aerospace Industry*	*Percent of Total Employment Generated by the Gateway Cities Aerospace Industry*
Aircraft, Missiles, and Space Vehicles	56,038	37.7%
Retail Trade	19,126	12.9%
Health Services	8,664	5.8%
Business Services	8,567	5.8%
Wholesale Trade	7,276	4.9%
Scientific Instruments	5,814	3.9%
Private Educational Services	2,722	1.8%
Hotels And Other Lodging Places	2,530	1.7%
Real Estate	2,351	1.6%
Electronic Equipment	2,327	1.6%
ALL INDUSTRIES	**148,797**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 9

Aerospace Employment Multipliers
Industries Ranked by Indirect Employment Effect

Industry	*Indirect Employment Generated by the Gateway Cities Aerospace Industry*	*Percent of Total Indirect Employment Generated by the Gateway Cities Aerospace Industry*
Business Services	5,592	17.0%
Wholesale Trade	4,015	12.2%
Scientific Instruments	3,463	10.5%
Electronic Equipment	2,183	6.6%
Hotels And Other Lodging Places	1,866	5.7%
Industrial Machinery	1,327	4.0%
Consulting and Research	1,291	3.9%
Aircraft, Missiles, and Space Vehicles	1,228	3.7%
Private Educational Services	1,141	3.5%
Construction	1,050	3.2%
ALL INDUSTRIES	**32,973**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

C.4 The Gateway Cities Machinery Industry: Output and Employment Multipliers

Output Multipliers

The machinery industry (SIC 35) includes manufacturers of industrial machinery and computers. In the Gateway Cities, 32 percent of machinery workers were employed in the machine shops classified under SIC 359. Machine shops are an important component of defense subcontracting networks. Other important machinery industries in the Gateway Cities include general industrial machinery (SIC 356)[5] and metalworking machinery (SIC 354), which employed 25 and 16 percent of Gateway Cities machinery workers respectively.

The machinery industry generated an estimated $1.08 billion of output in the Gateway Cities in 1992. An additional $342 million of indirect output was produced in firms providing inputs to Gateway Cities machinery firms, and $678 million of output was created in industries to meet the demand for goods and services by machinery industry workers employed in the Gateway Cities. The direct, indirect, and induced output of the Gateway Cities aerospace industry was $2.10 billion, yielding an output multiplier of 1.95. For every dollar of output in the Gateway Cities machinery industry, an additional $.95 of output was generated throughout the economy.

Table 10 ranks industries by total output effect. The total output of $1.10 billion produced by the Gateway Cities machinery industry accounted for 52.6 percent of total output generated throughout the economy by the machinery industry. Outside of the machinery industry, the industries with the greatest volume of output stimulated by production in the machinery industry include retail trade, wholesale trade, real estate, health services, and business services.

Table 11 ranks industries by indirect output effect. The wholesale trade industry produced $70.7 million of output for the Gateway Cities machinery industry. This accounted for 20.7 percent of the total dollar volume of inputs to the machinery industry. Other industries producing the greatest value of machinery inputs were business services, industrial machinery, utilities, and electronic equipment.

Employment Multipliers

The Gateway Cities machinery industry employed 11,900 workers in 1992. A total of 4,330 jobs were created in industries providing inputs to machinery firms, and 10,600 jobs were created through the consumer spending of machinery workers. The total number of jobs supported directly and indirectly by the machinery industry was 26,900, resulting in an employment multiplier of 2.25.

[5] This industry includes manufacturers of pumps, ball bearings, compressors, fans, gears, industrial furnaces, and power transmission equipment.

Table 10

Machinery Output Multipliers
Industries Ranked by Total Output Effect

Industry	*Total Output Generated by the Gateway Cities Machinery Industry ($million)*	*Percent of Total Output Generated by the Gateway Cities Machinery Industry*
Industrial Machinery	1,104.0	52.6%
Retail Trade	117.6	5.6%
Wholesale Trade	110.0	5.2%
Real Estate	105.1	5.0%
Health Services	82.3	3.9%
Business Services	53.5	2.5%
Utilities	33.3	1.6%
Banking	28.1	1.3%
Legal Services	26.3	1.3%
Petroleum Products	24.9	1.2%
ALL INDUSTRIES	**2,098.5**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 11

Machinery Output Multipliers
Industries Ranked by Indirect Output Effect

Industry	*Indirect Output Generated by the Gateway Cities Machinery Industry ($million)*	*Percent of Total Indirect Output Generated by the Gateway Cities Machinery Industry*
Wholesale Trade	70.7	20.7%
Business Services	34.8	10.2%
Industrial Machinery	23.7	6.9%
Utilities	16.5	4.8%
Electronic Equipment	15.0	4.4%
Construction	14.7	4.3%
Trucking and Warehousing	13.1	3.8%
Real Estate	13.0	3.8%
Fabricated Metal Products	11.7	3.4%
Legal Services	10.3	3.0%
ALL INDUSTRIES	**341.8**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 12 shows industries in which the most jobs were created as a result of machinery production in the Gateway Cities. Total direct and indirect employment in the machinery industry was 12,200, representing 45.3 percent of all jobs created by the machinery industry throughout the economy. Other industries in which a significant number of jobs were created include retail trade (3,500), wholesale trade (1,700), health services (1,600), and business services (1,500).

Table 13 shows industries ranked by the number of indirect jobs created to provide inputs for machinery firms. Most indirect employment was generated in the wholesale trade and business service industries.

C.5 The Gateway Cities Metals Industry: Output and Employment Multipliers

Output Multipliers

The metals industry includes the primary metals industry group (SIC 33) and the fabricated metals industry group (SIC 34). Employment in the Gateway Cities was distributed among several metals industries. The fabricated structural metal products industry (SIC 344) employed the most workers in the metals industry, accounting for 24 percent of metals employment. Other important metals industries in the Gateway Cities include metal services (e.g. plating and polishing) (SIC 347), nonferrous foundries (SIC 336), metal forgings and stampings (SIC 346), and blast furnace and basic steel products (SIC 331).

The metals industry generated an estimated $2.78 billion of output in the Gateway Cities in 1992. An additional $831 million of indirect output was produced in firms providing inputs to Gateway Cities metals firms, and $1.30 billion of output was created in industries to meet the demand for goods and services be metals industry workers employed in the Gateway Cities. The direct, indirect, and induced output of the Gateway Cities aerospace industry was $4.91 billion, yielding an output multiplier of 1.77. For every dollar of output in the Gateway Cities aerospace industry, an additional $.77 of output was generated throughout the economy.

Table 14 ranks industries by total output effect. The fabricated metals industry produced $1.91 million of total output in the Gateway Cities, and the primary metals industry produced $957 million of total output in the Gateway Cities. Together, the metals industries accounted for 58 percent of total direct and indirect output created by metals production in the Gateway Cities. Outside of the metals industries, the highest value of output was generated in wholesale trade, retail trade, real estate, and health services.

Table 12

Machinery Employment Multipliers
Industries Ranked by Total Employment Effect

Industry	*Total Employment Generated by the Gateway Cities Machinery Industry*	*Percent of Total Employment Generated by the Gateway Cities Machinery Industry*
Industrial Machinery	12,196	45.3%
Retail Trade	3,468	12.9%
Wholesale Trade	1,652	6.1%
Health Services	1,567	5.8%
Business Services	1,469	5.5%
Real Estate	410	1.5%
Consulting and Research	371	1.4%
Personal Services	355	1.3%
Private Educational Services	324	1.2%
Legal Services	321	1.2%
ALL INDUSTRIES	**26,907**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 14

Metals Output Multipliers
Industries Ranked by Total Output Effect

Industry	*Total Output Generated by the Gateway Cities Metals Industry ($million)*	*Percent of Total Output Generated by the Gateway Cities Metals Industry*
Fabricated Metal Products	1,904.7	38.8%
Primary Metals	957.4	19.5%
Wholesale Trade	233.8	4.8%
Retail Trade	227.2	4.6%
Real Estate	200.9	4.1%
Health Services	157.8	3.2%
Utilities	107.4	2.2%
Business Services	93.9	1.9%
Trucking and Warehousing	68.6	1.4%
Construction	60.2	1.2%
ALL INDUSTRIES	**4,912.1**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 13

Machinery Employment Multipliers
Industries Ranked by Indirect Employment Effect

Industry	*Indirect Employment Generated by the Gateway Cities Machinery Industry*	*Percent of Total Indirect Employment Generated by the Gateway Cities Machinery Industry*
Wholesale Trade	1,062	24.5%
Business Services	931	21.5%
Industrial Machinery	233	5.4%
Consulting and Research	225	5.2%
Construction	191	4.4%
Trucking and Warehousing	171	3.9%
Legal Services	125	2.9%
Printing and Publishing	115	2.7%
Electronic Equipment	113	2.6%
Real Estate	111	2.6%
ALL INDUSTRIES	**4,330**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 15 ranks industries by indirect output effect. Of the $831 million of inputs produced for firms in the metals industry, $158 million were produced by the wholesale trade industry, $75 million by utilities, $58 million by business services, and $54 million by trucking and warehousing firms.

