WHAT DETERMINES WHETHER A MANUFACTURING FIRM LOCATES AND REMAINS IN CALIFORNIA?

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ABSTRACT

Manufacturing currently provides high-paying jobs for nearly 10% of working Californians. However, between 1990 and 2003, the state lost almost 400,000 manufacturing jobs. Some believe that a significant portion of this loss in manufacturing base is attributable to statewide public policies that raise the cost of doing business in California. In this article, we offer a perspective on this issue by examining the following: (1) whether it is in California's best interest to pursue manufacturing jobs, (2) the factors blamed by many as responsible for the state's manufacturing losses, (3) what previous academic studies found as important to manufacturing location, and (4) the likely effect of California's business climate on its manufacturing investment. We also use "shift-share" analysis to document the strong tie between national trends in manufacturing and job losses in California, and identify state-specific components that point to the relative strength of most types of manufacturing in California. We conclude with a cautionary note to policymakers that this relative strength may not always continue.

INTRODUCTION

The State of California is a manufacturing powerhouse. In 2007, over 1.6 million Californians worked in manufacturing at over 27 thousand different firms. This raw employment number is far greater than in the next highest state, Texas, which employs a little fewer than one million of its residents in manufacturing. If the five-county Los Angeles Metropolitan Area and San Diego County were a state, its manufacturing employment would be just behind that of Texas. California's manufacturing employment comprises nearly 9% of

national manufacturing employment and over 60% of this industry's sector in the American West (Business News Press Release, 2007).

Manufacturing provides high-paying jobs for nearly 10% of working Californians and generates about $150 billion in value added (final sales less intermediate input purchases). Compared with the 2004 California median income of slightly more than $37,000, the average annual income earned in manufacturing was $57,000 (Keystone Group, 2004, p. 10). Manufacturing employment offers an economic base for California as well as many regional and local economies within the state. Economic impact studies estimate that manufacturing in California supports more than four million jobs and close to one third of the state's total employment (Schell, 2006).

Given the contribution of manufacturing to California's economy, it is reasonable that policymakers are concerned about some dismal trends related to it. California lost almost 400,000 manufacturing jobs between 1990 and 2003. In 1990, nearly 16% of employed Californians worked in manufacturing; 13 years later, this figure fell below 11%. The *Directory of California Manufacturers* (2008) recorded that in 2008 the state entered its fifth straight year of overall factory losses. Some believe that a significant portion of California's loss in manufacturing base is attributable to statewide public policies that raise the cost of doing business in the state. The California Manufacturers and Technology Association (2008) reported that state business costs are 24.2% higher than the national average and thus contribute to the greater loss in manufacturing employment experienced in California than in the rest of the United States. A study commissioned by the Bay Area Economic Forum (2005) noted the competitive challenges imposed by state policy upon California's manufacturing firms.

The previous information offers the necessary background as to why we chose to offer this perspective on manufacturing activity in California. We next explore whether it is in California's best interest to encourage manufacturing activity. Following is a description of the factors most often cited in business discussions as explaining why California is losing manufacturing. Next, we review the findings of academic empirical studies on what actually drives differences across state manufacturing activity. We then summarize the academic consensus of the effects of variables often cited in business climate studies on California. We conclude the discussion with a "shift-share" analysis of changes that separates the overall trend in activity in different California manufacturing sectors between the portion due to a national trend and the portion due to a state-specific trend. We also include a cautionary note to policymakers that California's current relative advantages are not guaranteed.

SHOULD CALIFORNIA CONTINUE TO PURSUE MANUFACTURING JOBS?

The importance of manufacturing activity in the state goes beyond sheer magnitude. The economic benefits of manufacturing activity reach the entire state to a larger degree than the economic benefits generated in most other sectors. These economic benefits in-

clude the following: (1) stronger multiplier effects, (2) greater research and development capacity, (3) higher productivity, (4) higher income and fringe benefits, and (5) greater state and local tax revenue.

