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378.794
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Working Paper Series

WAITE MEMORIAL BOOK COLLECTION
DEPT. OF AG. AND APPLIED ECONOMICS
1994 BUFORD AVE. - 232 COB
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ST. PAUL, MN 55108 U.S.A.

Working Paper No. 712

**THE 1990s DEFENSE BUILD-DOWN
IN CALIFORNIA AND THE UNITED STATES**

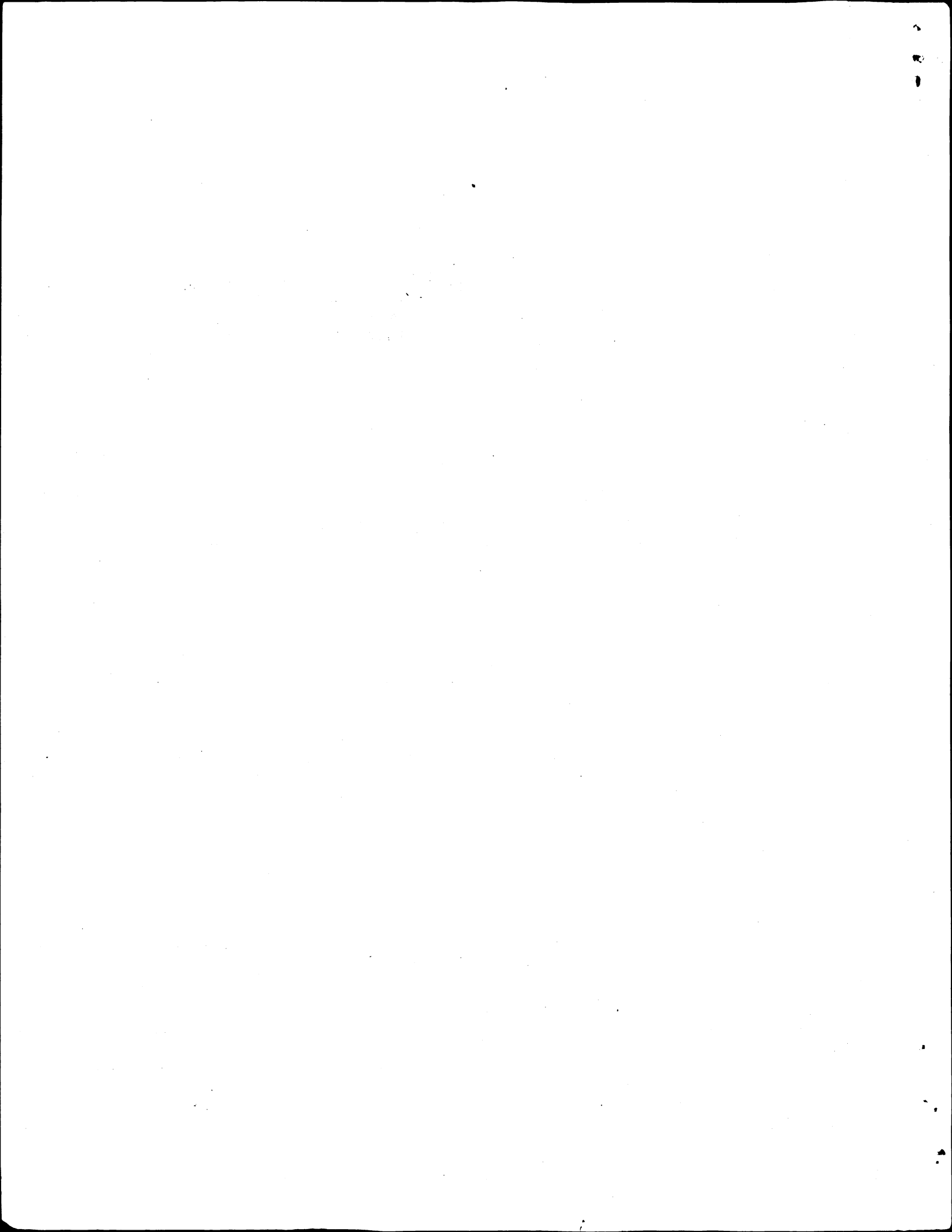
by

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June 1994

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Introduction

The California economy entered a significant downturn in 1990. Since mid-1990 California nonfarm wage and salary employment has dropped steadily at a rate of roughly 1% to 2% per year (Gov. 1994). This is the longest continuous decline in California employment since 1939 (CDF 1993b).¹ Net California nonfarm wage and salary employment dropped by 868,000 jobs between May 1990 (when the state recession began) and the end of 1993 (Gov. 1994). The California unemployment rate increased from 5.6% in 1990 to 9.1% in 1993. Manufacturing jobs accounted for 40% of this job loss; trade and construction accounted for roughly an additional 52% (Gov. 1994). Total employment also fell 1% between 1990 and 1991, but rose slightly in 1992 (CDF 1993b). Total California personal income fell less than 1% between 1990 and 1992 (CDF 1993b). In his 1994 budget proposal, Governor Wilson stated, "there is no question that defense is by far the leading cause of the state's economic distress. With the full impact of the Clinton cuts yet to be felt, recovery through much of this decade will be jeopardized absent concerted action at all levels of government" (Gov. 1994 p. 14).

California also reaped substantial gains from an expansion in U.S. military spending during the early through mid-1980s that was comparable to that during previous wars. In 1982, prime contract awards for defense procurement already exceeded their highest level during the Vietnam war. Between 1982 and their 1984 peak, prime contract awards rose 47% (DoD Prime Contract Awards various years). Nationwide, this expansion ended in 1986. By failing to substantially increase defense allocations between 1986 and 1991, Congress effectively cut defense appropriations in real terms by 2% annually (Wynne 1991). In January of 1990 President Bush formally proposed a 2% annual reduction in the defense budget for fiscal years FY1991 through FY1995 (Whitehead 1991). In February of 1991 he proposed cutting defense spending by 20% between FY1992 and 1997 (1992-97 Future Years Defense Program).

This paper reviews the literature discussing historical patterns in defense spending in the United States and California and the impact of the current defense build-down. Section 1 of this paper discusses defense spending's role in the U.S. economy and reviews proposed reductions in defense spending cuts at a national level. Section 2 describes the role defense spending has played in state economies, particularly the California economy, in the past and summarizes existing analyses of the impact of recent defense cuts on the California economy. It is also important to understand the range and limitations of economic model's ability to project the impact of such policy changes. Section 3 reviews models which have been used to analyze the impact of defense cuts nation-wide and discusses the findings of studies using these models.

¹California has been remarkably fortunate to have had almost continuous statewide growth in nonfarm wage and salary employment since the Great Depression. The period since 1990 is the first time since 1939 that California nonfarm wage and salary employment has dropped in more than one consecutive year (CDF 1993).

1. The National Picture

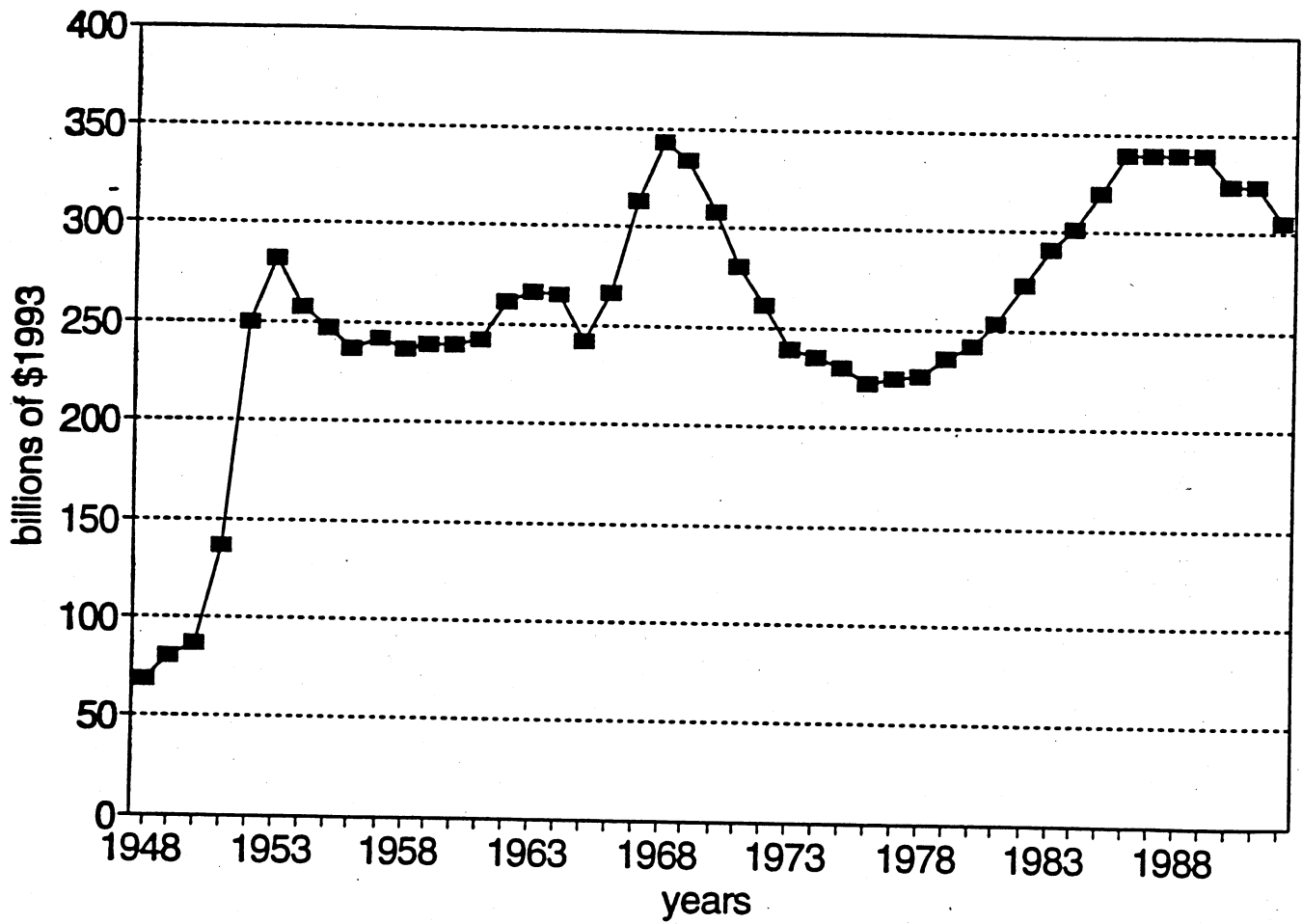
1.1. Defense Spending in the National Economy

The United States has undergone five major expansions in military spending during this century: four associated with major wars (World War I, World War II, the Korean War, and the Vietnam War) and a fifth with the recent Reagan defense build-up. Many of the disarmament periods following wartime build-ups were accompanied by slowed economic activity (Figure 1). World War I was followed by a serious recession and then a recovery in the 1920s. Between 1945 and 1946 defense spending fell by \$57.3 billion, or 27% of 1945 GNP. Nominal GNP fell \$22.8 billion, or 10.3% (18% in real terms), from a peak in 1945 to a post-war recession trough in 1946. Real GNP did not recover fully until the end of 1952. Adjustment following World War II was aided by the exit of many women from the labor market which decreased reported unemployment, and by government transfers to consumers (in the form of tax reductions and veterans' benefits) which increased demand for consumer goods partially offsetting decreased military demand (Garfinkel 1990). After the Korean War, the defense budget was cut by \$7.4 billion, or 2% of 1953 GNP. A mild recession followed the Korean War. Real GNP fell 3.2% from a peak in mid-1953 to a trough in mid-1954. But by the beginning of 1955 it again exceeded its 1953 level (Garfinkel 1990). A significant trough followed the end of the Vietnam War. It is unclear whether it was caused by defense reductions or by the world oil shocks in the early 1970s.