Employment Multipliers

The Gateway Cities metals industries employed 21,700 workers in 1992. A total of 9,500 jobs were created in industries providing inputs for the production of metals and metal products, and 20,400 jobs were generated throughout the economy by the consumption of goods and services by metals industry workers. Altogether, 51,600 jobs were created directly and indirectly by metal industry production in the Gateway Cities.

Table 16 ranks industries by the total number of direct and indirect jobs created by metals industry production. A total of 16,200 jobs were created in the fabricated metals industry, representing 31 percent of total job creation. Other industries in which the greatest number of jobs were created were retail trade (6,700), primary metals (6,000), wholesale trade (3,500), and health services (3,000).

Table 17 ranks industries by the number of jobs created to produce inputs for metals industry production. The wholesale trade industry created 2,400 jobs to produce metals industry inputs, followed by business services (1,500), trucking and warehousing (700), and construction (600).

C.6 Estimating the Impact of Aerospace Restructuring on Jobs and Payroll in the Gateway Cities

The negative impacts of aerospace restructuring in the Gateway Cities have reverberated throughout the regional economy. As aerospace firms cut output and employment, jobs are lost in industries that supplied inputs to aerospace manufacturers, as well as industries that benefited from the earnings spent by aerospace workers. The regional concentration of aerospace production systems and labor markets ensures that the brunt of the economic impact resulting from aerospace restructuring is felt locally.

In this section we use the input-output multipliers for the aerospace industry to estimate the impact of aerospace restructuring on jobs, payroll, and business taxes in the Gateway Cities. Figure 19 shows direct, indirect, and total employment connected to aerospace production in the Gateway Cities in 1987, 1992, and 1997. The 1992 figure of 54,100 aerospace jobs is based in the EDD ICE data. Employment estimates for 1987 and 1997 were based on the share of Los Angeles

Table 15

Metals Output Multipliers
Industries Ranked by Indirect Output Effect

Industry	*Indirect Output Generated by the Gateway Cities Metals Industry ($million)*	*Percent of Total Indirect Output Generated by the Gateway Cities Metals Industry*
Wholesale Trade	158.4	19.1%
Utilities	75.1	9.0%
Business Services	58.1	7.0%
Trucking and Warehousing	54.4	6.5%
Primary Metals	42.8	5.2%
Construction	42.7	5.1%
Fabricated Metal Products	37.2	4.5%
Petroleum Products	26.9	3.2%
Real Estate	24.2	2.9%
Chemicals	23.4	2.8%
ALL INDUSTRIES	**831.3**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 16

Metals Employment Multipliers
Industries Ranked by Total Employment Effect

Industry	*Total Employment Generated by the Gateway Cities Metals Industry*	*Percent of Total Employment Generated by the Gateway Cities Metals Industry*
Fabricated Metal Products	16,213	31.4%
Retail Trade	6,697	13.0%
Primary Metals	6,007	11.6%
Wholesale Trade	3,509	6.8%
Health Services	3,005	5.8%
Business Services	2,538	4.9%
Trucking and Warehousing	895	1.7%
Construction	789	1.5%
Real Estate	781	1.5%
Personal Services	700	1.4%
ALL INDUSTRIES	**51,608**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Table 17

Metals Employment Multipliers
Industries Ranked by Indirect Employment Effect

Industry	*Indirect Employment Generated by the Gateway Cities Metals Industry*	*Percent of Total Indirect Employment Generated by the Gateway Cities Metals Industry*
Wholesale Trade	2,378	24.9%
Business Services	1,506	15.8%
Trucking and Warehousing	709	7.4%
Construction	556	5.8%
Consulting and Research	415	4.4%
Fabricated Metal Products	353	3.7%
Printing and Publishing	236	2.5%
Utilities	232	2.4%
Industrial Machinery	226	2.4%
Real Estate	206	2.2%
ALL INDUSTRIES	**9,549**	

Source: Derived from IMPLAN input-output tables by Professor David Rigby, UCLA Department of Geography

Figure 19

GATEWAY CITIES AEROSPACE
Estimated Job Loss, 1987-1997

Source: Employment Development Department; IMPLAN

County aerospace employment found in the Gateway Cities in 1992 (34.2 percent). Total employment was estimated using the aerospace employment multiplier (2.61).

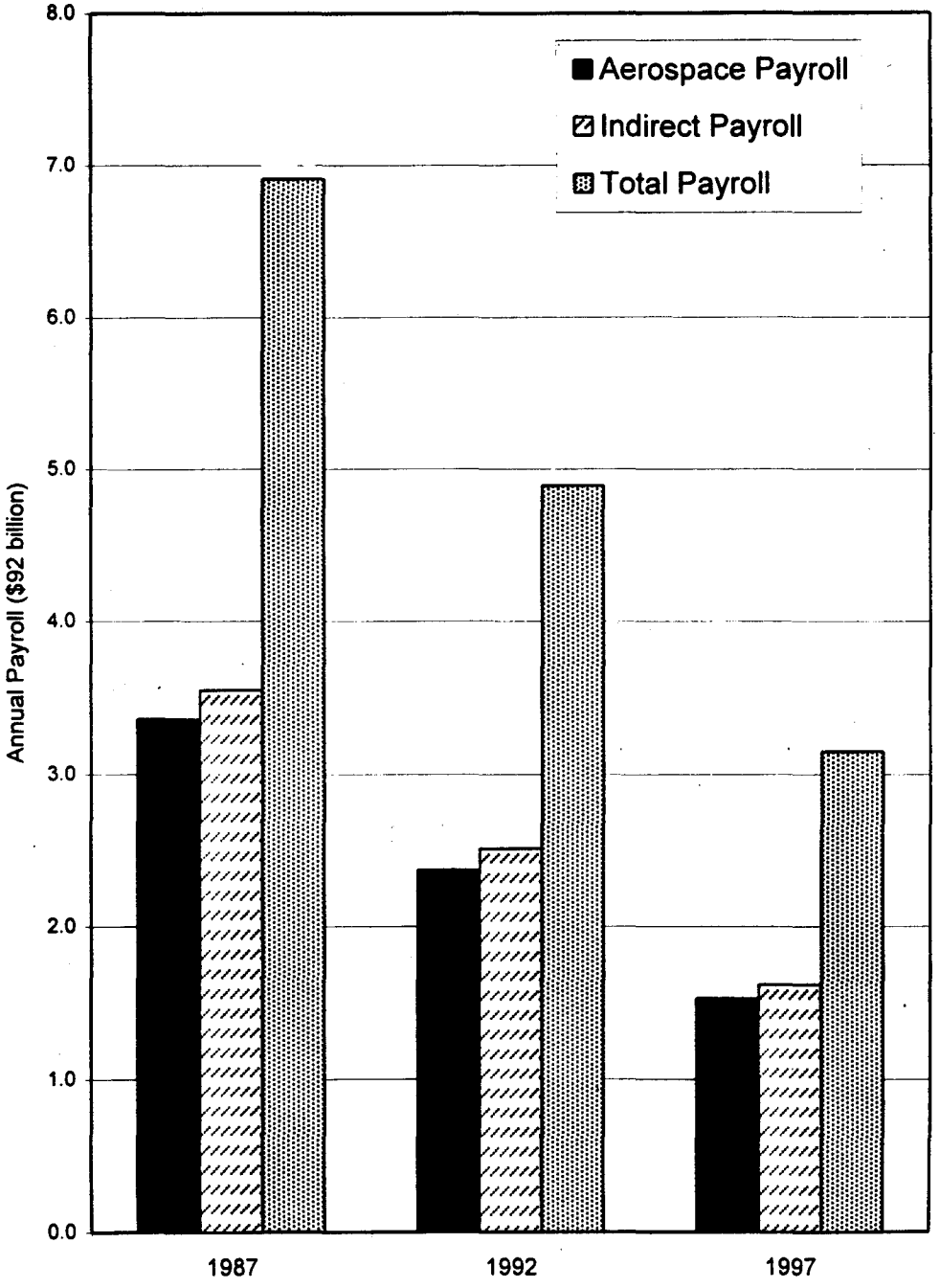
Based on this data, aerospace employment in the Gateway Cities fell from 76,600 in 1987 to 34,900 in 1987, a loss of 41,700 jobs. The total indirect and induced employment generated by the aerospace industry declined form 123,300 in 1987 to 56,200 in 1997, a loss of 67,100 jobs. Therefore, we estimate that total employment connected to Gateway Cities aerospace production fell form 199,900 in 1987 to 91,100 in 1997, a loss of 108,900 jobs.