MULTIPLIER EFFECTS

Differences in multiplier effects arise because economic activity in a state consists of "basic" and "nonbasic" sectors (or "export-based" and "nonexport-based" sectors). Basic sectors, of which manufacturing is a part, sell a large percentage of their output outside the state in which they produce. By selling output produced in a state to consumers outside the state, new dollars flow into the state's economy. Outside dollars become payments to factors of production in the export-based industry. This process continues and the progressive stream of in-state spending produces a multiplier effect, whereas a given change in earnings or employment in a specific industry produces a greater change in the same variable in the state's economy. The U.S. Department of Commerce's Regional Input-Output Modeling System (RIMS II) illustrates the expected eventual effect of a one-unit increase in either earnings or employment on these measures for the entire state (based upon 2002 data). Table 1 lists some of these multipliers.[1]

Table 1. RIMS II Multipliers for State of California

INDUSTRY	EARNINGS MULTIPLIER	EMPLOYMENT MULTIPLIER
Nonmanufacturing		
Agricultural, Forestry, and Fishing Services	2.1	1.6
Construction	2.1	2.1
Retail Trade	1.8	1.6
Insurance	2.5	2.8
Hotel, Amusement, Rec Services, Motion Pictures	2.2	2.0
Health Services	1.8	2.0
Manufacturing		
Food and Kindred Products and Tobacco Products	3.6	4.0
Apparel and Other Textile Products	2.6	2.1
Chemicals, Allied Products, Petroleum and Coal	2.8	4.4
Primary Metal Industries	2.3	2.5
Industrial Machinery and Equipment	2.7	4.2
Electronic and Other Electric Equipment	2.6	3.9
Motor Vehicles and Equipment	2.9	3.5
Instruments and Related Products	2.0	2.9

Multiplier values for manufacturing industries are generally larger than for nonmanufacturing industries. Nevertheless, policymakers need to be aware that not all manufacturing multipliers are equally potent. An additional manufacturing job in a textile mill, printer, or plastic producer generates only two jobs in the state, or an increase very similar in magnitude to the multiplier predicted for many nonmanufacturing sectors.

RESEARCH AND DEVELOPMENT CAPACITY

The purpose of spending on research and development (R&D) is the discovery of more efficient production processes that benefit a state's economy. One benefit is the use of fewer resources to produce a good or service. This translates into a combination of a lower price for the product, greater wages paid to workers producing the product, and/or higher returns for the owner of the production process. Not to be ignored are the secondary spillover benefits whereby innovation by one firm or industry benefits other firms or industries. Oftentimes these spillover benefits are geographically specific and stay within a state (e.g., Silicon Valley).

HIGH PRODUCTIVITY

Active R&D spending by manufacturing has paid off in the form of greater productivity increases in this sector than in others. Productivity increases guarantee more things produced with fewer resources. Between 1995 and 2001, labor productivity in U.S. manufacturing grew at an annual rate of 4.2%, while the same productivity in the private nonfarm economy grew at only 2.4% annually (Hersh & Weller, 2003).

HIGH INCOME AND BENEFITS

The high value added generated by the typical worker in the manufacturing sector allows the payment of relatively high wages and benefits. Table 2 offers information from the U.S. Bureau of Labor Statistics (2006a) about the average wage earned by all workers employed in a selection of nonmanufacturing industries and different categories of manufacturing industries.The overall mean annual wage earned in manufacturing of $40,320 is relatively high in comparison with the mean annual wages listed for nonmanufacturing industries. Table 2 also lists the far lower mean annual wages for many of the sectors in which Californians are likely to find a job if they lose their manufacturing job: Agriculture, Forestry, Fishing, and Hunting ($22,960); Retail ($27,040); Real Estate and Rental ($36,020); and Arts, Entertainment, and Recreation ($29,260).

Furthermore, as recognized by Hersh and Weller (2003) and Popkin (2003), the nonwage fringe benefits offered to manufacturing employees are typically greater. Table 3 offers evidence for this from a Bureau of Labor Statistics (2006b) publication, *National Compensation Survey: Employee Benefits in Private Industry in the United States*.

Table 2. Mean Annual 2006 California Wage for All Occupations in Listed Industry

INDUSTRY	MEAN ANNUAL WAGE
Nonmanufacturing	
Agriculture, Forestry, Fishing and Hunting	$22,960
Mining	$46,310
Utilities	$55,750
Construction	$41,950
Wholesale	$44,930
Retail	$27,040
Transportation and Warehousing	$40,340
Information	$51,860
Finance and Insurance	$51,150
Real Estate and Rental	$36,020
Professional, Scientific, and Technical Services	$60,590
Health Care and Social Assistance	$41,050
Art, Entertainment, and Recreation	$29,260
Accommodation and Food Services	$19,650
Other Services	$31,680
Manufacturing	
Overall	$40,320
Food	$29,870
Beverage and Tobacco Products	$38,940
Textile Mills	$30,310
Wood Products	$30,660
Paper	$40,430
Printing	$37,510
Petroleum and Coal Products	$53,380
Chemical Products	$48,650
Plastic and Rubber Products	$34,390
Nonmetallic Mineral Products	$35,370
Primary Metal	$39,390
Fabricated Metal	$37,370
Machinery	$42,340
Computer and Electronic Product	$59,390
Electrical Equipment, Appliance, and Components	$39,230
Transportation Equipment	$47,450
Furniture	$32,220
Miscellaneous	$38,910