The Reagan defense build-up was massive in absolute terms. By 1986, the United States spent roughly \$350 billion (1992 dollars) on defense compared to approximately \$230 billion (1992 dollars) a decade earlier at the bottom of the post-Vietnam War trough in defense spending (CBO 1992). In real terms, the 1986 spending level was only slightly less than that at the height of the Vietnam War. The national defense budget increased about 5% annually in real terms from 1980 to 1986 (Garfinkel 1990, Jayne 1988). In 1985 it was 49% higher in real terms than in it was in 1980 (CBO 1992)²

Relative to other economic activities the build-up was not as massive. Since the early 1950s, defense has accounted for a progressively smaller proportion of U.S. GNP. At the height of World War II, defense spending accounted for 41.4% of GNP (Wynne 1991). Since World War II, defense has averaged 7.4% of GNP (Wynne 1991). As a percent of GNP, it peaked in 1953 at 13.2% of GNP and fell to its lowest level in the post-Vietnam build-down at 4.8% of GNP. When the Reagan build-up peaked in 1986, defense spending accounted for 6.6% of GNP, still less than the post-World War II average. By 1990 it had fallen to 5.8% of GNP (Wynne 1991). During the current rounds of budget cuts, analysts often have stated with alarm that by

²Defense budget authority here refers to Congressional authorization for Department of Defense (DoD) spending. Actual spending (DoD outlays) lag spending authorization by periods of several months to several years depending on the type of expenditure.



Source: U.S. Council of Economic Advisers, *Economic Report of the President* (various years).

Figure 1. U.S. Defense Outlays (1948-92)

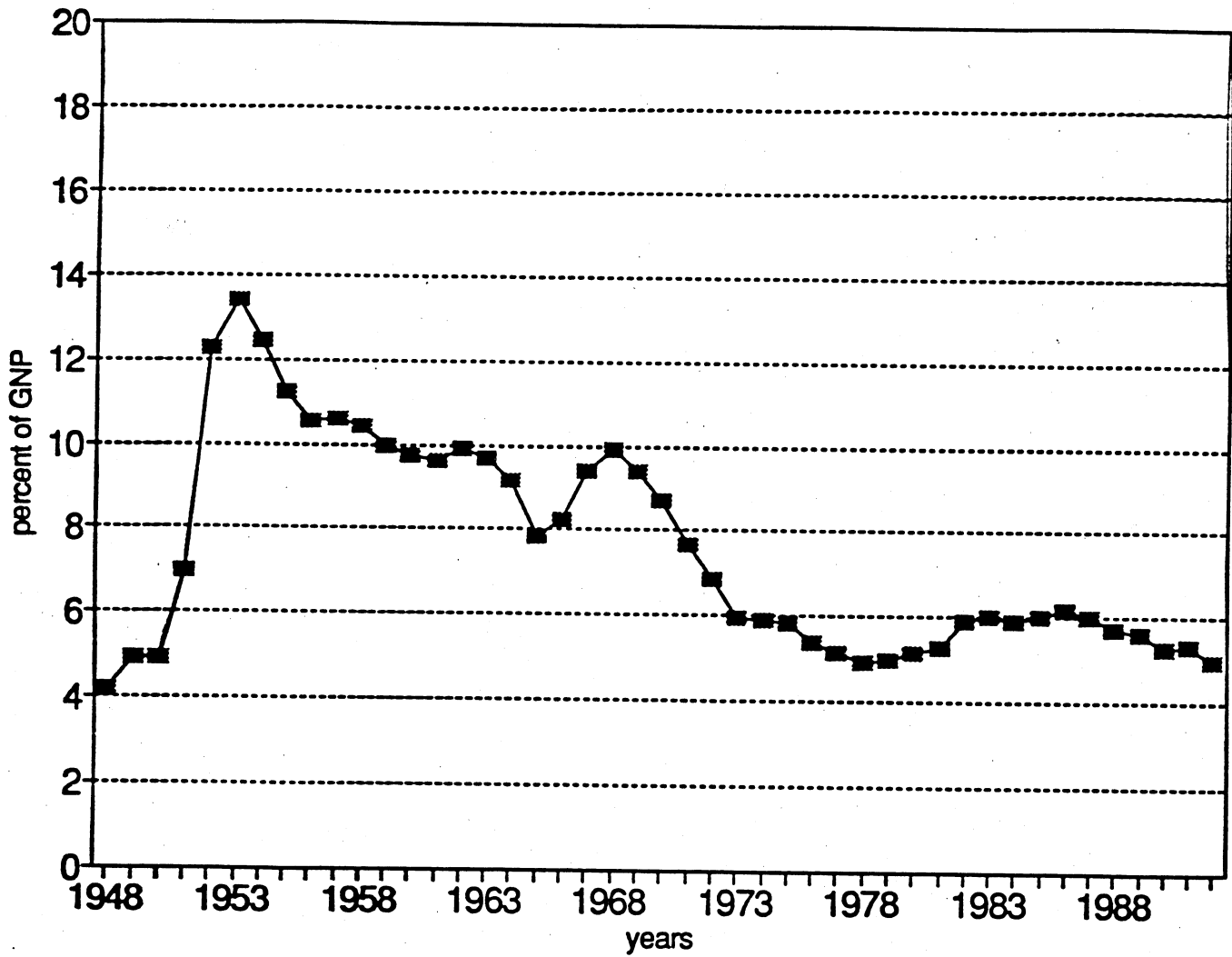
1995 defense spending will account for less than 4% of GNP, a historic post-World War II low. This actually is part of a secular decline in defense's share of GNP (Figure 2). This trend is due to continued absolute growth in U.S. GNP rather than reduction in defense spending.

The popular perception that the Reagan defense build-up was massive may in part reflect the fact that growth in the federal deficit was massive during the 1980s. The total federal deficit for the period from 1934 to 1981 was \$818 billion dollars (Jayne 1988). During the Reagan presidency alone, the federal deficit increased by \$1.1 trillion dollars. During the period from 1980 to 1986, the federal deficit grew by 23.2% annually. During this same period, the defense budget grew by 12.6% annually. Defense spending played a role in this growth, but growth in non-discretionary spending, particularly entitlements, accounted for a more significant portion of deficit growth during the 1980s. Entitlements grew from 33% of total federal expenditures in 1970 to 53% in 1992 (Wildavsky 1992). Defense spending dropped from 43% of federal expenditures in 1970, to 23% in 1981; it increased to 28% by 1986 and then fell to 22% by 1992 (Wildavsky 1992). Yet, the Reagan defense build-up was significant to the deficit in that, unlike past defense build-ups, it was financed largely through debt rather than increased tax revenues and, therefore, did contribute to the increasing deficit (Jayne 1988).

1.2. Defense Cuts at a National Level

U.S. Defense Budget: 1986-1995. Beginning in 1986, Congress failed to substantially increase annual defense appropriations, in effect cutting them by 2% annually between 1986 and 1991. Defense budget authority fell from \$317.5 billion in 1986 to \$278.3 billion in 1991 (1990 dollars) (Commerce 1993a). By 1991, the national defense budget authority was already 20% below its 1985 peak in real terms (CBO 1992). With the prospect that the collapse of the Warsaw Pact and announced plans to remove Soviet troops from Eastern Europe might herald an end to the Cold War and lead to a substantial "peace dividend," defense spending became a major issue in the 1990 budget summit and the consequent Omnibus Budget Reduction Act of 1990 (OBRA) (CBO 1992). OBRA mandated that 36% (\$180 billion) of the reduction in the federal deficit planned for 1991-1995 come from defense. In effect, it capped 1995 defense expenditures at \$350 billion (Table 1). Consistent with this mandate, the Bush administration's FY1991 budget proposed a real 2% annual decrease in the Department of Defense's FY1991 to FY1995 budgets (CBO 1992).

In February of 1991 the Joint Chiefs of Staff presented their most recent multi-year plan for defense expenditures. The plan reflected their perception that military threats to Western Europe's security were greatly reduced (DoD 1991 *1992-1997 Future Years Defense Program*). It proposed a 25% reduction in U.S. military forces. The Bush FY1992 budget proposal was based on, but slightly exceeded, the Joint Chiefs of Staff spending recommendations. It proposed a real annual decrease in defense outlays of 20% from 1992 to 1997 (CBO 1992) (table A). The Bush FY1993 budget and plan for defense spending during 1994-1997 would have accelerated the pace of reductions in force envisioned in the Joint Chiefs of Staff 1991 plan, but would not have changed their ultimate force reduction goals (CBO 1993). The Congressional Budget Office



Source: U.S. Council of Economic Advisers, *Economic Report of the President* (various years).

Figure 2. U.S. Defense Outlays as a Percent of GNP (1948-92)

Table 1. Trends in National Defense Budget Authority by Budget Category Under Clinton Administration FY 1995 Proposed Budget

Category	Budget Authority (billions of 1995 dollars)						Change from 1990 Level (in percent)	
	Fiscal Year						1995	1999
	1990	1995	1996	1997	1998	1999		
Dept. of Defense								
Military Personnel	\$ 91	\$ 70	\$ 65	\$ 63	\$ 62	\$ 61	-23%	-33%
Operation and Maintenance	103	93	86	83	81	81	-10	-21
Procurement	94	43	47	47	52	53	-54	-43
Research development, test, and evaluation	42	36	34	30	28	27	-14	-36
Military construction	6	5	8	5	4	4	-15	-38
Family housing	4	3	4	3	3	3	-9	-5
Other	0	1	-5	-4	-4	-3	N/A	N/A
<i>Subtotal</i>	339	252	237	228	227	227	-26	-33
Other Agencies	12	12	12	11	11	11	-8	-8
TOTAL	351	264	249	239	238	238	-25	-32

Source: Congressional Budget Office, *Planning for Defense: Affordability and Capability of the Administration's Program* (1994).

Notes: Budget authority proposed in the Clinton FY1995 budget. DoD price index was used to express values in constant 1995 dollars.

N/A = not available.

(CBO) estimated that if inflation held at 1992 levels, real annual defense outlays would decrease by 20% between 1992 and 1997 under this FY1993 budget proposal (CBO 1993).³