As jobs are lost, so are workers' earnings. Figure 20 shows the estimated loss of earnings tied to Gateway Cities aerospace production. The average annual earnings of aerospace workers were $43,800 in 1992. To estimate average annual earnings in jobs created through indirect and induced multiplier effects, we used the average annual earnings in all Gateway Cities jobs in 1992 of $28,800. These figures were multiplied by employment figures to estimate aerospace-related earnings in 1987 and 1997.

Based on these calculations, we estimate that the total annual earnings of workers in the Gateway Cities aerospace industry fell from $3.36 billion in 1987 to $1.53 billion in 1997. The total annual earnings of workers in jobs supported by aerospace production fell from $3.55 billion in 1987 to $1.62 billion in 1997. As a result, total annual earnings connected to Gateway Cities aerospace production declined from $6.91 billion in 1987 to $3.15 billion in 1997.

Figure 20

GATEWAY CITIES AEROSPACE
Estimated Payroll Loss, 1987-1997



Source: Employment Development Department; IMPLAN

D. LABOR MARKET ANALYSIS

Since the 1940's, Los Angeles County has been one of the country's major aerospace manufacturing centers.[6] Over the past 55 or so years, this sector has been an important mainstay for the Los Angeles economy. However, it has also been subject to periods of sharp expansion and contraction. Beginning with World War II, the first expansion took place, reaching a peak in 1943. After a major cutback following the end of the war, a new wave of hiring began, culminating in a post-war peak of 329,900 jobs in 1957. In the same year a new period of decline began, reaching a low of 275,500 by June 1961. The next expansion started in the same year, lifting employment to 359,100 by the end of 1967. A new period of contraction began, and employment in aerospace, despite some occasional years of growth, reached what was, at that time, a post-war low of 208,300 by 1976-77. The latest period of expansion ended in 1987, by which time the sector was employing a total of over 293,000 workers. Following that year, aerospace production entered a period of severe decline, with the number of employees falling to only 119,000 by 1994.

The last period of layoffs that began in 1988 coincided with a nationwide recession. Together, these two factors produced the deepest recession in Los Angeles County since the pre-war period. A recovery in jobs began in 1994, and a steady, although slow, recovery has been in effect since. Aerospace employment continued to decline through 1996, then remained stable throughout 1997.

Production of aircraft, aircraft parts and engines, and missiles has been a primary anchor for regional manufacturing, and supported the rise of other important industry sectors such as electronics, computers, instruments, and navigational and communications equipment. Aerospace production has sustained a myriad of ancillary industries such as machine shops, foundries, plastics, and many smaller contractors. Moreover, the salaries paid by this complex provided consumer buying power that helped fuel growth of the Los Angeles economy since the 1940s, and helped spur local growth in real estate, retail trade, construction and many service businesses.

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[6] The historical wage and salary employment data published by the Employment Development Department's Labor Market Information Division have identified certain industries as belonging to the "High Technology" group. Until a few years ago, this arbitrary grouping of industries was referred to as the "Aerospace" group. This sector includes the following Standard Industrial Classification (SIC) industries:

SIC	Industry Title
357	Computer and Office Equipment
366	Communications Equipment
367	Electronic Components and Accessories
369	Misc. Electrical Equipment & Supplies
372	Aircraft and Parts
376	Guided Missiles, Space Vehicles, Parts
381	Search and Navigation Equipment
382	Measuring and Controlling Devices

For convenience, this High Technology group is referred to as "aerospace" in this narrative.

Major aerospace employment losses since 1988 have greatly curtailed job opportunities in Los Angeles in a wide variety of occupations. In order to measure the effect that these employment changes have had on employment in aerospace-related occupations, an analysis was made of employment in occupations found in firms within this industry group. This was done using an industry-occupation matrix created by the Employment Development Department (EDD) in 1994.

The "base" year of EDD's current matrix is 1992. This means that the data collected through EDD's Occupational Employment Statistics (OES) program (a very large employer-based survey of occupational structure within industry) is based on staffing patterns as of 1990 through 1993, or early in the most recent recession. The data being analyzed in this report held the occupational structure of all industries constant for the period covered here (1990, 1994, and 1996). The 1992 OES-based staffing patterns do not take into account any changes that may have occurred since the period of the employer survey. Since it is unlikely that layoffs in this industry group have affected all occupations equally, the numbers presented here are an estimate of occupational employment in more recent years.

The following tables show employment trends by OES occupational category. Data are shown by both broad occupational groupings as well as at a detailed level. Table 18 presents data showing employment for those occupations found within the aerospace group, and also compares employment levels in these occupations with employment in all industries combined (for those specific aerospace occupations) for the years 1990, 1994, and 1996. Tables 19 and 20 show the actual and percent changes in aerospace and all industries combined for the 1990-94, 1994-96, and 1990-96 periods. Figures 21 and 22 show aerospace occupations with the greatest job loss between 1990-96 and 1994-96. Figure 23 shows employment in 1990 and 1996 in aerospace occupations.

These tables and figures present a detailed picture of how losses within aerospace firms, as well as in all industries combined, have greatly lowered demand for workers in a wide variety of occupations since 1990. Aerospace firms, particularly aircraft manufacturers, generally have complex and extensive manufacturing processes and use a wide variety of occupations at all skill levels. The total number of different occupations found within aerospace represents about a third of the total number of different OES occupations that exist within all industries in Los Angeles County, although aerospace jobs in 1990 only accounted for just 10 percent of all local employment.

Table 18

Occupation Groups Found in the Aerospace Industry
Employment in All Industries and Aerospace
Los Angeles County, 1990, 1994, 1996

OES Code	Occupation Title	1990 Total Employment	1990 Number Employed in Aerospace	1990 Percent Employed in Aerospace	1994 Total Employment	1994 Number Employed in Aerospace	1994 Percent Employed in Aerospace	1996 Total Employment	1996 Number Employed in Aerospace	1996 Percent Employed in Aerospace
	Total, all occupations	2,380,879	252,379	10.6%	2,067,517	142,571	6.9%	2,182,182	135,012	6.2%
10000	Managers and administrative occs	269,422	26,007	9.7%	237,503	15,021	6.3%	251,003	14,720	5.9%
21000	Management support occupations	108,931	19,489	17.9%	90,885	10,805	11.9%	96,516	9,750	10.1%
22000	Engineers, architects, surveyors	139,108	65,296	46.9%	103,011	36,368	35.3%	116,814	33,926	29.0%
24000	Natural scientits and related	14,227	2,949	20.7%	11,680	1,660	14.2%	11,050	1,750	15.8%
25000	Computer, math, ops research, rel	40,171	7,831	19.5%	33,874	4,456	13.2%	37,028	4,204	11.4%
32000	Health practitioners, tecs, rel	13,663	304	2.2%	13,262	172	1.3%	12,565	153	1.2%
34000	Writers, artists, entertainmers	23,367	2,400	10.3%	21,239	1,321	6.2%	22,107	1,167	5.3%
39000	Misc professionals, paraprof tech	49,168	4,992	10.2%	45,748	2,737	6.0%	56,779	2,651	4.7%
41000	First-line supvs, mgrs, sales	48,112	528	1.1%	40,717	376	0.9%	42,478	344	0.8%
49000	Merchandise, products, other sales	91,334	3,954	4.3%	76,467	2,278	3.0%	80,780	2,220	2.7%
51000	First-line supv, mgr, clerical	59,598	1,781	3.0%	53,937	1,005	1.9%	59,256	1,039	1.8%
53000	Industry specific clerical, admin	16,321	523	3.2%	13,993	299	2.1%	15,801	215	1.4%
55000	Secretarial, general office occs	444,055	12,513	2.8%	412,553	7,176	1.7%	428,717	6,877	1.6%
56000	EDP and office machine operators	38,093	1,572	4.1%	33,963	882	2.6%	36,013	802	2.2%
57000	Communications, mail distribution	9,390	238	2.5%	8,747	140	1.6%	9,249	139	1.5%
58000	Material recording, dispatching	103,427	11,087	10.7%	88,907	6,294	7.1%	84,105	6,009	7.1%
59000	Clerical, admin support, NEC	27,720	2,556	9.2%	25,013	1,419	5.7%	20,509	1,358	6.6%
61000	First-line supv and mgrs, service	20,304	502	2.5%	19,424	289	1.5%	20,427	264	1.3%
63000	Protective service occupations	39,766	1,578	4.0%	40,498	846	2.1%	44,649	755	1.7%
65000	Food, beverage prep and svc occs	9,505	166	1.7%	9,233	90	1.0%	8,825	80	0.9%
67000	Cleaning, building svc, excl priv	60,959	1,565	2.6%	55,400	879	1.6%	53,562	826	1.5%
69000	Misc service workers	11,641	274	2.4%	10,856	145	1.3%	11,374	126	1.1%
70000	Agricultural occupations	92	14	15.2%	77	8	10.4%	81	8	9.9%
81000	First-line supv, mgrs, blue collar	50,235	4,250	8.5%	41,539	2,373	5.7%	45,987	2,290	5.0%
83000	Inspectors, related occupations	27,046	9,633	35.6%	20,590	5,496	26.7%	21,005	5,110	24.3%
85000	Mechanics, installers, repairers	103,570	8,289	8.0%	87,050	4,565	5.2%	92,316	4,314	4.7%
87000	Construction trades	53,661	1,471	2.7%	44,038	782	1.8%	48,808	706	1.4%
89000	Production occupations, precision	37,729	8,429	22.3%	27,779	4,720	17.0%	29,404	4,826	16.4%
91000	Mach set-up, operators, tenders	48,269	7,132	14.8%	36,361	3,883	10.7%	37,149	4,059	10.9%
92000	Machine setters, operators	56,905	3,845	6.8%	50,477	2,271	4.5%	52,627	2,074	3.9%
93000	Assemblers and fabricators, hand	115,068	37,680	32.7%	85,948	21,849	25.4%	86,461	20,403	23.6%
95000	Plant and system occupations	2,111	75	3.6%	1,987	36	1.8%	2,154	25	1.2%
97000	Trans, material moving mach ops	94,907	1,353	1.4%	86,178	752	0.9%	92,795	725	0.8%
98000	Helpers, laborers, hand, ex agric	132,381	2,093	1.6%	120,513	1,170	1.0%	132,874	1,089	0.8%