STATE AND LOCAL TAX REVENUE

Popkin (2003,) reported that in the last decade, manufacturers have paid about one third of all state and local taxes, social security and payroll taxes, excise taxes, import and tariff duties, environmental taxes, and license taxes collected in the country. Though no specific estimates exist regarding the percentage of California's state and local tax revenue originating from the manufacturing sector, it is likely higher than in other states where the reliance on the personal income tax and corporate income tax as sources of state general revenue is not as great. According to the California Legislative Analyst's Office, these two sources of revenue respectively account for about 53% and 11% of the state's 2005–2006 general revenue.[2]

Though manufacturing activity offers heightened benefits to California's economy, it would be remiss if we failed to mention that many forms of manufacturing activity also impose heightened costs on California's natural environment. We do not mean to imply that the state's policymakers should embrace the expansion of all forms of manufacturing activity without careful consideration of economic benefits weighed against environmental costs. That being said, and the need for it being carefully considered when looking at the desirability to the state of encouraging a specific manufacturing plant or industry, our conclusion is that it is in California's general interest to retain most of its existing forms of manufacturing and pursue policies that attract and encourage even more of it.

Table 3. Percentage of Workers in Goods or Service Producing Types of Industrial Sectors Receiving a Particular Nonwage Benefit in United States

NONWAGE BENEFIT	GOODS-PRODUCING INDUSTRY	SERVICE-PRODUCING INDUSTRY
Life Insurance	62%	49%
Short-Term Disability	53%	35%
Retirement	88%	83%
Medical Care	81%	72%
Dental Care	86%	75%
Vision Care	83%	72%
Paid Holidays	85%	74%
Nonproduction-Related Bonuses	55%	44%

FACTORS OFTEN CITED BY NONACADEMICS AS IMPORTANT TO MANUFACTURING LOSS

Reports generated by business groups (see the Keystone Group (2004), Bay Area Economic Forum (2005), and Silicon Valley Leadership Group (2005, 2006, and 2007) as examples) point to the higher cost of doing business in California as the primary reason that manufacturing has declined in the state. Policymakers have all heard that California's above average labor cost, worker's compensation cost, energy cost, corporate tax rate, and a more stringent regulatory environment are the primary drivers of this higher cost of doing business. We extend this discussion further by an examination of three "business climate" studies. Two place California in the bottom of states concerning desirability; another places it in the middle. In doing so, we uncover the variables and methodology that earned California these vastly different designations.

The three representative business climate studies discussed here are the Tax Foundation's (Dubay & Atkins, 2007) *State Business Tax Climate Index*, Pacific Research Institute's (Huan, McCormick, & McQuillan, 2004) *U.S. Economic Freedom Index*, and Consumer News and Business Channel's (CNBC) (2007) *America's Top States for Business.* Below the top state listed as most "business friendly," California is respectively ranked 45th, 49th, and 28th in these three studies.

STATE BUSINESS TAX CLIMATE INDEX

Dubay and Atkins (2007), for the Tax Foundation,use 113 different tax variables to develop its ranking of the 50 state business climates. All tax variables are placed into component indexes by scaling them each from zero (worst) to ten (best), based on how they contribute to the "competitiveness" of each state's tax system in regard to the corporate income tax, individual income tax, sales tax, unemployment insurance tax, and property tax. Across these five component indexes, California did best on the property tax (16th) and worst on the individual income tax (46th). On unemployment insurance, it was ranked 18th, while on the corporate income tax and sales tax it was respectively ranked 40th and 39th.

As an example of how this index is calculated, consider that the corporate tax rate index is created by looking at the top marginal rate (lower is better), taxable-income level at which the highest rate kicks in (higher is better), number of tax brackets (fewer are better), and the average width of brackets (narrower is better). In a critical evaluation, Fisher (2005) pointed out that Dubay and Atkin's interpretation of competitiveness is really about "low taxes, and not neutral taxes" (p. 18). In addition, he stated that nowhere is the multitude of tax preferences (investment and job tax credits, R&D tax credits, enterprise zones, foreign-source income, etc.) accounted for in this index. Fisher concluded, "As a tool for assessing public policy, it is fatally flawed…" (p. 28).