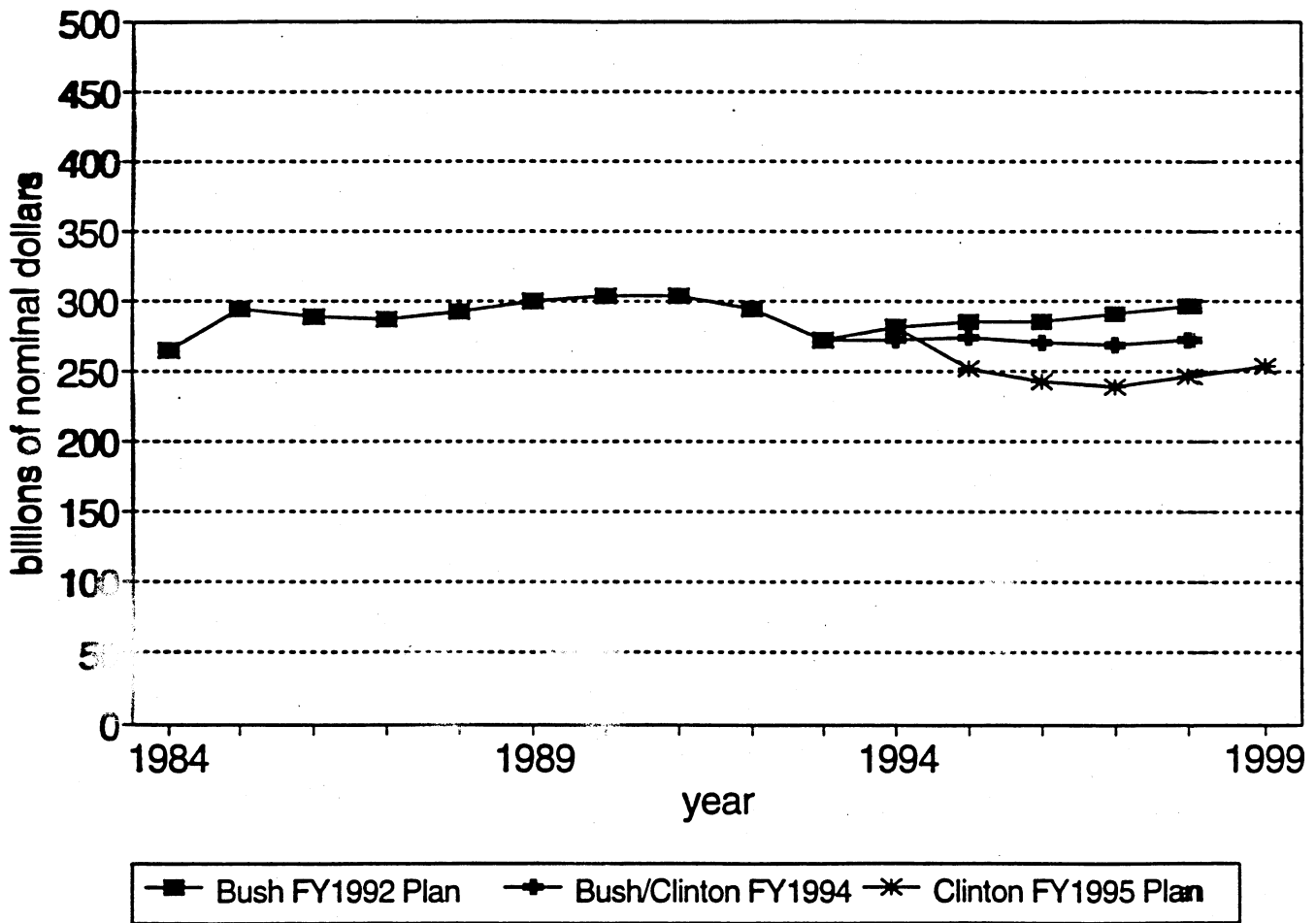
The FY1993 Clinton budget proposed reducing national defense outlays by \$131 billion between 1994 and 1998. This closely followed the budget President Bush would have proposed for FY1993 if elected. For FY1994, the Clinton administration proposed decreasing defense spending from \$273 billion (1993 dollars) to \$215 billion (1993 dollars) by fiscal 1997 (CSF 1993). This FY1994 budget proposal deepened the cuts that had been anticipated under an FY1994 Bush administration budget (Figure 3). At the same time, President Clinton announced he would initiate a "bottom up review" of defense budget needs. This report was completed in October 1993 (DoD 1993b). This review focused on the need for conventional weapons and forces. A study of strategic forces is under way (CBO 1994). This second review may have additional impact on California which has a large military missiles and space sector.

The Clinton FY1995 budget request incorporated detailed plans for national defense developed in the Joint Chief of Staffs "bottom up review." The FY1995 budget provides \$104 billion (1994 dollars) less funding for defense over the period 1995-1999 than would have Bush's FY1994 budget (CBO 1994). This is \$97 billion (1994 dollars) less than what would be need to maintain spending at 1994 level from 1995 to 1998 (CBO 1994). Under the FY1995 budget proposal, 1999 defense spending would be 32% below 1990 levels. The Congressional Budget Office estimates that under this proposal defense spending would fall from 4.2% of gross domestic product (GDP) in 1994 and to 2.9% by 1999 (CBO 1994). These proposed spending levels push the discretionary spending caps established under the Budget Enforcement Act of 1990 extended by the Omnibus Budget Reconciliation Act of 1993 (CBO 1994). Secretary of Defense Perry has stated that as it stands, the FY1995 budget is still roughly \$20 billion short of the funding needed to maintain the forces called for in the "bottom up review" (CBO 1994).

Under the Clinton Administration FY1995 proposal, procurement would be hit harder than other areas of defense expenditure. In 1990, as California entered its current downturn, defense procurement budget authority stood at \$94 billion (1995 dollars). Under the FY1995 budget

³"Using CBO's economic projections, 1998 defense spending would represent 3.7 percent of gross domestic product, compared with 6.3 percent in 1987 and 4.7 percent in 1993. The 1998 percentage would be about one-third of the average for the 1950s, when defense often accounted for more than 10 percent of GDP" (CBO 1993).

The Institute for Defense Analyses pointed out that the change associated with the 1992 defense spending plan was small compared to the shocks experienced during the two oil shocks of the 1970s. Further, unlike the oil crisis which fundamentally shifted the cost of supply across almost all sectors of the American economy and permanently decreased the nation's wealth, the defense cuts involve changing activities among sectors. Economic activity moves location within the nation's economy, but does not disappear or leave the country (DCC 1993a).



Source: Congressional Budget Office, (CBO) *Effects of Alternative Defense Budgets on Employment* (1992); CBO, *Planning for Defense: Affordability and Capability of the Administration's Program* (1994).

Figure 3. Actual and Alternative Defense Authority (1984-99)

procurement drops 54% to \$43 billion (1995 dollars) by 1995. During the remainder of the decade, procurement spending will rise slightly with 1999 levels 43% below those in 1990 (CBO 1994). Procurement spending is expected to pick up during the first decade of the next century. Defense analysts maintain that the current "holiday" from procurement spending was only made possible by the extraordinarily high level of procurement of advanced weapons systems during the 1980s. This leaves open the possibility that California could enter another boom and bust cycle in the early part of the next century. It also appears that the change from peak to trough in defense spending cycles may have increased over time, and may continue to do so as generations of weapons become successively more expensive.

Base Closures. In 1991, at the same time that proposals were being made to significantly cut defense expenditures, Congress called for further realignment of U.S. military bases. "The 1991 National Defense Authorization Act [called] for the Base Closure and Realignment Commission to reconvene in 1993 and again in 1995 to reassess military needs and recommend additional facilities for shutdown" (CBO 1992 p. 3). The 1993 report of the Base Closure Commission recommended that 130 bases be closed, and 43 be realigned (BRAC 1993).

Base closures have been perhaps the most publicly visible aspect of the current build-down. Several attempts have been made in the past to restructure the nation's military bases. Many bases were closed in the early 1960's to reduce overhead. Hundreds were closed in the early 1970s during the build-down after the Vietnam War. These closures met with predictable local opposition. Members of Congress responded to this pressure by enacting section 2587 of Title 10 of the U.S. Code (BRAC 1993). This law required the Department of Defense to notify Congress of proposed base closures and to conduct lengthy environmental reviews before closure. Together these requirements effectively stopped base closures. By the late 1980s, the U.S. system of bases was bloated with excess capacity at the same time that force requirements were decreasing. To break this stalemate, Congress passed legislation in 1988 charging the Commission on Base Realignment and Closure with recommending bases for closure and realignment (P.L. 100-526). The Commission recommended closing 86 bases and realigning 59. Savings were estimated at \$693.6 million annually (BRAC 1993).

It became evident by 1990 that further base closures were required to accommodate post-Cold War reductions in force. Secretary of Defense Cheney recommended additional closures and realignments. Congress passed legislation creating an independent 5-year Defense Base Closure and Realignment Commission to avert political stalemate and ensure closure decisions were made after public hearing (P.L. 101-510) (BRAC 1993 pp. 3-1). The Commission was mandated to meet in 1991, 1993, and 1995 to hold public hearings on and consider base closures and realignments recommended by the Secretary of Defense. The 1991 and 1993 rounds have been held. Another round of base closings is expected in 1995.

In the most recent round, the Secretary of Defense was required to submit his list to the Commission by March 15, 1993. His recommendations had to be based on a force-reduction plan submitted to Congress as part of the President's FY1994 budget proposal and criteria developed by the Secretary and approved by Congress. The Commission was allowed to change the

Secretary's recommendation only if it found these requirements were not met. The Commission was required to submit its recommendations to the President by July 15, 1993. The President could disapprove of the recommendations in whole or in part and return them to the Commission for further consideration. If disapproved, the Commission would have had until August 15, 1993 to submit a revised list to the President. At this point both the President and Congress could have chosen whether to follow the recommendations in whole, but they could not amend the August 15 list (BRAC 1993).

The force structure plan submitted with the FY1994 budget recommended reducing forces 32% from the FY1992 level of 4,971,000 to 3,361,000 by FY1997 (BRAC 1993). The plan was made anticipating that the United States might be called upon to play a role in resolving regional conflicts (BRAC 1993). The 1993 Commission held 7 investigative hearings in Washington, D.C.; made more than 125 visits to bases; held 17 regional hearings; took testimony from hundreds of members of Congress; and reviewed over a quarter of a million letters from the American public (BRAC 1993). On July 15 the Commission recommended to the President that 130 bases be closed and 43 realigned. The Commission estimated that these closures would result in a \$3.8 billion in savings net of one-time costs of \$7.43 billion (BRAC 1993). The recommendations were accepted by the President and approved by Congress. Another round of base closings is expected in 1995 under the 1990 legislation.

The 1991 round of base closures led to a direct net loss of 30,600 military and 27,800 civilian jobs nationwide. In 1991, 305,732 people living in California were on Department of Defense (DoD) payroll. The 1991 round cut 10% of these positions. California absorbed 54% of the national net loss of military jobs (16,500) and 55% of the national net loss of civilian jobs (15,200). The 1993 round of base closures is expected to result in a net loss of 20,700 military and 41,000 civilian jobs nationwide. The 1993 round calls for closure or realignment of 13 military facilities in California. This is expected to lead to a net loss of 15,523 military (75% of U.S. net loss) and 14,160 civilian jobs (34% of U.S. net loss) (DoD 1993a). In 1991, 27% of DoD direct employment was located in California (Commerce 1993a table 546, DoD Atlas FY1991). In total, national military personnel payroll decreased from \$75.6 billion (1990 dollars) in 1990 to \$72.8 billion (1990 dollars) in 1992 (DoD Atlas various years). California military payroll dropped from \$10.2 billion (1990 dollars) in 1990 to \$9.7 billion (1990 dollars) in 1992 (DoD Atlas various years).

2. The State Picture

2.1. Defense Spending in State Economies

Impacts of past and proposed cuts have differed and are likely to differ regionally in short- and long- term effect. In the past, states which were once important defense manufacturing centers have "permanently" lost defense business. But these geographic shifts have been a function of shifts in military demand and technology rather than a direct consequence of changes in the level of defense funding (Malecki 1984).

During the Second World War, military expenditures were concentrated in the Great Lakes states and the northeast. These states were centers of auto and conventional munitions manufacturing before the war. Between 1941 and 1945, Michigan led the nation in military prime contract awards of \$2448 per-capita (1972 dollars) (Crump 1989). In the 1950s and 1960s, military expenditures shifted focus to aircraft and missiles, and shifted geographically away from the Great Lakes states to California and the Pacific Northwest, where space and climate provided a cost advantage in testing and building aircraft. By 1953, Michigan prime contract awards were less than \$200 per capita, and by 1970 less than \$120 per capita (1972 dollars) (Crump 1989). The presence of top universities further favored the development of defense-related electronics and aerospace industries in California and the Northeast during the 1960s, 1970s and 1980s by providing research facilities and a highly skilled labor pool (Malecki and Stark 1988). Recently, Texas, Arizona, Florida, and Georgia have emerged as areas of concentrated defense activity involving space and aviation (Malecki and Stark 1988).⁴

Several lessons can be drawn from looking at the pattern of contract awards to the 10 states with the highest levels of contract awards. First, California has shown a remarkable ability to remain a center for defense industry through major changes in weapons systems. Since development of the aircraft industry during World War II, California has remained among the top 10 recipients of defense spending per capita. In 1992, California continued to lead the nation in direct and indirect defense spending (Crump 1989). However, California's share of prime contract awards nationwide has been dropping since the 1960s (DoD Prime Contract Awards, various years). Second, defense spending is remarkably concentrated geographically. There would be obvious political advantage to spreading defense spending broadly among jurisdictions, yet for the past 50 years 10 states have captured more than 60% of the prime procurement contract awards (Malecki and Stark 1988). But this concentration has also been dropping for the past 40 years. This phenomena more than competition from one or a few other major recipient states seems to account for California's drop in national share.