Source: California EDD, Labor Market Information Division

Table 19

Occupation Groups Found in the Aerospace Industry
Employment Change in Aerospace
Los Angeles County, 1990-96

OES Code	Occupation Title	1990-94 Absolute Change	1990-94 Percent Change	1994-96 Absolute Change	1994-96 Percent Change	1990-96 Absolute Change	1990-96 Percent Change
	Total, all occupations	-109,808	-43.5%	-7,559	-5.3%	-117,367	-46.5%
10000	Managers and administrative occs	-10,986	-42.2%	-301	-2.0%	-11,287	-43.4%
21000	Management support occupations	-8,684	-44.6%	-1,055	-9.8%	-9,739	-50.0%
22000	Engineers, architects, surveyors	-28,928	-44.3%	-2,442	-6.7%	-31,370	-48.0%
24000	Natural scientists and related	-1,289	-43.7%	90	5.4%	-1,199	-40.7%
25000	Computer, math, ops research, rel	-3,375	-43.1%	-252	-5.7%	-3,627	-46.3%
32000	Health practitioners, tecs, rel	-132	-43.4%	-19	-11.0%	-151	-49.7%
34000	Writers, artists, entertainers	-1,079	-45.0%	-154	-11.7%	-1,233	-51.4%
39000	Misc professionals, paraprof tech	-2,255	-45.2%	-86	-3.1%	-2,341	-46.9%
41000	First-line supvs, mgrs, sales	-152	-28.8%	-32	-8.5%	-184	-34.8%
49000	Merchandise, products, other sales	-1,676	-42.4%	-58	-2.5%	-1,734	-43.9%
51000	First-line supv, mgr, clerical	-776	-43.6%	34	3.4%	-742	-41.7%
53000	Industry specific clerical, admin	-224	-42.8%	-84	-28.1%	-308	-58.9%
55000	Secretarial, general office occs	-5,337	-42.7%	-299	-4.2%	-5,636	-45.0%
56000	EDP and office machine operators	-690	-43.9%	-80	-9.1%	-770	-49.0%
57000	Communications, mail distribution	-98	-41.2%	-1	-0.7%	-99	-41.6%
58000	Material recording, dispatching	-4,793	-43.2%	-285	-4.5%	-5,078	-45.8%
59000	Clerical, admin support, NEC	-1,137	-44.5%	-61	-4.3%	-1,198	-46.9%
61000	First-line supv and mgrs, service	-213	-42.4%	-25	-8.7%	-238	-47.4%
63000	Protective service occupations	-732	-46.4%	-91	-10.8%	-823	-52.2%
65000	Food, beverage prep and svc occs	-76	-45.8%	-10	-11.1%	-86	-51.8%
67000	Cleaning, building svc, excl priv	-686	-43.8%	-53	-6.0%	-739	-47.2%
69000	Misc service workers	-129	-47.1%	-19	-13.1%	-148	-54.0%
70000	Agricultural occupations	-6	-42.9%	0	0.0%	-6	-42.9%
81000	First-line supv, mgrs, blue collar	-1,877	-44.2%	-83	-3.5%	-1,960	-46.1%
83000	Inspectors, related occupations	-4,137	-42.9%	-386	-7.0%	-4,523	-47.0%
85000	Mechanics, installers, repairers	-3,724	-44.9%	-251	-5.5%	-3,975	-48.0%
87000	Construction trades	-689	-46.8%	-76	-9.7%	-765	-52.0%
89000	Production occupations, precision	-3,709	-44.0%	106	2.2%	-3,603	-42.7%
91000	Mach set-up, operators, tenders	-3,249	-45.6%	176	4.5%	-3,073	-43.0%
92000	Machine setters, operators	-1,574	-40.9%	-197	-8.7%	-1,771	-43.1%
93000	Assemblers and fabricators, hand	-15,831	-42.0%	-1,446	-6.6%	-17,277	-45.9%
95000	Plant and system occupations	-39	-52.0%	-11	-30.6%	-50	-66.7%
97000	Trans, material moving mach ops	-601	-44.4%	-27	-3.6%	-628	-46.4%
98000	Helpers, laborers, hand, ex agric	-923	-44.1%	-81	-6.9%	-1,004	-48.0%

Source: California EDD, Labor Market Division

Table 20

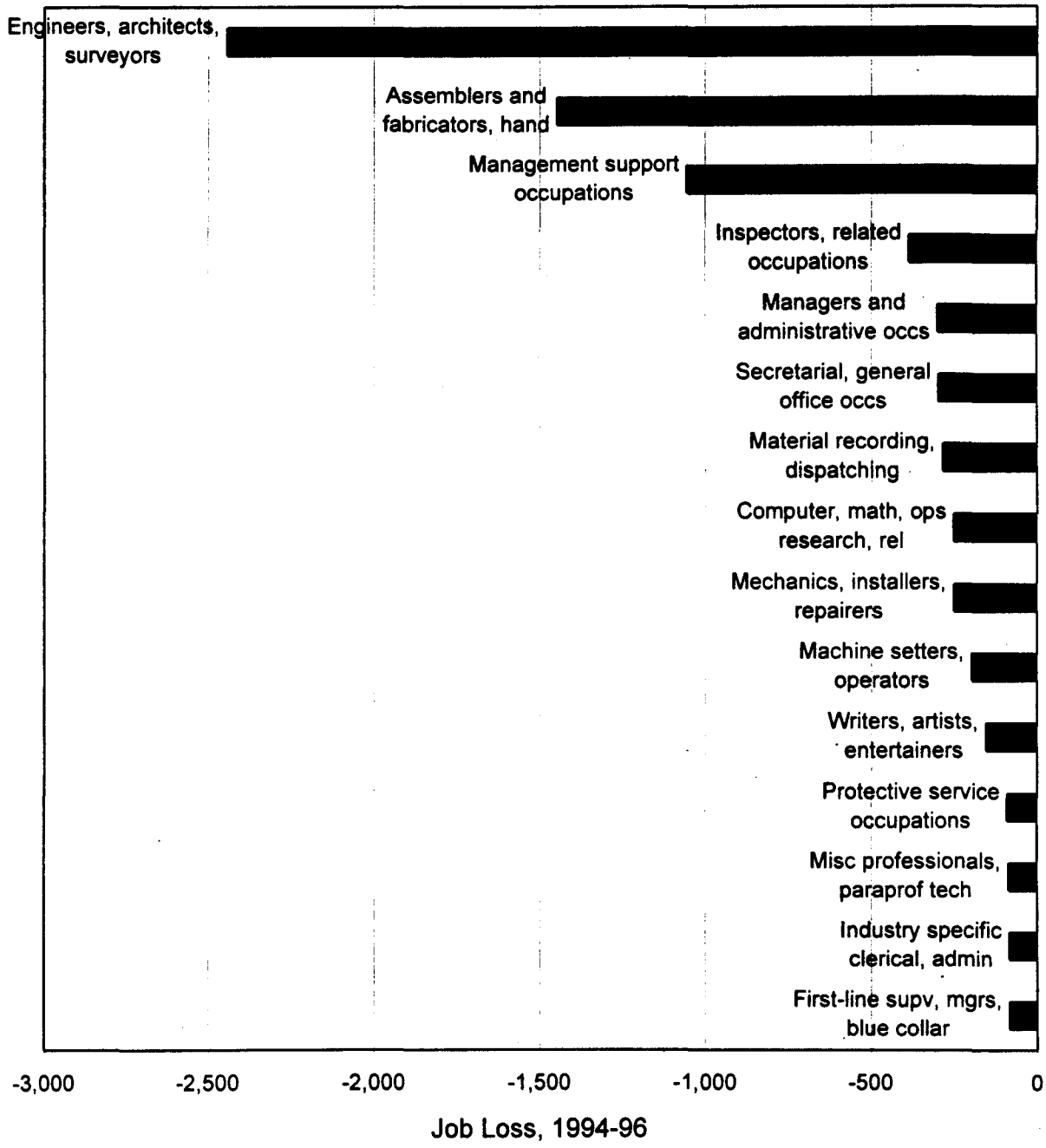
Occupation Groups Found in the Aerospace Industry
Employment Change in Aerospace and All Industries
Los Angeles County, 1990-96