Defense spending is also characterized by regional specialization. The type of military spending, personnel, procurement -research and development, or operations and maintenance- may have greater influence on a region's economy than the total amount. "The type of military expenditure in a region is a structural characteristic which determines not only the numbers but also the skill levels of personnel, as well as the types of support industries and infrastructure required by the military [or military-supply industry]. An additional qualitative or structural dimension concerns whether defence funds flow into regions through Department of Defense (DOD) facilities or through private industrial firms" (Malecki and Stark 1988). Because the Reagan build-up occurred in peace time its spending was concentrated on military procurement in aerospace, electronics, and communications rather than on military personnel and supplies, as was the case during WWII, the Korean, and Vietnam Wars (Malecki and Stark 1988). These industries all play a major role in the California economy.

⁴Personal communication with Michael Dardia, Rand Corporation, March/April 1994.

**Table 2. Average Prime Contract Awards by State, World War II-1990s
(Percentage of U.S. total)**

Rank	World War II	% of U.S.	Korean War	% of U.S.
1	New York	10.5%	New York	15.3%
2	Michigan	10.5	California	13.6
3	California	9.1	Michigan	9.5
4	Ohio	8.3	Ohio	6.3
5	Pennsylvania	6.8	New Jersey	5.3
6	Illinois	6.4	Illinois	5.0
7	New Jersey	6.3	Pennsylvania	4.5
8	Indiana	4.8	Indiana	4.5
9	Connecticut	3.8	Connecticut	4.2
10	Texas	3.8	Washington	4.0
<i>Percent Accounted for:</i>		70.3		72.2

Rank	1960s	% of U.S.	1980s	% of U.S.	1990s	% of U.S.
1	California	22.0%	California	22.0%	California	19.7%
2	New York	11.0	New York	7.8	Texas	7.8
3	Massachusetts	5.0	Texas	6.9	Virginia	6.0
4	New Jersey	4.7	Massachusetts	5.4	Massachusetts	5.8
5	Texas	4.8	Missouri	5.1	New York	5.3
6	Connecticut	4.5	Connecticut	4.8	Missouri	4.5
7	Ohio	4.4	Virginia	4.5	Florida	4.2
8	Pennsylvania	3.6	Florida	3.7	Maryland	3.5
9	Washington	3.4	Maryland	3.1	Connecticut	3.4
10	Michigan	2.8	Ohio	2.8	Ohio	3.4
<i>Percent Accounted for:</i>		68.8		66.1		63.5

Source: E. Malecki and L. Stark, "Regional and Industrial Variation in Defense Spending: Some American Evidence," in *Defence Expenditure and Regional Development* (1988) and DoD, *Prime Contract Awards by Region and States, Fiscal Years* (various years).

Even procurement spending is regionally specialized (Table 3). Most states have less than 1%, often less than .05% of U.S. prime contracts in all 25 industries. Several states have a large share in one or two industries. For example, between 1989 and 1991 Ohio received an average of 39.4% of prime contracts for aircraft engines, but only 6.8% of total aircraft prime contracts (DoD Prime Contract Awards 1991, 1990, and 1989).⁵ Often this pattern appears to be tied to the presence of a strong civilian industry in the state. Only a handful of states have large shares in several categories. In the 1980's these included California and Texas. These states' diversification may reflect agglomeration economies associated with geographic proximity (see Krugman 1991, Porter 1990, and Glaeser 1992). Diversification among defense industries may lead to states receiving more subcontracts in addition to their prime contracts, concentrating defense spending even further.

The regional distribution of subcontracts from the recipients of prime contracts may also have a significant effect on the impact of defense cuts on a state or regional economy. The pattern of subcontracting has been difficult to study for lack of data. During FY1979 the DoD was required to maintain a record of total subcontracts from prime contracts over \$500,000 by state of origin and destination. A study based on this data found that the geographical distribution of subcontracts closely followed that of prime contracts (Malecki 1984). In FY1979 California firms received \$11,674.3 million in prime contract awards over \$500,000. From these \$881.4 million (54.4%) of the subcontracting was let within the state.⁶ A series of earlier studies suggested that subcontracting was even more concentrated during the 1960s (Malecki 1984). Malecki also found that California and New York led the nation in both prime contracting and subcontracting. He concluded from his own and earlier studies that "subcontracting studies reveal that little net geographic dispersion of DoD funds occurs because of subcontracting. Instead, subcontracting actually increases the concentration of defense money within a few of the top state in the West and Northeast regions of the country" (Malecki and Stark 1988, p. 79). Malecki offered the following explanation for this additional layer of concentration. "This increase in geographical concentration occurs, despite the fact that 50% or more of aircraft or missile-system work may be subcontracted, because the same firms that are common prime contractors are most often the largest subcontractors on other systems. . . . [F]irst consideration often goes to firms that can offer subcontracts in return" (Malecki 1984, p. 38). It also appears that the level of subcontracting activity in a state may be related to the diversity of the state's defense industry (Clayton 1967). California is particularly well situated on both accounts. Preliminary estimates

⁵DoD, Prime Contract Awards by Region and State, reports states' shares of prime contract awards for 25 major procurement-related industries.

⁶This largely supports a modeling assumption that there is no net flow of subcontracts between California and other states. If anything this and the other evidence discussed suggests that this assumption understates the amount of subcontracting dollars coming to California (Robinson, Hoffmann, and Subramanian 1994).

Table 3. Geographic Distribution of Defense Prime Contract Awards by Industrial Sector

	Fiscal Year 1989-1991		
	Rank	State	% of U.S. Total
<i>Aircraft and Parts</i>	1	California	17.9%
	2	Missouri	16.1
	3	Texas	15.3
	4	Connecticut	8.8
	5	New York	7.6
		Total	65.7
<i>Missile and Space</i>	1	California	33.9
	2	Massachusetts	13.1
	3	Colorado	10.1
	4	Texas	7.3
	5	Missouri	3.8
		Total	68.2
<i>Ships</i>	1	Connecticut	18.3
	2	Virginia	17.4
	3	Mississippi	9.7
	4	New York	9.1
	5	California	8.4
		Total	62.9
<i>Electronics</i>	1	California	19.7
	2	Massachusetts	11.7
	3	New York	9.0
	4	Virginia	7.2
	5	Maryland	6.1
		Total	53.7
<i>Services</i>	1	California	17.4
	2	Virginia	13.3
	3	Massachusetts	7.5
	4	Maryland	6.7
	5	Dist. of Columbia	5.0
		Total	49.9

Source: DoD, *Prime Contract Awards by Region and States* (various years).

based on a survey of the six largest aerospace contractors in California indicate that roughly 50% of their subcontracts are let to California firms (52% in 1981, 54% in 1986, and 49% in 1991)⁷

2.2. Defense Spending in California

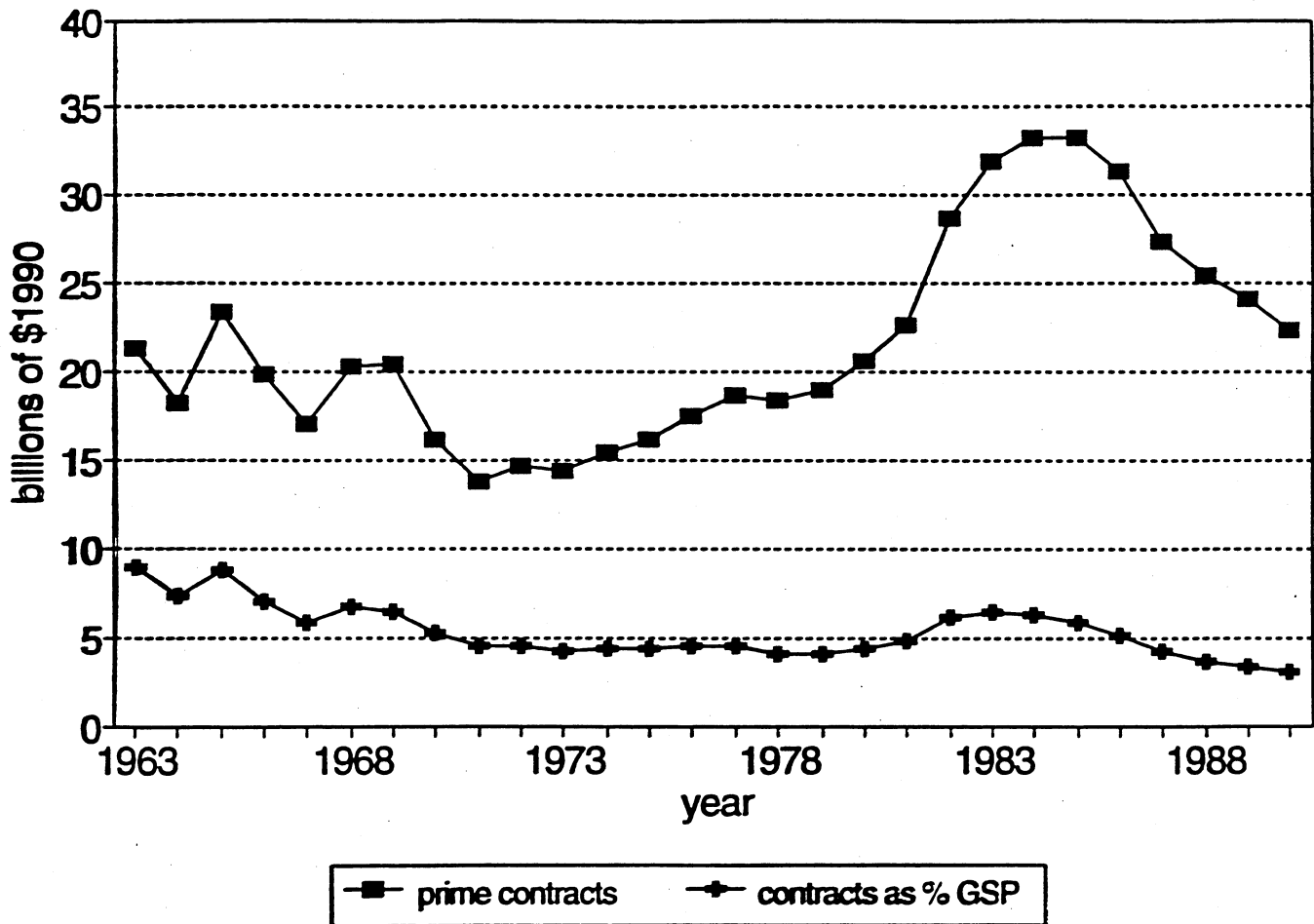
During the 1980s, California gained considerably from the up-side of the defense market.⁸ The Commission on State Finance contends that the Reagan build-up contributed significantly to California's recovery from the 1982 recession. Between 1981 and 1986 (the national peak of the 1980's prime contract awards), prime contract awards to California rose by 47%. During this period, California accumulated \$74 billion (1990 dollars) in excess of its average annual prime contract awards for the period, 1960 through 1979. At the peak of defense outlays under the Reagan defense build up, California received more than \$60 billion (1992 dollars) (Figure 4). This is over \$10 billion (1990 dollars) more than it received at the height of the Vietnam War (CSF 1992). In 1992, it received \$51 billion in defense outlays (1992 dollars) (CSF 1992). Prime contract awards have still not fallen below their peak during the Vietnam War in real terms. Defense-related employment has been credited for more than "half the net increase in manufacturing jobs between 1982 and 1987 (still a relatively small share of total job growth during this period)" (Kroll 1993 p. 2).

State government analysts also see defense spending as contributing significantly to California's current recession (CSF 1992, Gov. 1994). Between 1984 (the peak of 1980s contract awards to California) and 1992, defense prime contracts to California firms decreased 30%. This compares with a 32% drop from 1969 to 1971, in the wake of the Vietnam War.⁹

⁷Personal communication with Michael Dardia, Rand Corporation March/April 1994.

⁸ The only direct data available on the magnitude of defense cuts in California is that on DoD contract awards by state and on direct DoD payroll by state. This data describes for each fiscal year: the value of contracts over \$25,000 let to each of 25 major defense industries for procurement; the value of contracts let to business firms, educational institutions and other non-profit research organizations for research, development, testing, and evaluation (RDT&E); and the number of direct DoD civilian and military employees in a state and the total payroll for these employees. Any information on indirect or total expenditures in a state must be derived from a model. In the California work reviewed below this has most frequently been done by applying a modification of the Bureau of Economic Analysis's (BEA) input/output (I/O) table to an estimate of direct expenditures. Any information on future cuts must be based on projections.