OES Code	Occupation Title	1990-94 Employment Change in All Industries	1990-94 Employment Change in Aerospace	1990-94 Percent	1994-96 Employment Change in All Industries	1994-96 Employment Change in Aerospace	1994-96 Percent	1990-96 Employment Change in All Industries	1990-96 Employment Change in Aerospace	1990-96 Percent
	Total, all occupations	-313,362	-109,808	35.0%	114,665	-7,559		-198,697	-117,367	59.1%
10000	Managers and administrative occs	-31,919	-10,986	34.4%	13,500	-301		-18,419	-11,287	61.3%
21000	Management support occupations	-18,046	-8,684	48.1%	5,631	-1,055		-12,415	-9,739	78.4%
22000	Engineers, architects, surveyors	-36,097	-28,928	80.1%	13,803	-2,442		-22,294	-31,370	140.7%
24000	Natural scientists and related	-2,547	-1,289	50.6%	-630	90		-3,177	-1,199	37.7%
25000	Computer, math, ops research, rel	-6,297	-3,375	53.6%	3,154	-252		-3,143	-3,627	115.4%
32000	Health practitioners, tecs, rel	-401	-132	32.9%	-697	-19	2.7%	-1,098	-151	13.8%
34000	Writers, artists, entertainers	-2,128	-1,079	50.7%	868	-154		-1,260	-1,233	97.9%
39000	Misc professionals, paraprof tech	-3,420	-2,255	65.9%	11,031	-86		7,611	-2,341	
41000	First-line supvs, mgrs, sales	-7,395	-152	2.1%	1,761	-32		-5,634	-184	3.3%
49000	Merchandise, products, other sales	-14,867	-1,676	11.3%	4,313	-58		-10,554	-1,734	16.4%
51000	First-line supv, mgr, clerical	-5,661	-776	13.7%	5,319	34		-342	-742	21.7%
53000	Industry specific clerical, admin	-2,328	-224	9.6%	1,808	-84		-520	-308	59.7%
55000	Secretarial, general office occs	-31,502	-5,337	16.9%	16,164	-299		-15,338	-5,636	36.7%
56000	EDP and office machine operators	-4,130	-690	16.7%	2,050	-80		-2,080	-770	37.0%
57000	Communications, mail distribution	-643	-98	15.2%	502	-1		-141	-99	70.2%
58000	Material recording, dispatching	-14,520	-4,793	33.0%	-4,802	-285	5.9%	-19,322	-5,078	26.3%
59000	Clerical, admin support, NEC	-2,707	-1,137	42.0%	-4,504	-61	1.4%	-7,211	-1,198	16.6%
61000	First-line supv and mgrs, service	-880	-213	24.2%	1,003	-25		123	-238	
63000	Protective service occupations	732	-697		4,151	-91		4,883	-823	
65000	Food, beverage prep and svc occs	-272	-76	27.9%	-408	-10	2.5%	-680	-86	12.6%
67000	Cleaning, building svc, excl priv	-5,559	-686	12.3%	-1,838	-53	2.9%	-7,397	-739	10.0%
69000	Misc service workers	-785	-129	16.4%	518	-19		-267	-148	55.4%
70000	Agricultural occupations	-15	-6	40.0%	4	0	0.0%	-11	-6	54.5%
81000	First-line supv, mgrs, blue collar	-8,696	-1,877	21.6%	4,448	-83		-4,248	-1,960	46.1%
83000	Inspectors, related occupations	-6,456	-4,137	64.1%	415	-386		-6,041	-4,523	74.9%
85000	Mechanics, installers, repairers	-16,520	-3,724	22.5%	5,266	-251		-11,254	-3,975	35.3%
87000	Construction trades	-9,623	-689	7.2%	4,770	-76		-4,853	-765	15.8%
89000	Production occupations, precision	-9,950	-3,709	37.3%	1,625	106	6.5%	-8,325	-3,603	43.3%
91000	Mach set-up, operators, tenders	-11,908	-3,249	27.3%	788	176	22.3%	-11,120	-3,073	27.6%
92000	Machine setters, operators	-6,428	-1,574	24.5%	2,150	-197		-4,278	-1,771	41.4%
93000	Assemblers and fabricators, hand	-29,120	-15,831	54.4%	513	-1,446		-28,607	-17,277	60.4%
95000	Plant and system occupations	-124	-39	31.5%	167	-11		43	-50	
97000	Trans, material moving mach ops	-8,729	-601	6.9%	6,617	-27		-2,112	-628	29.7%
98000	Helpers, laborers, hand, ex agric	-11,868	-923	7.8%	12,361	-81		493	-1,004	

Source: California EDD, Labor Market Information Division

Figure 21

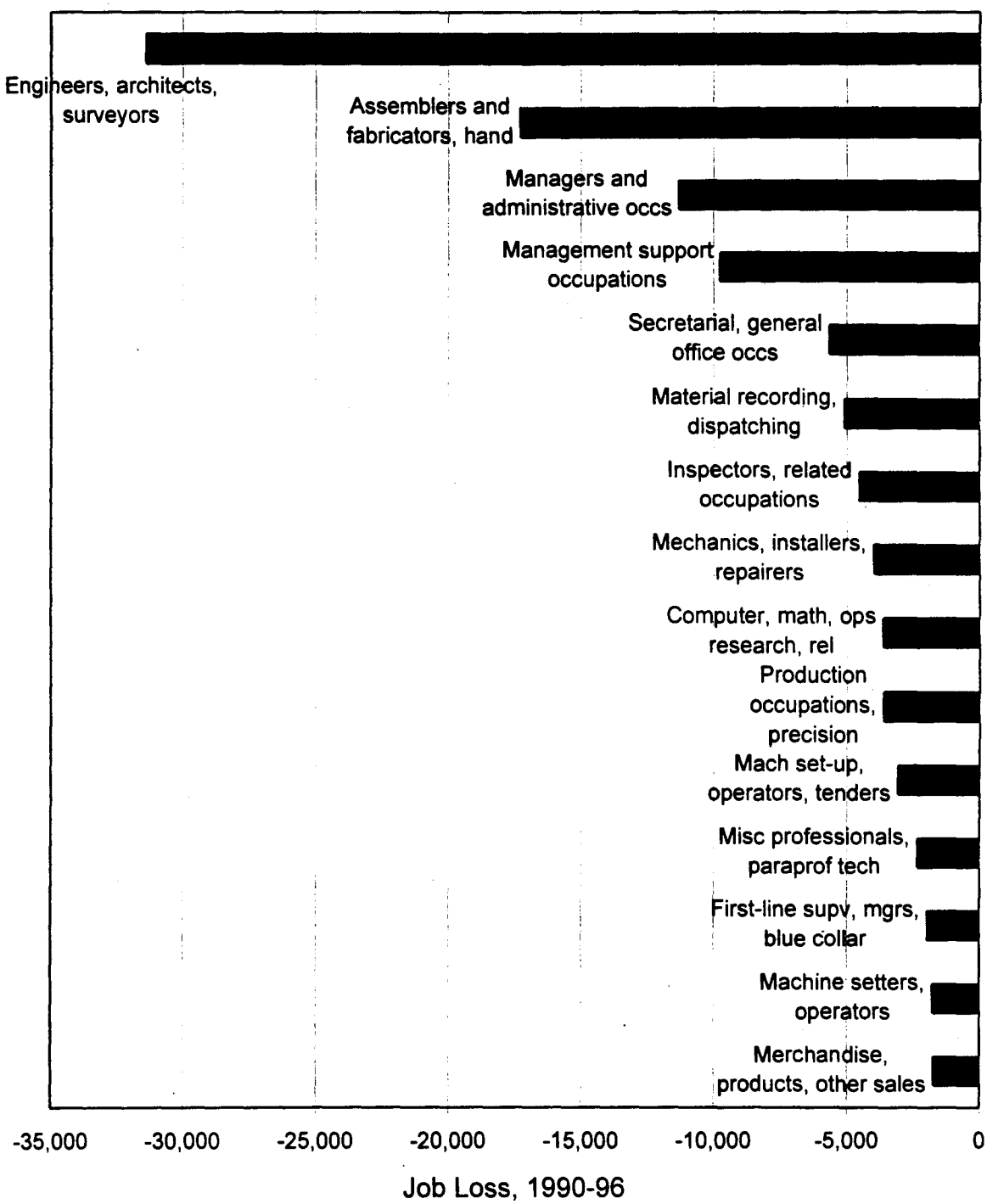
AEROSPACE OCCUPATIONS IN LOS ANGELES COUNTY
Occupations With Greatest Job Loss, 1994-96



Source: California Employment Development Department, Labor Market Information Division

Figure 22

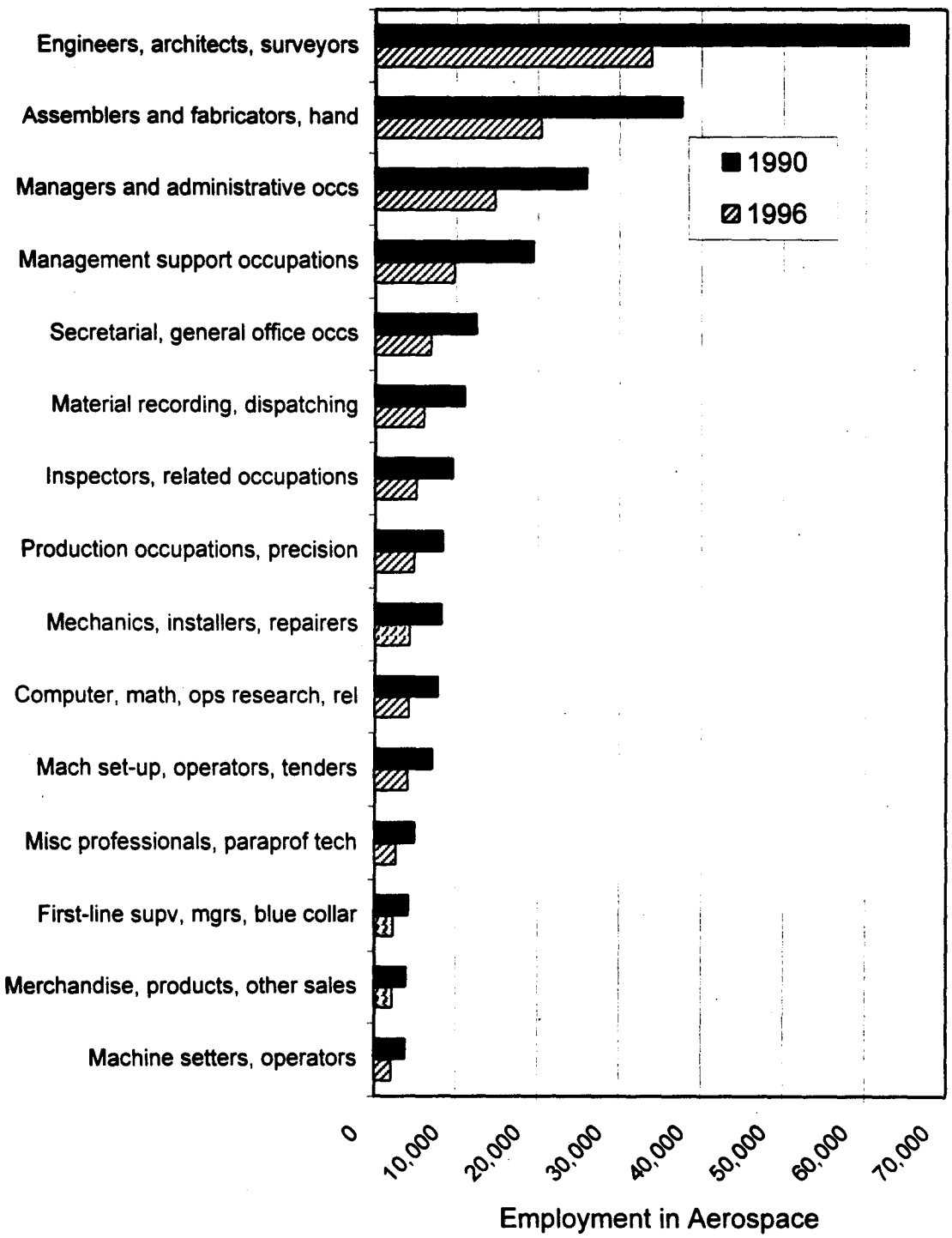
AEROSPACE OCCUPATIONS IN LOS ANGELES COUNTY
Occupations With Greatest Job Loss, 1990-96



Source: California Employment Development Department, Labor Market Information Division

Figure 23

AEROSPACE OCCUPATIONS
Employment in Los Angeles County, 1990 and 1996
Occupations Ranked by 1996 Employment



Source: California Employment Development Department, Labor Market Information Division

Employment in the occupations found within the aerospace group, regardless of industry, totaled 2,380,879 in 1990. Of these jobs, 10.6 percent, or 252,379, were located within aerospace firms. However, in that year aerospace was a very important source of jobs for many key occupations in Los Angeles County. Aerospace manufacturers employed 18 percent of all management-support workers, 47 percent of engineers, 35 percent of manufacturing-process inspectors, 22 percent of precision production workers, and a third of all assembly and fabrication workers.

By 1996, aerospace's share of all aerospace-related jobs had fallen to only 6.2 percent. The majority of the job losses registered between 1990 and 1996 took place between 1990 and 1994. Although countywide employment expanded in aerospace occupations by a total of 123,200 between 1994 and 1996, employment in those occupations within aerospace continued to fall, declining by 7,500 over that two-year period. The net result was that for these aerospace occupations overall, the 1990-96 job loss was 198,697, of which 117,367, or 59 percent, was concentrated within the aerospace industry group. These job losses are shown for all job families in Figure 24, and for occupations with the greatest job losses in Figure 25. The concentration of high technology job losses within aerospace industries is strikingly apparent in these graphs.

There are sixty-nine high technology occupations in which at least 300 jobs have been lost as a result of aerospace cutbacks, with losses reaching 7,000 in the most severely impacted occupations. These occupations are shown in Figure 26.

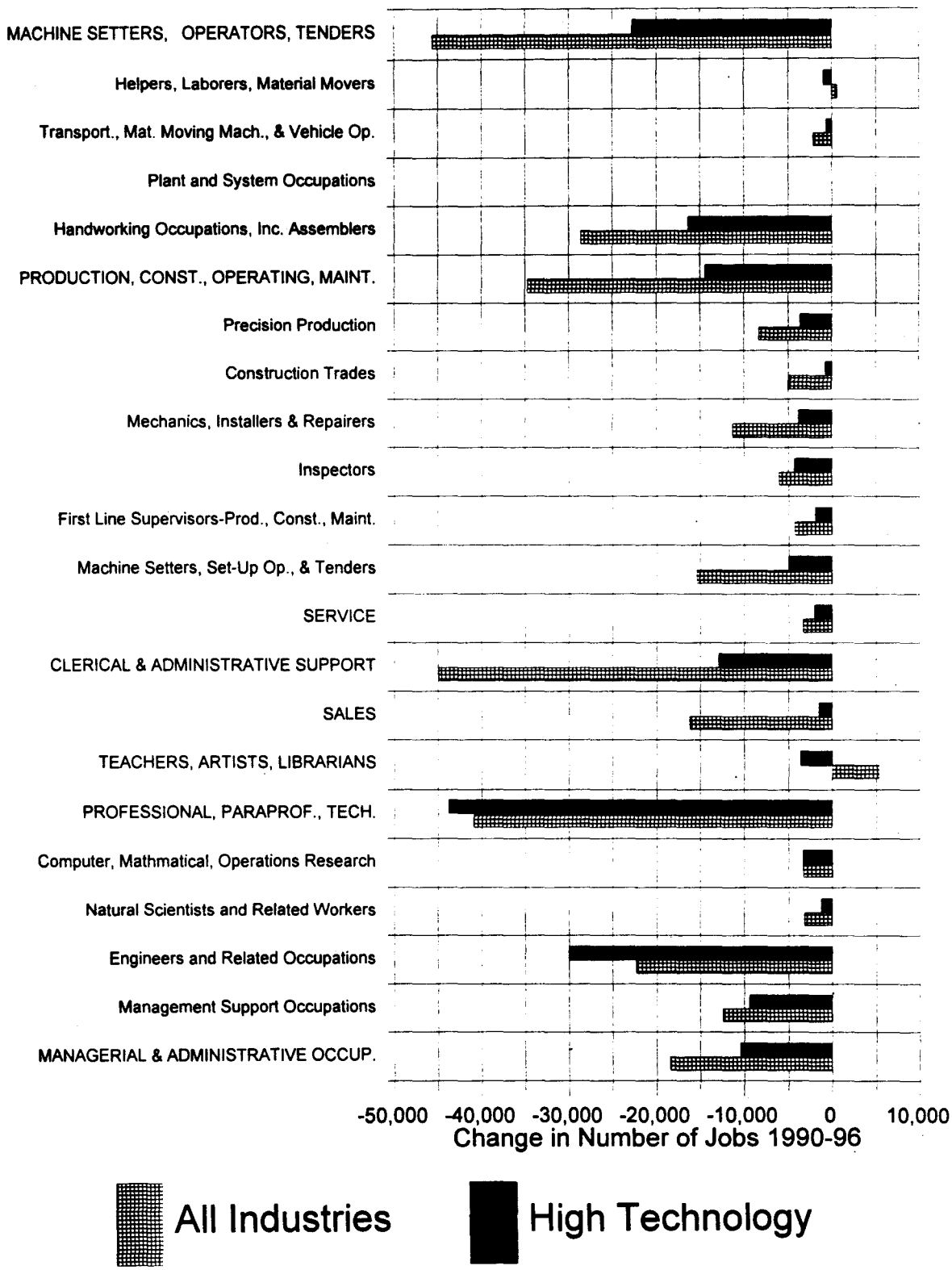
Looking just at high technology workers who lost their jobs before 1994, the ratio of unemployed workers to openings for occupations from aerospace/high technology industries during the recovery period of 1994 to 1996 has been 2.7 to 1. As shown in Figure 27, there are an estimated 58 unemployed workers from hand work occupations such as assemblers for every job opening, and 16 unemployed inspectors for every job opening.