⁹Prime contract awards grew 20% in California, 48% nationally, during Vietnam War build up (DoD Prime Contract Awards various years). These percentage changes are based on prime contract awards in 1990 dollars.



Source: Department of Defense, *Prime Contract Awards by Region and State* (various years); California Department of Finance, *California Statistical Abstract* (1993).

Figure 4. Defense Prime Contracts Over \$25,000 Awarded to California Firms

In its analysis of the role of defense in the California economy, the Commission on State Finance (CSF) estimated that defense expenditures accounted for almost 14% of gross state product (GSP) at the height of Vietnam War-related spending. They estimated that it accounted for only 8.6% of GSP at the height of the Reagan era build up. The Commission on State Finance concluded that the state is less dependent on defense spending and better positioned to sustain the current build down than it was during the build-down after the Vietnam War.¹⁰ They based this conclusion on estimates of total defense expenditure in California, which includes expenditures on personnel and bases.¹¹

The 1980s defense build up focused on modernizing weapons systems and therefore affected procurement expenditures in California more than bases or personnel. As a result, it seems that for the purpose of understanding the impact of the current defense build-down it is more useful to look at the relative dependence of the state on procurement. Defense prime contract awards have averaged 4.6% of California GSP during the past 20 years (1972 through 1991). By 1987 prime contract awards to California firms accounted for only 4.16% of GSP. By 1990, they had fallen to a historic low of 2.97% (compared to 4.05% at the bottom of the post-Vietnam War trough). Based on this measure, it is true that since 1988 California's dependence has dropped to a historic low. Yet, at the height of the Reagan build up, prime contract awards represented 6.5% of GSP compared to 6.6% at the height of the Vietnam War build up. This may indicate that California's defense-related industries are no less dependent on defense than they have been in the past.

Based on this measure of dependence, California has been, and continues to be, more dependent on defense than the nation as a whole. During the past 20 years, this relationship has been more pronounced during defense booms than during ebbs in defense spending. In 1983, prime contract awards accounted for 3.5% of U.S. GDP. In the same year they accounted for 6.45% of California's GSP. By 1990, they accounted for only .78% of GDP compared to 2.97% of GSP (Dept. of Commerce 1993a). This is one reason to expect that California may suffer more than the average state from defense cuts, just as it gained more from the rise.

¹⁰CSF bases its statement on its estimates of defense expenditures as a percent of gross state product. Data is not available on actual state level defense procurement expenditures. Data on state level DoD payroll is available. As a result, any estimate of total defense expenditures at a state level are based on assumptions regarding the state's share of procurement expenditures. This is usually based on the state's share of prime contract awards, for which data is available (DEIMS 1985).

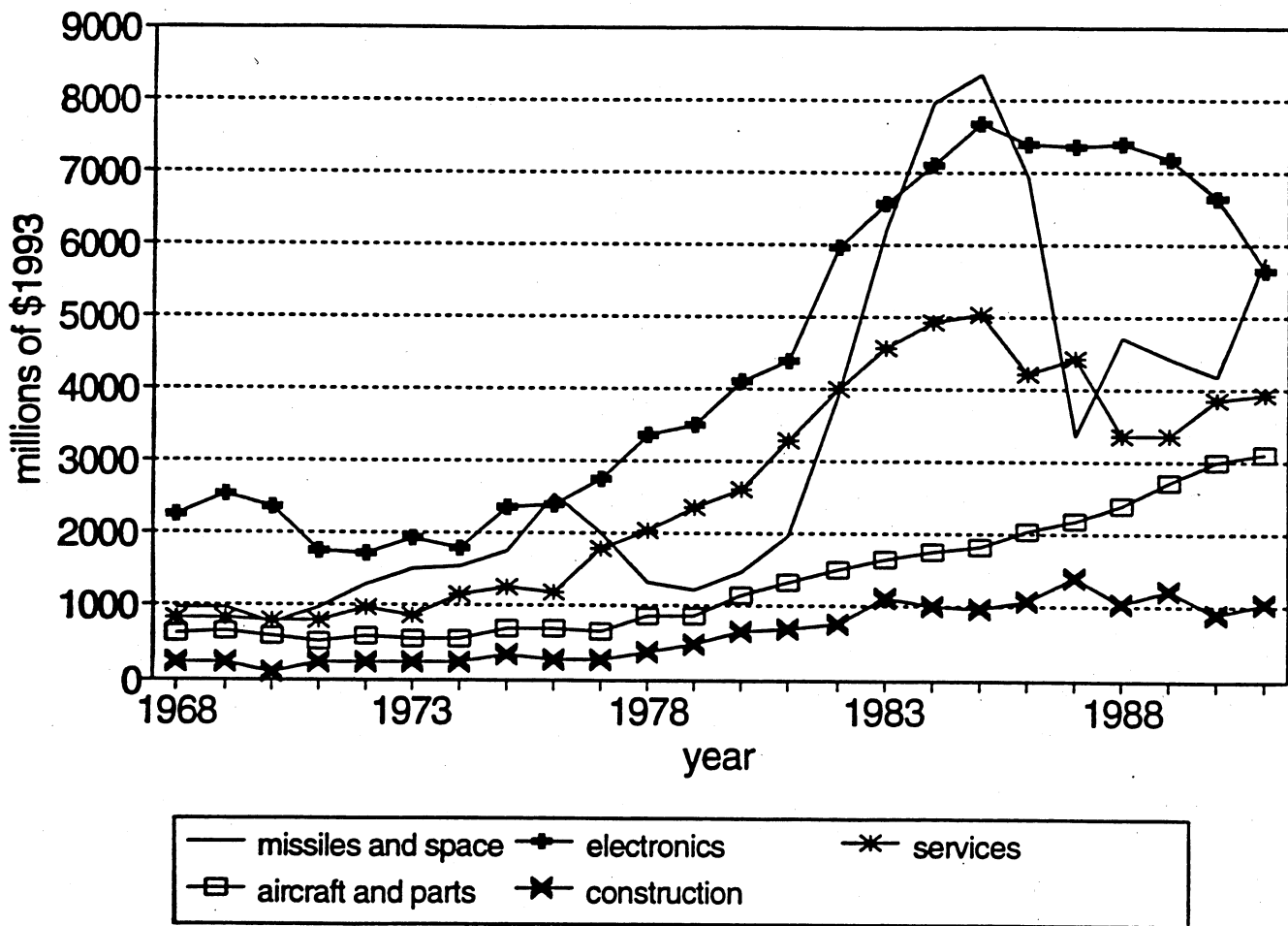
¹¹CSF maintains that California is better positioned than in the past to sustain this cut because its economy is less dependent on defense spending. Using an estimate of defense expenditures, CSF calculates that defense spending as a percent of gross state product rose from 6% in 1979 to 8.5% in 1986 and then fell to roughly 6.5% by 1992. They project that it will continue to fall to 4.5% by 1997 under the FY 1993 budget. CSF believes this fall is due to growth and diversification in the California economy over the past 30 years.

However, this measure of gross dependence may be deceptive. California's vulnerability to any restructuring of the armed forces depends on which particular programs are cut, the level of the affected defense activity in the state, and its role in the state economy. For the past 20 years four sectors (aircraft, missiles and space, and electronics and communications) have been California's largest source of prime contract awards (Figure 5). California received roughly twice as much in prime contracts in these industries in the mid-1980s as it did at the beginning of the decade. In 1981 California received \$1975 million in aircraft prime contract awards compared to \$8347 million in 1985 (1992 dollars). It received \$4376 million in 1981 missiles and space contracts compared to \$7679 in 1985 (1992 dollars). Similarly, in electronics and communications California received \$5038 million in 1985 compared to \$3300 million in 1981 (1992 dollars). Contract awards to these industries fell in the late 1980s, but in 1991 they all still received markedly more in real terms than a decade earlier (\$5837 million in aircraft, \$5630 million in missiles and space, and \$3914 (1992 dollars) million in electronics and communications). Contracts for services, including engineering and design, tripled through steady growth from 1980 to 1991.

California's share of nationwide awards in a given industry affects the vulnerability of that industry's California activities related to national cuts. There is considerable variation in trends among California's major defense-related industries (Figure 6). The missiles and space industries have been losing their share of national defense contracts relatively steadily over the past 25 years, dropping from 45.9% in 1979 to 31.3% of national contract awards in 1991 (DoD Prime Contract Awards for various years). This represents a movement of the missiles and space industry out of California to Texas and southeastern states. The electronics and communications industry lost national contract share steadily from 27.4% in 1978 to 17.4% in 1989. Since then it has climbed steadily to 22.4%. This may represent a change of direction for this industry. California's share of aircraft and parts appears roughly to follow major swings in total defense spending. It peaked at 25.1% of national contracts in 1984, fell to 11.4% in 1987, and more recently has increased to 26.3% (DoD Prime Contract Awards various years). While this measure does not describe these industry's defense dependence, it does give a better picture of which California industries will receive the heaviest federal defense cuts.

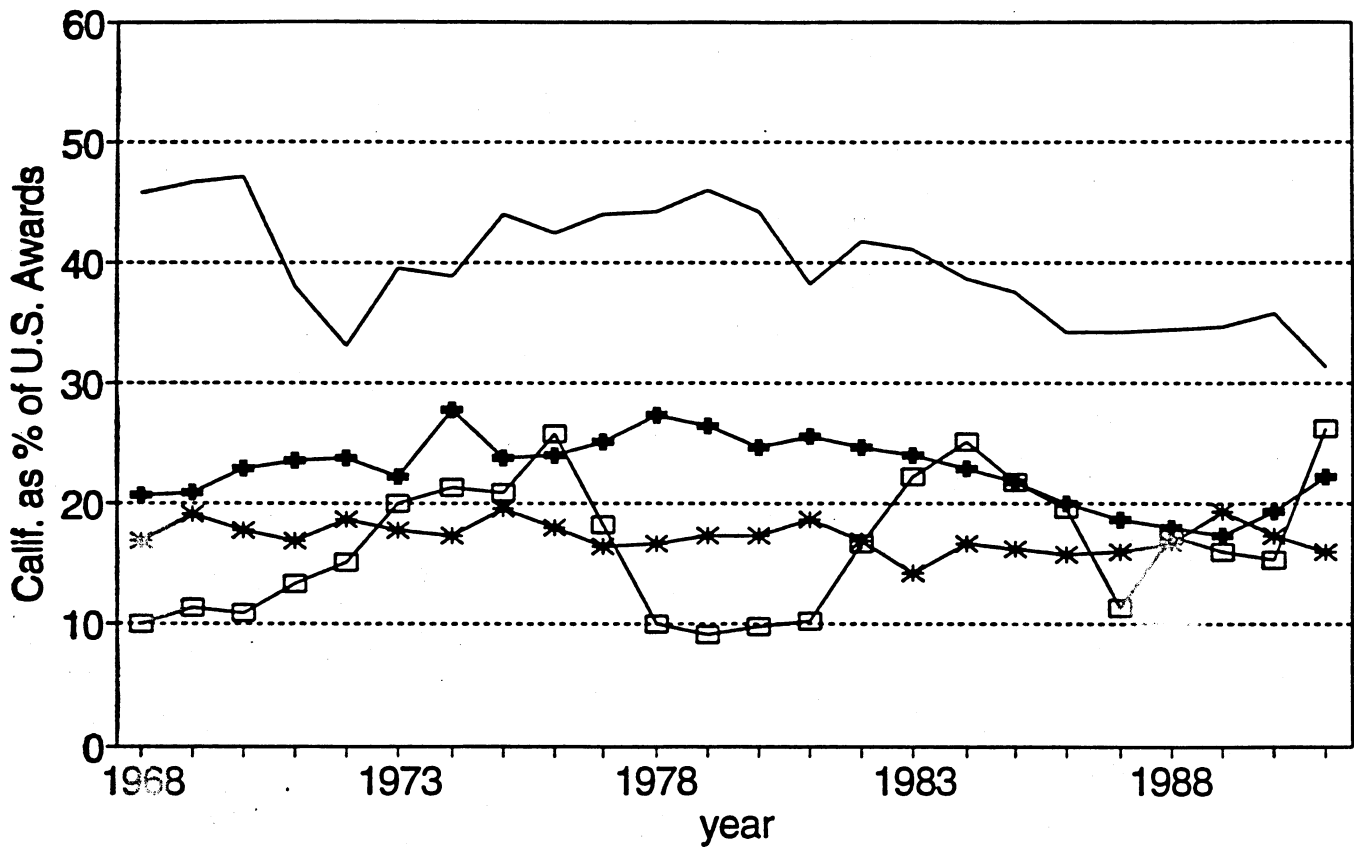
Employees of defense-related industries bear a significant share of the costs of this adjustment. This analysis will estimate the impact of the spending cuts on employment. Ultimately, the impact of defense cuts on employees will depend on the alternatives available. During the past 10 years, the most significant trend in the California labor market has been the sharp increase in service employment, the lack of growth, and, recently, the downturn in manufacturing jobs (Figure 7).