Los Angeles County is estimated to have over 67,000 long-term unemployed high technology workers who lost their jobs before 1994 and have not found new jobs utilizing their skills. The Gateway Cities account for at least 29% of jobs lost in Los Angeles County in the high technology sector, with approximately 20,000 long-term unemployed workers, as shown in Figure 28.

Figure 24

EMPLOYMENT CHANGE BY JOB FAMILY

High Tech & All Ind. L.A. Co. 1990-96

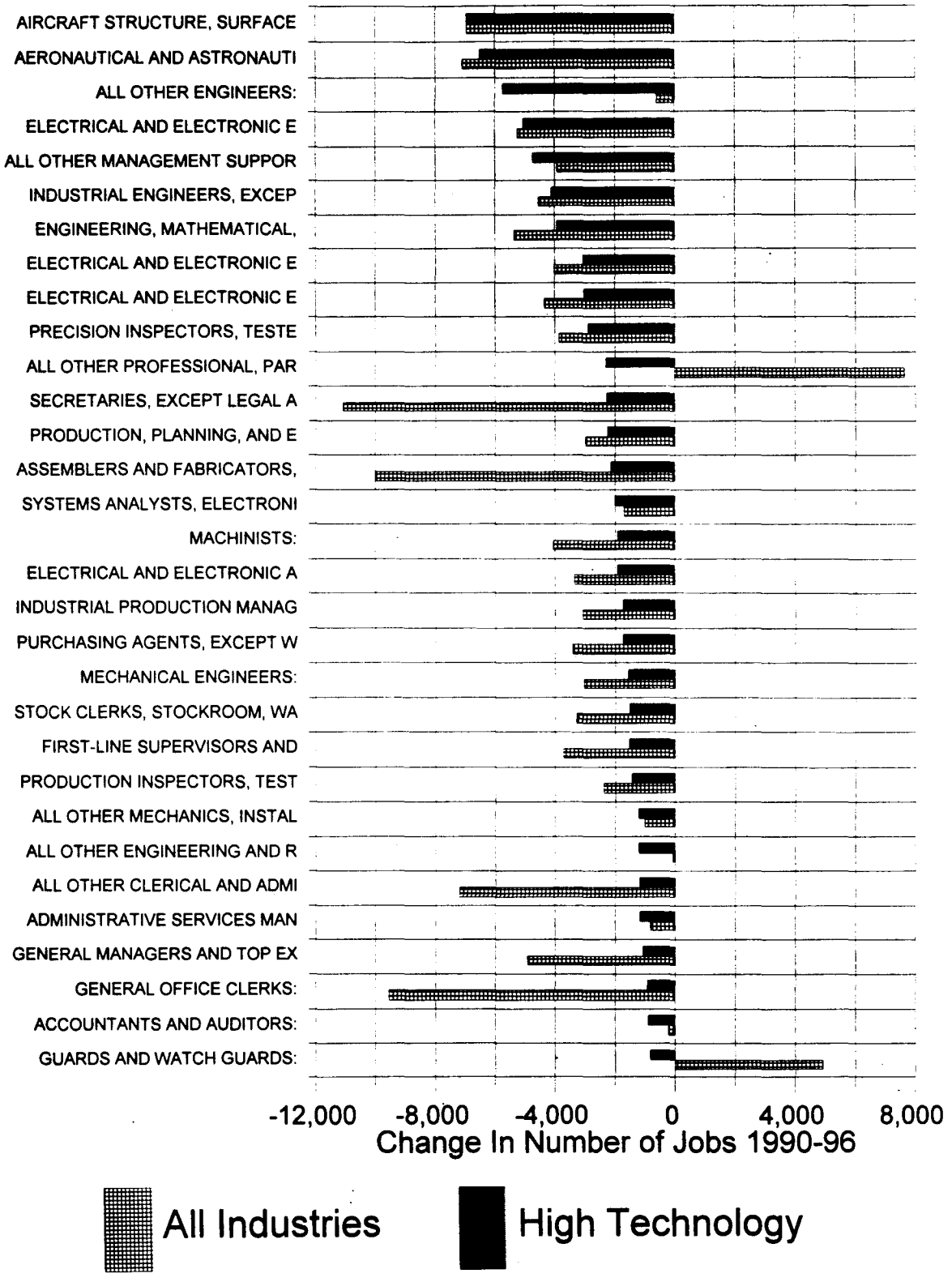


Source: California EDD, Labor Market Information Division

Figure 25

OCCUPATIONS WITH GREATEST JOB LOSS

High Tech & All Indus. L.A. Co 1990-96