Common wisdom has it that service sector jobs are low skilled and low paid. However, service also includes medium- to high-skilled work in engineering, computer maintenance, accounting, etc. More detailed analysis of the distribution of service sector jobs and wages by skill category would provide useful insights into where displaced workers may be looking to find jobs.



Source: Department of Defense, *Prime Contract Awards by Region and State* (various years).

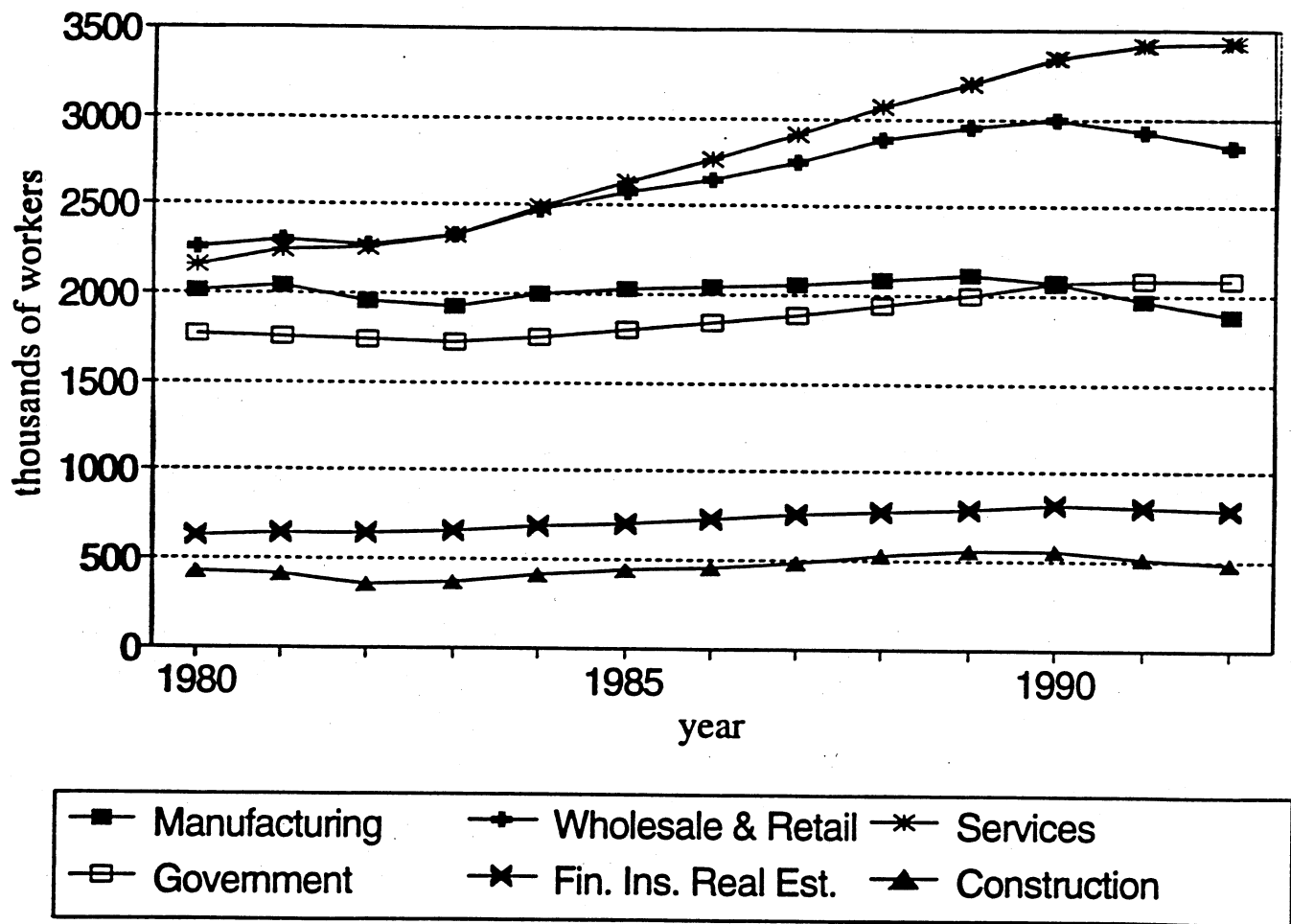
Figure 5. Defense Prime Contracts Over \$25,000 Awarded to California Firms by Sector



— missiles and space + electronics * services □ aircraft and parts

Source: Department of Defense, *Prime Contract Awards by Region and State* (various years).

Figure 6. Defense Prime Contracts Over \$25,000 Awarded to California Firms as % of U.S. Awards by Sector



Source: California Department of Finance, *California Statistical Abstract* (1993).

Figure 7. California Wage and Salary Employment by Major Industry, 1980-1992

Californians have already seen that defense cuts affect some areas of the state more than others. At the peak of the 1980s defense boom, 79.3% of the state's 1988 aircraft employment, 59.2% of its missile employment, and 72.5% of the state's employment in producing search and navigation equipment took place in Los Angeles or Orange counties (Kroll 1993). Between January of 1988 and August of 1992, Los Angeles, Orange, and San Diego counties lost 89,000 of the 107,000 aerospace jobs lost statewide (CSF 1992).¹² Southern California, due to its heavy involvement in the aerospace industry, and Monterey County, due to the closing of Fort Ord, will likely undergo a permanent restructuring as a result of the current build down. A recent report noted: "the concentration of [defense aerospace] firms in Southern California is a further troubling factor in the region's poor showing in the 1990-92 recession, and its prospects for recovery. Industrial sectors showing relative strength in Southern California have either a much lower-skilled, lower paid occupational and wage profile (e.g., apparel) or use educated workers whose skills are not closely parallel to defense workers' skills (e.g., health, motion pictures)" (Kroll 1993 p. 4).

2.3. Defense Cuts in California

In fall 1992, the California Commission on State Finance wrote one of the first reports on statewide impacts of defense cuts based on the Clinton FY1993 budget proposal (CSF 1992). Between 1990 and 1992, CSF estimated that defense spending in California fell from \$56 billion (1992 dollars) to \$51 billion in 1992. They projected that it would fall an additional 22% to \$37 billion (1992 dollars) by 1997. In 1993, they revised this estimate downward to \$33 billion (1993 dollars) based on the FY1994 proposed budget and the 1993 round of base closures (CSF 1993).¹³

¹²Reports of job losses in southern California's aerospace industry may overstate the impact on the area's employment. This statistic ignores findings in regional economics that there are agglomeration effects among industries. Large lay-offs may not result in high unemployment, even within defense industries. As an example, when Rockwell finished the B-1 bomber in 1987 it laid off 18,500 workers. At the same time, Northrup hired as many as 10,000 of these workers. Both of these projects were operated out of the Los Angeles Basin. Northrup was able to take advantage of the fact that there was a large pool of trained workers who already had security clearances in the Los Angeles Basin. The security clearance alone saved Northrup a few months of preparation per worker. Analysts who study the aerospace industry in southern California report that when one talks to people who have worked in the Los Angeles area defense industry for a long time, one hears that most have worked for several different defense contractors. People move from project to project. A pool of ready, trained, cleared workers and engineers is part of what influences locational decisions in the defense industry (Personal communication, M. Dardia, Rand Corporation March/April 1994).

¹³The only direct data available on the magnitude of procurement spending cuts in California is that on DoD contract awards by state and on direct DoD payroll by state. This data describes

The Commission on State Finance maintains that California is better positioned than in the past to sustain this cut in defense spending because they believe that the California economy is less dependent on defense spending than in the past. Using an estimate of defense expenditures, CSF calculated that defense spending as a percent of gross state product rose from 6% of GSP in 1979 to 8.5% in 1986 and then fell to 6.5% by 1992 (CSF 1992). They projected that it would continue to fall to 4.5% of GSP by 1997 under the FY1993 budget. The Commission on State Finance believes that this fall in defense spending's share of GSP is due to growth and diversification in the California economy over the past 30 years.

In part because defense spending in California is concentrated in weapons procurement (73% of total defense spending), and in part because California's aerospace industry is heavily defense-related (65% of industry output), CSF maintains that defense cuts will primarily affect California's aerospace industry (CSF 1992). They estimate that this industry lost 107,000 jobs between 1988 and August 1992 and expect an additional 60,000 aerospace workers will lose their jobs by 1997.

CSF estimated that a total of 126,000 California defense-related jobs were lost between 1988 and 1992 (107,000 aerospace, 19,000 from military bases). CSF estimated that 22% of California's total job loss (810,000 jobs) between 1990 and 1992 was defense related. They projected that an additional 81,000 jobs would be lost between 1993 and 1997 (60,000 aerospace, 21,000 from bases). They based these estimates on experience in the 1970s which showed that defense firms responded quickly to expectations about future defense expenditures. The CSF report has no detailed information on how defense cuts will affect employment in other sectors or how it will affect state finance.

In April 1994, Governor Wilson included an analysis of the impact of defense cuts in his annual budget proposal. He stated:

Pres. Clinton's \$188 billion cuts (FY1994 budget) over the next five years are two and one-half times larger than those in Pres. Bush's last budget proposal. ... As adopted by Congress in 1993, the five-year budget plan will, by 1998, cut real national defense outlays by 40% from peak 1989-88 levels. The cuts will fall disproportionately on equipment purchases, which are slated to drop twice as much as payroll costs. ... Compared to the nation's 40% cut in real defense outlays, California will see real

for each fiscal year: the value of contracts over \$25,000 let to each of 25 major defense industries for procurement; the value of contracts let to business firms, educational institutions, and other non-profit research organizations for research, development, testing and evaluation (RDT&E); and the number of direct DoD civilian and military employees in a state and the total payroll for these employees (DoD Prime Contract Awards, various years, DoD Atlas, various years). Any information on indirect or total expenditures in a state must be derived using this data. The California work reviewed here, estimated direct DoD expenditures in California using a method similar to DEIMS, discussed below.

spending slashed by as much as 60% by 1998. ... Using traditional economic analysis, it is possible to trace roughly half the state's 850,000 plus recession job loss [1990-1993] to the direct and indirect effects of the defense cuts. The direct and indirect effects of defense cuts to date account for at least 60% of the decline in real economic activity. ... Since 1988, the state has lost 162,000 aerospace manufacturing jobs -- 43% of the industry -- due mainly to defense cuts; a significant portion of the 72,000 electronics industry job losses may also be traced to the drop in defense purchases.

(Gov. 1994 p. 13).¹⁴

In April 1993, the Center for Real Estate and Urban Economics at the University of California at Berkeley released an report which focused primarily on strategies for adjusting to the build down (Kroll 1993). Joseph Nation prepared an I/O analysis of state impact for the California State Senate in 1993 (Nation 1993). James Dertouzos and Michael Dardia conducted a study based on surveys of major Los Angeles basin aerospace contractors of subcontracting practices and adjustment to the cuts (Dertouzos 1993). These reports have been requested, but have not yet been received these reports.