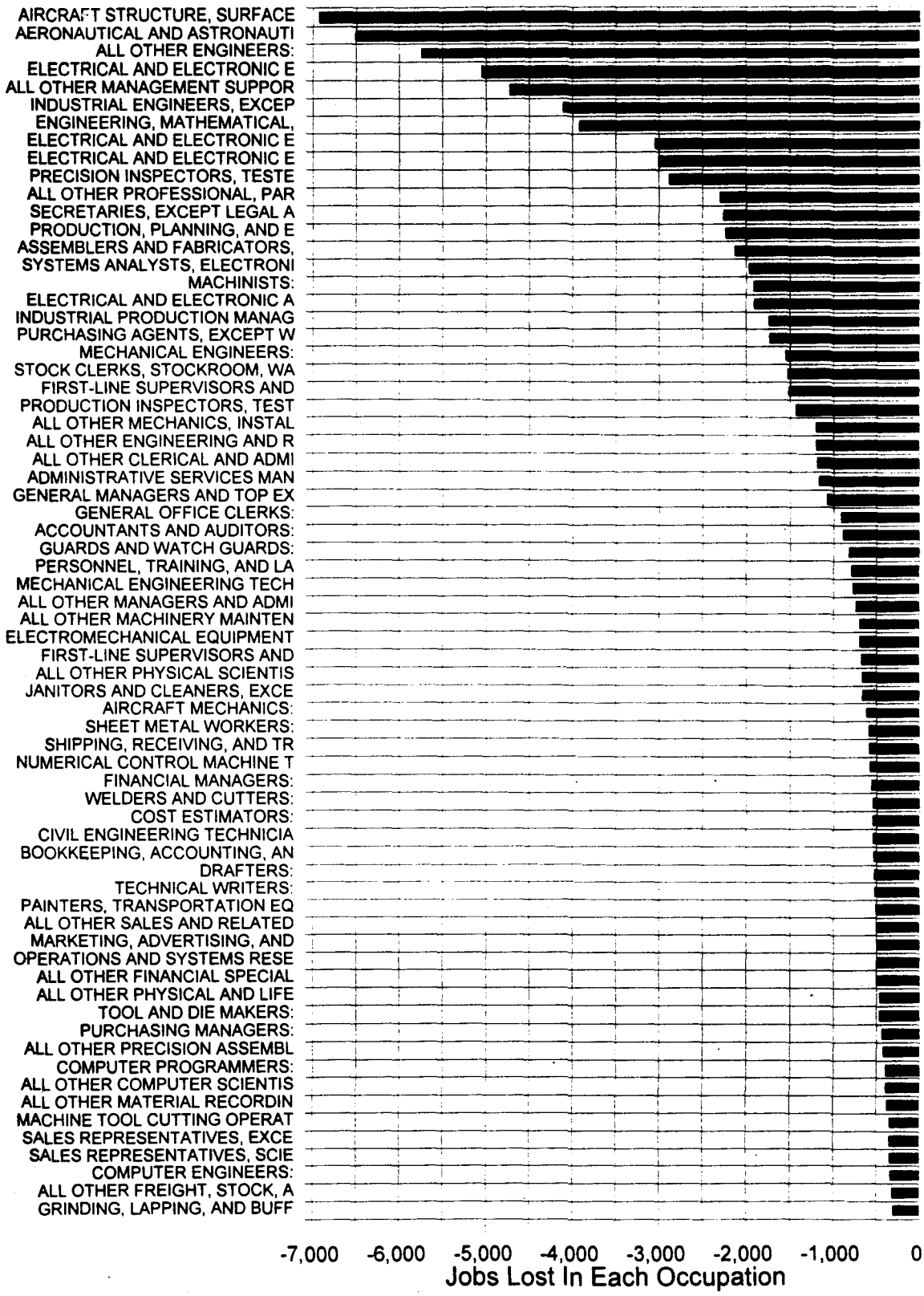


Source: California EDD, Labor Market Information Division

Figure 26

JOB LOSS IN HIGH TECH OCCUPATIONS

L.A. Co. 1990-96 Occup. 300+ Job Loss

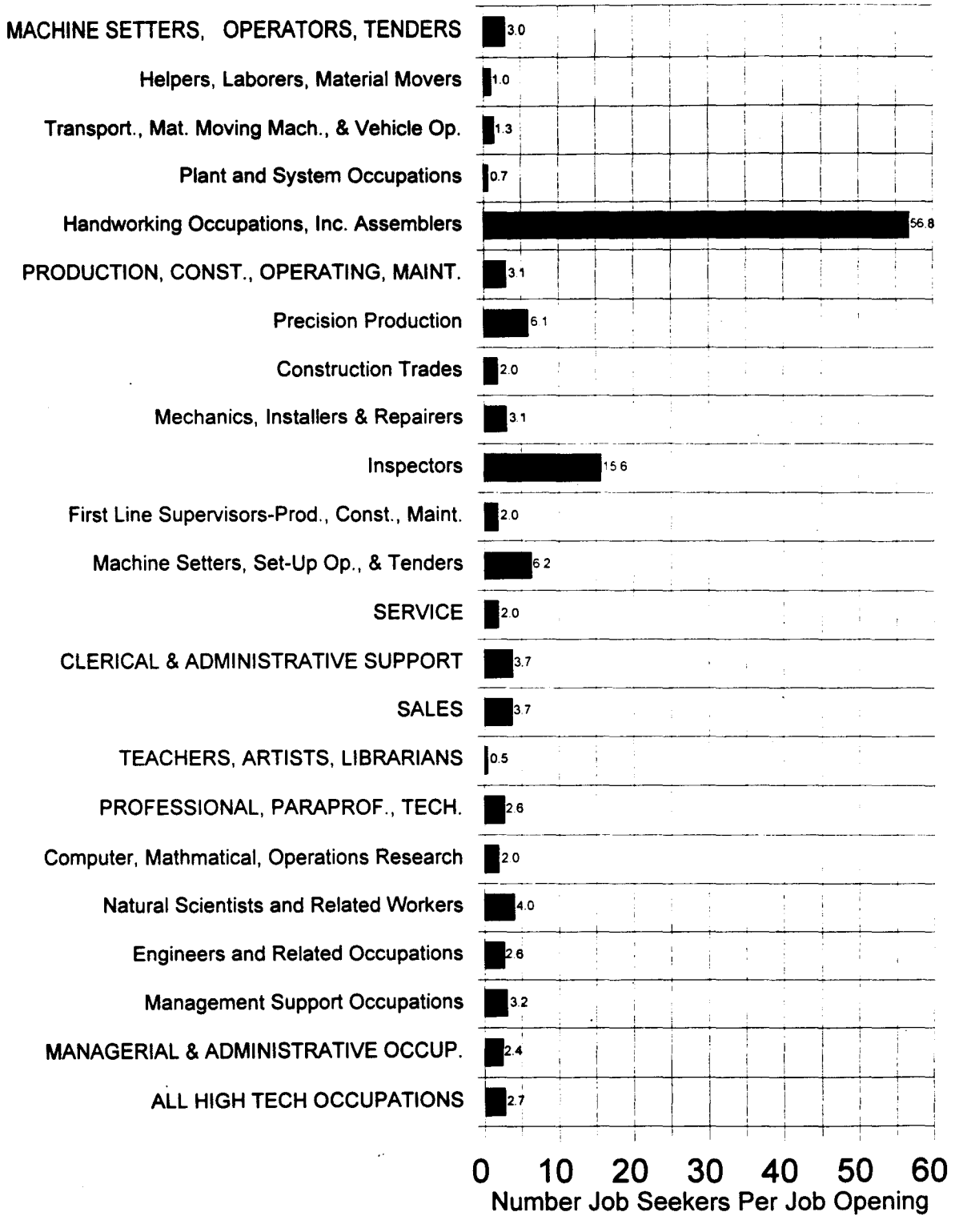


Source: California EDD, Labor Market Information Division

Figure 27

NUMBER HIGH TECH JOB SEEKERS PER JOB

LA Co. Jobs Lost 1990-94/Gained 94-96

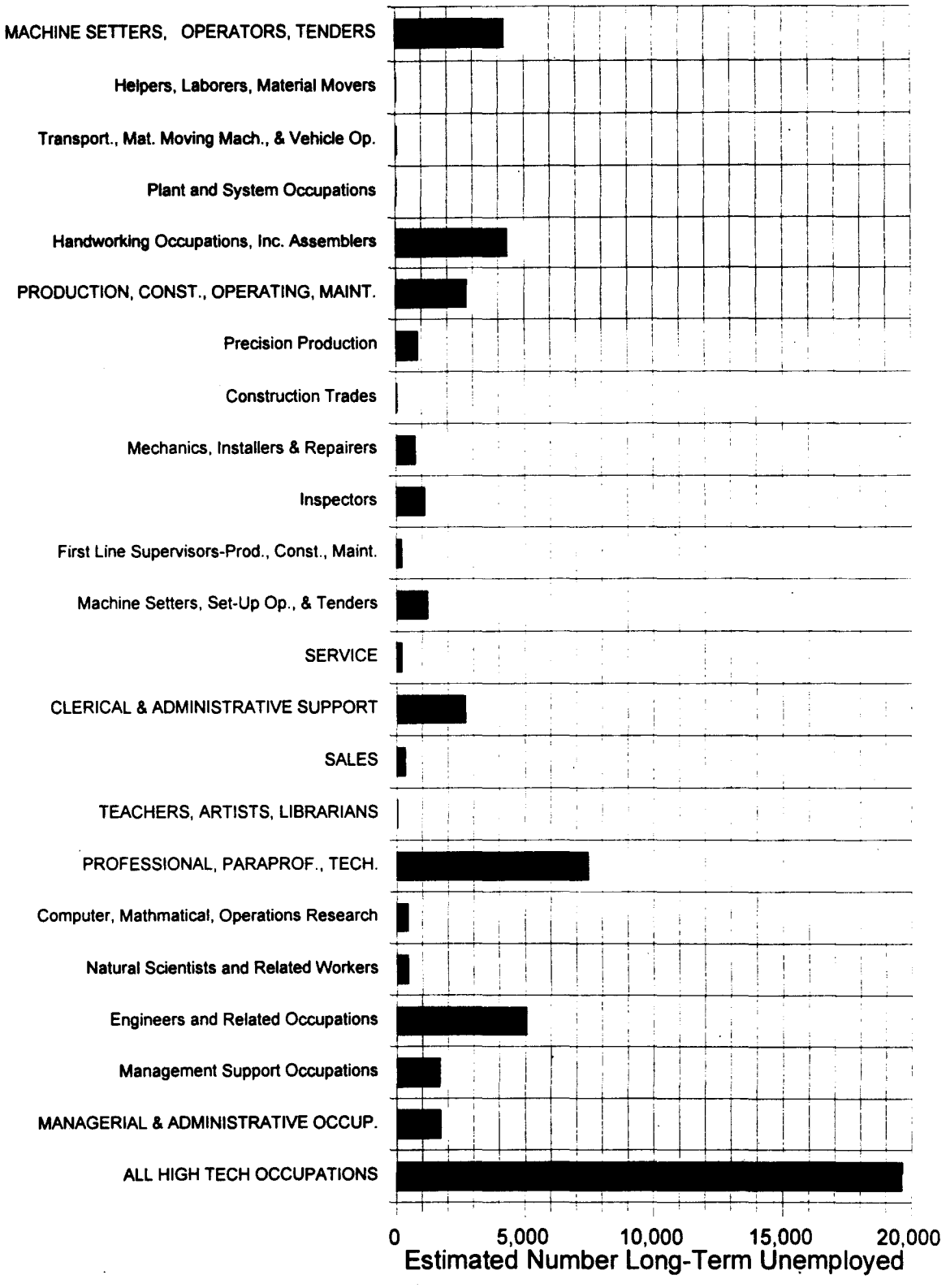


Source: California EDD, Labor Market Information Division

Figure 28

LONG-TERM JOBLESS - GATEWAY CITIES

High Tech Workers Unemployed 3+ Years



Source: California EDD, Labor Market Information Division