In April of 1993, the State Library also released a report on base closures. This report predated the final base closure decisions. The report focused primarily on resources available to communities to help adjust to base closures, and also discussed their likely impact. It was reported that, if approved, the planned third round closing or realignment of 15 California military facilities would create a net direct loss of 32,000 military and civilian jobs (Simmons 1993b). This, in turn, would eliminate 100,000 jobs. Under these assumptions California would have lost "an estimated 250,000 direct and indirect jobs from all three rounds of closures" (Simmons 1993b p. 10).

California has been hit disproportionately by base closures. In the 1988 and 1991 rounds of base closures, California lost 33,699 military jobs and 10,686 civilian jobs. In the third round California is likely to loose 23,309 military jobs and 26,830 civilian jobs (CSF 1993). California absorbed 60% of the job losses associated with the 1988 and 1991 rounds of base closures nationwide, even though it had only 15% of the national military and civilian employment (Simmons 1993b). Given their assumptions regarding 1993 closures, Simmons et. al. estimated that California would absorb 39% of the national job losses associated with the 1993 round of closures (Simmons 1993b). Base closures in the Bay area and Sacramento regions alone account for 45% of national DoD military and civilian personnel reductions (CSF 1993).

¹⁴The Governor's office attributed the cause of 863,000 job losses from 1990 to 1993 to: direct defense cuts 222,000 (25.6%); indirect defense cuts 193,000 (22.2%); direct construction decline 201,000 (23.2%); indirect from construction 143,000 (17.2%); all other 103,000 (11.9%).

3. Measuring the Impact of the Defense Build-Down

3.1 National Models

Part of understanding the impact of policy changes involves understanding how those impacts have been estimated. Efforts to model regional economic impacts of defense spending have relied heavily on national efforts, both for data development and for basic modeling approach. In a sense, a national economy can be viewed as a regional economy within a larger global economy. It is not surprising that many of the same modeling questions arise in both settings. Regional or national economic models must address three basic questions. How will the model capture indirect (multiplier) effects flowing from the initial direct impact? How will the model address substitution effects -- i.e., the fact that outside events can change prices and producers can change their input mix to respond to these price changes? How will the model incorporate macroeconomic phenomenon like savings, capital flows, and imports and exports?

Some of the earliest attempts at national models (input-output models) focus solely on capturing multiplier effects. They are essentially very short-run models which can therefore safely assume no substitution effects and no need to account for capital flows or international or interregional trade. They do give some idea of the direct and indirect effects of an external shock or policy change but, by ignoring substitution, they can overstate the total effect. The DoD's DEIMS model, discussed below, uses a national level input-output model to project direct and indirect defense expenditures resulting from Congressionally approved budget authority. One direction in which these national models have advanced is by combining an I-O model with a macroeconomic model that accounts for savings, interest rates, capital flows, and unemployment. CBO and the Defense Conversion Commission have used one such model, INFORUM (Interindustry Forecasting at the University of Maryland), to model the impact of defense cuts nationally (CBO 1993, DCC 1993a). Another direction in which models have developed is toward a more fully integrated general equilibrium model which incorporates an I/O table into a larger Social Accounting Matrix (SAM) which traces the flow of goods and services through the private and public sectors and accounts for savings, capital formation and international (interregional) trade. These models use the SAM as the data base for an economic model which describes flows of goods and services through the economy. Advances in computer technology have led to several generation of Computable General Equilibrium (CGE) models. Robinson and Roland-Holst, Robinson and Tyson used a CGE model to examine the nationwide impact of defense spending (Roland-Holst 1988). A companion to this working paper, "Working Paper 688, Defense Spending Reductions and the California Economy: A Computable General Equilibrium Model," uses a state-level CGE model to analyze the impact of defense cuts on the California economy (Robinson, Hoffmann and Subramanian 1994).

The Department of Defense (DoD), the Congressional Budget Office (CBO) and the Defense Conversion Commission have each developed models that analyze direct and indirect impacts of defense cuts nationally. These models are widely viewed as the most complete efforts currently used to model national impacts of the defense budget. Each uses a modified input-output model. Both the assumptions made in these models and their results are informative in

considering how to model the impact of defense budgets regionally.

DEIMS. The Department of Defense periodically publishes a multi-year projection of direct and indirect DoD purchases based on the DoD's defense budget authority.¹⁵ The Defense Economic Impact Measurement System (DEIMS) model is used to project direct and indirect purchases from 50 major defense supply industries (most at a 4-digit SIC level), defense related employment, and state level direct and indirect defense expenditures (DEIMS 1985).¹⁶ DEIMS estimates do not reflect the full multiplier effect of direct defense purchases because consumer purchases resulting from DoD pay or from the pay of contractor and subcontractor employees are excluded. Similarly, the employment estimates reflect only direct DoD employment and employment resulting from direct and indirect DoD purchases, not employment resulting from the multiplier effects of consumer purchases.

The DoD reports provide multi-year annual national projections of: 1) direct defense purchases and associated indirect purchases from 50 manufacturing industries; 2) employment by 13 broad occupational classes; 3) employment of 19 categories of engineers and scientists. The DEIMS projections are based on the President's annual budget proposal, not actual appropriations.¹⁷ DEIMS converts budget data to an estimate of annual outlays based on the historical payout rates for each of 50 DoD budget accounts. It then translates outlay data (deflated to 1977 dollars) from each of the 50 DoD budget accounts to purchases from 429 Standard Industrial Code (SIC) industries. DEIMS includes a separate "translator" for each of its 50 budget accounts. The translator consists of the estimated average share of an account historically spent in each of the 429 industries. "The translators vary from one year of the forecast period to the next as the mix of items funded by the account changes" (DEIMS 1985, p. 17). DEIMS then uses Data Resources, Inc. (DRI) update of the Department of Commerce 1977 I/O table to compute the "dollar volume of inputs required to produce the outputs demanded by DoD from each of the 429 industries" (DEIMS 1985, p. 18).¹⁸

DoD uses a modification of DEIMS, Regional DEIMS (RDEIMS), to make state-level projections of: (1) total direct defense purchases and payroll; (2) indirect expenditures resulting

¹⁵This excludes expenditures for DoD civilian functions such as the Army Corps of Engineers and for DoE defense activities.

¹⁶Direct expenditures are purchases made by DoD including procurement and military and civilian pay. Indirect expenditures are purchases of intermediate goods from subcontractors and lower tier suppliers.

¹⁷DoD notes that for state impact analysis it may be more appropriate to base projections on actual appropriations. We base our analyses on accounting data of actual 1990 expenditures.

DEIMS substitutes its own input coefficients for certain major weapons systems for BEA I/O coefficients to more accurately reflect the use of government furnished inputs (Institute for Defense Analysis 1984).

from direct purchases; (3) indirect defense purchases resulting from direct payroll; and (4) for the largest eight industrial sectors in each state, direct defense purchases and the indirect purchases resulting from these them (RDEIMS 1987).¹⁹ While DEIMS focuses solely on purchases, RDEIMS includes salaries of DoD personnel and military retirement payroll as part of Federal Government Wages and Salaries (sector 82). RDEIMS uses the payroll, and the 429 sector-level direct purchase and indirect purchase projections from DEIMS after removing an estimate of goods purchased abroad and pay disbursed outside the United States. The purchase projections are aggregated to 77 sectors (2-digit SIC and other combinations of 4-digit SIC industries). Direct purchases are then allocated among states according to each DoD budget account's historic share of purchases from each state.²⁰ Total direct purchases in a state by industrial sector is the sum of the states' share of these five budget accounts. "A given state's share of purchases from a given sector varies across these five DoD budget accounts" (RDEIMS 1987). State shares are held constant over the contract period. Indirect purchases are not separated by defense budget account; rather, the total purchase from a sector is allocated among states according to their share of total national employment in that sector.²¹ DoD uses Labor DEIMS (LDEIMS) to estimate national level defense-related civilian employment by 77 industrial sectors (DoD 1991). These employment estimates are also broken into 99 employment categories. State level employment is assumed to be proportional to the state's share of direct and indirect defense purchases by industry.

INFORUM. The Congressional Budget Office and the Defense Conversion Commission used the Interindustry Economic Research Fund, University of Maryland (INFORUM) modeling

¹⁹State level projections exclude expenditures made abroad or expenditures for imported goods. "This exclusion is based on an assumption that within a given industry, imports will constitute the same share of defense purchases as they will of civilian purchases. This may overstate defense related imports" (DoD 1991).

²⁰To compute a state's share of direct purchases, DEIMS first groups prime contract awards in a state according to the budget account that funded them. Prime contract awards expenditures are recorded using Federal Stock Codes (FSC). A bridge table is used to link FSC to SIC codes. State shares for direct defense purchases are based on a state's prime contract awards over a 3-year period. DoD believes that the 3-year average more closely reflect outlay patterns than any single year's contract awards. This analysis uses the share of national prime contracts awarded to California firms in 1990 to apportion defense expenditures to California. This is appropriate because this study focuses on a period in which awards were being cut significantly. A multi-year average would dampen the change that the study is designed to measure.

²¹For 10 industries (transportation and warehousing; communication excluding radio and TV; utilities; wholesale and retail trade; real estate and rental; personal services except auto; eating and drinking places; automobile repair and service; amusements; and miscellaneous services), states were assigned shares equal to total defense purchases in the state, excluding these 10 activities. DoD assumed that these 10 activities are more likely to follow the distribution of defense activities than nationwide industry patterns (DoD 1987).

system (CBO 1993) to model national and aggregate state impacts of possible defense cuts. INFORUM estimates changes in industry output for 420 industries using its Detailed Output Model (DOM). DOM takes DEIMS estimates of final demand by industry and uses the Department of Commerce input-output table to generate estimates of total industry shipments. INFORUM estimates national level macroeconomic changes resulting from defense cutbacks using the Long-Term Interindustry Forecasting Tool (LIFT) model. LIFT uses an I/O table to estimate intermediate demand from a given vector of final demand for 83 industrial sectors. Total sector output is the sum of final and intermediate demand. LIFT combines these I/O results with a macroeconomic model to estimate hours of employment, wage rates, and number of employees for each industry. CBO distributes estimated direct defense purchases according to the statewide distribution of prime contract awards. National estimates of indirect purchases (subcontracting) for each of the 429 industries were distributed among the states according to the statewide distribution of each industry's activities in the Census of Manufacturers and the Census of Business. Under this approach, state economic activity is described in terms of gross state output, the sum of private industry sales and public gross output.

3.2. Projections of National Impacts

Each of these studies made assumptions regarding likely defense spending paths over the next 5 to 7 years. The DoD projection of impacts published in November 1991 was based on the Bush FY1991 budget proposal and on the recent geographic distribution of major defense programs. The 1993 CBO paper, *Effects of Alternative Defense Budgets on Employment*, used the Bush Administration FY1993 budget proposal as its base scenario. It then sketched three alternative scenarios, reducing the projected Bush 1998 DoD budget of \$293 billion (1998 dollars) by \$25 billion, \$50 billion and \$100 billion (1998 dollars) (CBO April 1993). These respectively represent 24%, 30%, and 42% cuts in defense spending between 1992 and 1998. The Clinton FY1994 budget fell between the \$50 billion and \$100 billion reduction scenarios, as did its FY1995 defense spending plan based on the "Bottom Up Review" (Table 4).

CBO found that the impact of these alternative defense spending paths on the national economy depended on how the savings from reduced defense spending were used. "In the short run, cuts in defense spending -- indeed, cuts in any type of federal spending -- reduce the demand for goods and services if used to trim the deficit" (CBO 1993, p. 8) In the long run, they could lead to lower interest rates and permanently higher levels of GDP if properly invested (CBO 1993). CBO based its short-run analysis on its January 1993 economic forecast, which it found consistent with the cuts proposed in the Bush FY1993 budget.²² All of the cuts slowed GDP growth in the short run -- the 24% defense reduction led to 1.8% GDP growth in 1998, the 42%

²²That analysis forecasted real GDP growth at 2.8% in 1993 and 3.0% in 1994 (CBO 1993). Real GDP growth was projected to slow during the remainder of the decade, reaching 2% by 1998. The unemployment rate was forecast to drop from 7.1% in 1993, to 6.6% in 1994, to 5.7% by 1998 (CBO 1993).

defense reduction led to 1% GDP growth by 1998. CBO estimated that private sector defense related employment would fall by 610,000 jobs (22.8%) from the 1992 base of 2,670,000 jobs nationwide under the Bush plan; by 780,000 (29.2%) with a 24% reduction, and by 1,260,000 jobs (47.2%) with the 42% reduction (CBO 1993 table 10). Cuts in DoD direct employment by 1998 ranged from 865,000 (under the Bush 1992 plan) out of 5,455,000 jobs nationwide in 1992, to 2,495,000 under the 42% reduction. At an industry level, the aerospace industry shows as loss of 45,000 defense-related jobs between 1992 and 1998 under the Bush Plan. Communications equipment was projected to loose 85,000 jobs.²³

CBO projected that under the Bush plan guided missile sector output would decline on 3% over 1992-1998, while aircraft and parts and communications equipment would decline nearly 13% and engineering and scientific instruments would decline 27% (CBO 1993, Appendix A). Most sectors changed little. In CBO's analysis with the 417 sector INFORUM model, 56% of the sectors changed by less than 1% in either direction even under the largest cut scenario, 28% actually increase by 1% or more (CBO 1993). For those industries highly dependent on defense, obviously the larger the cut the larger the impact. Under the 42% cut, defense output of guided missiles fell 38% from 1992 to 1998, aircraft fell 34% to 41%, and engineering and scientific instruments fell 52% (CBO 1993, Appendix A). obviously the larger the cut the larger the impact. Under the 42% cut, defense output of guided missiles fell 38% from 1992 to 1998, aircraft fell 34% to 41%, and engineering and scientific instruments fell 52% (CBO 1993, Appendix A).

At a state level, CBO estimated that California could expect to see a decrease of 1% to 1.9% in defense related spending by 1998 under the Bush Administration plan, and between 3% to 3.9% under the 42% cut scenario (CBO 1993, figs. 2 and 7). Using the INFORUM model, CBO also estimated that California gross state output would fall by .5% or less by 1998 under a 24% cut and by 1% to 1.9% by 1998 under a 42% cut (CBO 1993, figs. 4 and 8).

In the DoD 1991 study, based on the FY1991 budget proposal, U.S. total direct defense purchases and payroll were expected to fall from \$231.68 billion (1990 dollars) in 1990 to \$193.99 billion in 1997 (1990 dollars) (DoD 1991). Direct DoD purchases and payroll in California fell from \$45.96 billion in 1990 (1990 dollars) to \$37.77 billion (1990 dollars) in 1997. Using the DEIMS multiplier model DoD estimated that direct *purchases* resulted \$141.1 billion (1990 dollars) in indirect spending in 1990 and \$122.3 billion (1990 dollars) in 1997 and \$103.2 billion (1990 dollars) in 1990 and \$86.98 billion (1990 dollars) in 1997 from direct *payroll*. Defense-related indirect purchases in California dropped from \$20.6 billion (1990 dollars) in 1990 to \$17.8 billion (1990 dollars) in 1997. Direct payroll in California was estimated to lead to

²³In terms of defense dependence, California industries are generally better positioned than other major defense related industries. While 80% of guided missile output was defense related in 1992, only 27% to 37% of aircraft and parts industries outputs were defense related, as was 41% of communications equipment. In contrast 56% to 68% of ammunition, ordnance, shipbuilding, and tank production was defense related in 1992. (CBO 1993).

Table 4. Alternatives for Reducing the Defense Budget
(By fiscal year, in billions of current U.S. dollars)

	Fiscal Year								Total
	1990	1993	1994 (est.)	1995 (est.)	1996 (est.)	1997 (est.)	1998 (est.)	1999 (est.)	
									1994-98 (est.)
			<i>Base: Bush Administration's 1992 Plan^a</i>						
Budget Authority	\$ 304	\$ 273 ^a	\$ 282	\$ 284	\$ 286	\$ 291	\$ 296 ^b		\$ 1438
Outlays ^c	299	293	282	283	286	290	293		1434
			<i>Alternative A: Cut \$25 Billion from Base 1998 Budget</i>						
Budget Authority	304	273	277	277	274	273	171		1371
Outlays ^c	299	293	279	277	277	275	271		1378
			<i>Alternative B: Cut \$50 Billion from Base 1998 Budget</i>						
Budget Authority	304	273	273	269	261	255	245		1304
Outlays ^c	299	293	277	272	267	260	249		1324
			<i>Alternative C: Cut \$100 Billion from Base 1998 Budget</i>						
Budget Authority	304	273	267	253	235	219	195		1169
Outlays ^c	299	293	274	261	247	230	205		1216
			<i>Clinton Administration FY1995 Budget Proposal Based on "Bottom Up Review"</i>						1995-99 (est.)
Budget Authority	304	273		252	243	240	247	253	1236

Sources: CBO, *Effects of Alternative Defense Budgets on Employment* (1993). CBO, *Planning for Defense: Affordability and Capability of the Administration's Program* (1994). U.S. Dept. of Commerce; Bureau of the Census, *Statistical Abstract of the United States*, 1993.

Notes: ^a Adjusted for Congressional action in 1993.
^b Projected by the Congressional Budget Office assuming the same real decline in budget authority as in 1977.
^c Outlays estimated after enactment of the fiscal year 1993 budget using economic and spendout assumptions consistent with the Bush Administration's plan.

\$11.7 billion (1990 dollars) in 1990 and \$9.9 billion (1990 dollars) in 1997. DEIMS estimated that the multiplier effect of this direct and indirect spending generated \$1,115.3 billion (1990 dollars) in economic transactions in California in 1991, making total defense related expenditures \$1,115.3 billion (1990 dollars). By 1997 the multiplier effect was projected to drop to \$1,294.7 billion (1990 dollars) and total effect to \$1,360.3 (1990 dollars) by 1997.

The DoD study also provided state level estimates of expenditures by industrial sector (DoD 1991). California's aircraft and parts sector was expected to earn \$4.8 billion (1990 dollars) from direct and indirect expenditures in 1991, dropping to \$3.5 billion by 1997 (DoD 1991). DoD projected that the California radio and communication equipment sector would receive \$7.9 billion (1990 dollars) in direct and indirect defense expenditures in 1991, dropping to \$6.3 billion (1990 dollars) by 1997. The five sectors receiving the highest level of direct defense expenditures were federal government wages and salaries, ordnance and accessories, radio, TV and communication equipment, business and misc. services, and aircraft and parts.

The Defense Conversion Commission (DCC) report based on INFORUM estimated that under the FY1993 budget defense outlays would fall from \$324 billion (1993 dollars) (5.4% of GNP) in 1990 to \$237 billion (1993 dollars) (3.5% of GNP) in 1997 (DCC 1993a). By 1992 procurement outlays had already been cut by 17% from 1985 levels and could be expected to decrease another 28% by 1992 (% in 1993 dollars). These cuts were consistently higher in percentage terms than cuts to total DoD spending -- 5% between 1985 and 1992, 22% between 1992 and 1997. The report presented two sets of analysis: long-run simulations using the University of Maryland's Long Range Interindustry Forecasting Tool (LIFT); and simulations of short run labor impacts using the University of Maryland's Quarterly Economic Simulation Tool (QUEST).

The DCC long-run analysis considered three mechanisms, federal non-defense expenditures, federal tax rate, and federal deficit reduction, to finance two alternative uses of the defense cut savings, consumption and investment. No matter which mechanism was used to finance consumption, GDP was projected to grow at roughly 2.35% per year and productivity at roughly .86% per year from 1992 to 2001 (DCC 1993a). If the "peace dividend" was used to finance investment, the mechanism mattered more. The greatest impact came from using it to finance an investment tax credit (encourage private sector investment). Under this scenario GDP grew 2.49% per year and productivity grew 1.01% per year from 1992 to 2001. Government investment in infrastructure brought the lower end of investment response which was still far favorable to using the savings to finance consumption. With government infrastructure investment GDP grew 2.41% and productivity .92% from 1992 to 2001. The results for the scenario where defense savings were used finance deficit reduction which in turn induced increased investment fall between the two other investment results. The analysis gave no information on the change in industry level output resulting under the 6 scenarios. This model was long-run in the sense that it modeled the economy as converging to full employment in long-run simulations. The long-run simulations indicate that the FY1993 budget could induce the loss of as many as 200,000 manufacturing and 500,000 government jobs by 2001 (DCC 1993a). The authors note that this must be considered in the contexts of forecasts that by 2001 total U.S.

employment will increase by around 18 million jobs over the 1992 level. Together this represents a net *gain* of 2 million jobs.

The DCC short-run analysis asked what impact the six scenarios would have on GDP and unemployment between 1992 and 1996 (DCC 1993a). GDP growth under the deficit reduction case lagged that in the government investment and federal tax cases by 0.4% through 1996 when productivity growth will begin to dominate decreased defense demand (DCC 1993a). Unemployment increased in the tax cut and government investment scenarios by about 0.1%. Under the deficit reduction scenario it increased between 0.4% and 0.5%. The report's authors believe the unemployment results are influenced by "an extremely conservative upper bound estimate of the effect of the defense drawdown on unemployment" (DCC 1993a p. 26).

Conclusion

During the 1980s, the United States experienced a defense build-up comparable to that of previous wars. Between 1980 and 1986, national defense outlays increased 49%, to a level just slightly less (in real terms) than outlays at the peak of the Vietnam War. Since the mid-1980s national defense cuts have paralleled previous post-war experience. By 1991, national defense budget authority was 20% below its 1985 peak and cuts in defense expenditures are expected to continue through most of the 1990s.

By FY1999, under the Clinton FY1995 budget proposal, defense spending is expected to fall 32% from 1990 levels. According to the Congressional Budget Office, procurement spending is expected to fall through 1995 and then increase throughout the remainder of the decade. By 1999, national defense procurement outlays are expected to be 43% below 1990 levels. In the wake of the end of the cold war, Congress also called for three rounds of base closures (1991, 1993, 1995). The 1991 and 1993 rounds are expected to eliminate 120,700 of the 2,115,645 Department of Defense (DoD) jobs that existed nationwide in FY1990.

The California economy benefitted significantly from the defense build-up of the 1980s. According to one study (Kroll 1993), defense-related employment is credited with more than half the net increase in manufacturing jobs between 1982 and 1987. Similarly, the reductions in defense spending are credited with contributing significantly to the downturn in the California economy since 1990 (Gov. 1994). The value of prime defense contracts awarded to California firms rose 47% from 1981 to 1984 and fell 30% from 1985 to 1992. This decline was comparable to the decline between 1969 and 1971, following the Vietnam war. The California Governor's Office translates national cuts in defense expenditures to a 60% cut in defense spending in California (Gov. 1994).

The California economy is more dependent on defense spending than the nation as a whole. California receives a larger proportion of U.S. defense spending than any other state (19.3% of 1992 U.S. defense outlays). But it also has the largest state economy in the nation — 14% of 1990 U.S. GDP (Gross Domestic Product). The share of federal defense spending in

California GSP (Gross State Product) is higher than that in the national economy as a whole (6.7% of California GSP compared to 5.7% of U.S. GDP). These expenditures are concentrated in a few important manufacturing and service sectors (planes, ships, space, instruments, and public administration).

Several studies have examined the impact of defense cuts on the U.S. economy. A major Department of Defense study used the DEIMS model, a relatively straightforward application of an input-output model. Two other major studies by the Congressional Budget Office and the national Defense Conversion Commission have used the INFORUM model, which integrates an input-output model with a macroeconomic model. These studies both conclude from long-run, comparative dynamic experiments that the defense cuts will have a significant negative impact on national employment and GDP. This negative shock can be mitigated, however, by channelling the savings into private or public investment, especially investment that increases productivity.

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