U.S. ECONOMIC FREEDOM INDEX

Huan, McCormick, and McQuillan (2004), writing for the Pacific Research Institute (PRI) believe that they designed an *Economic Freedom Index* to measure how friendly a state government is toward free enterprise and consumer choice. To calculate this overall index, the

generation of scores for each state occurs using 47 different variables spread over five different categories (fiscal, regulatory, judicial, government size, and welfare spending) that PRI considers to best capture the degree of "economic oppression" in a state. For each variable, each state is given a rank of one for the "most free" and 50 for the "least free." The five sector scores for a state are simple averages of the ranks of variables included in the score. As an example, four of the eight variables included in the judicial sector measure are number of attorneys (fewer are better), compensation of judges (higher is better), terms of judges (shorter is better), and medical liability reform (caps on damages are good).

Huan, McCormick, and McQuillan chooses not to report the specific rank of a state regarding a sector but instead lists whether a state was in the first group of 10 states from the top, second group, third group, fourth group, or fifth group. In the fiscal, regulatory, and welfare categories, California finished in the fifth or lowest group. In government size, it finished in the second group. In the judicial category, it finished in the first group. In a somewhat biased weighting scheme that has been criticized by Fisher (2005, p. 55), PRI counts a state's score in the fiscal, regulatory, and welfare spending categories much higher than in the two categories in which California did well. This arbitrary weighting largely determines California's 49th ranking.

AMERICA'S TOP STATES FOR BUSINESS

Two members of the Consumer News and Business Channel (CNBC) newsgroup designed a mid-2007 study that they believe captures which states are better at attracting new business. They began by designating 10 broad categories that they felt describe the "competitiveness" of a state for business, including Cost of Doing Business (22%), Workforce (17%), Economy (16%), Education (12%), Quality of Life (12%), Technology and Innovation (7%), Transportation (5%), Cost of Living (3%), Business Friendliness (3%), and Access to Capital (3%). They then chose 40 different variables (4 for each of the 10 categories) that they believed offer a measure of how states compared across these categories. Choosing not to weigh each of the 10 categories equally in the final calculation of their state ranking, the CNBC researchers decided to anonymously request a packet of economic development marketing materials from all 50 states and count the number of times each of the 10 categories is cited. This led to the relative weights listed in the parentheses next to each of the stated categories.

California's overall ranking of 28th was the result of applying the weights derived from the business marketing tools to the ranks given to California of 48th for business cost, 33rd for workforce, 6th for economy, 31st for education, 9th for quality of life, 1st for technology, 19th for transportation, 49th for cost of living, 48th for business friendly, and 1st for capital access. The methods used in the derivation of this middling ranking for California exhibit a greater balance than in the other two studies. CNBC captured in its choice of 40 variables a vast majority of the elements that could attract or repel a business (including a manufacturer) from a state. A potential flaw in the CNBC methodology is the exclusive use of the literature used by the states to promote their own economic development in assessing the relative importance of the 10 categories. A state will emphasize in such literature what it hears

business people say as important to economic development. As discussed next, this may or may not be what is actually important. Business cost and regulation categories drive about two thirds of the determination of where a state ranks.

Academics completing statistical studies, and questioning business location decisions, have long been skeptical of soliciting only the personal opinions of business people on this issue (see Anderson & Wassmer (2000, pp. 32–35); Bittlingmayer, Hall, & Orazem (2005), Courant & Fulton (1985), and Fisher (2005) as examples). Business people likely view the opportunity to answer such a question as an opportunity to lobby for a public policy change that increases their bottom line. The preferred method of determining what really drives a manufacturing firm to locate in one state as opposed to another is to examine studies of real-world data that correlate the observed relationship between explanatory variables thought to cause differences in business location to real-world measure of differences in manufacturing activity across the states.[3] We offer a brief review of such studies next.

DETERMINANTS OF MANUFACTURING LOCATION

A MANUFACTURING FIRM'S LOCATION DECISION

A business is most likely to locate in the jurisdiction where it earns the largest profit. As noted by Schmenner (1982), differences in profit across jurisdictions are determined by differences in the market for the good or service the firm sells, differences in the availability and quality of inputs needed to produce the firm's output, and differences in state and local government activities across jurisdictions that influence the firm's profitability. State policymakers possess little ability to affect the market (either increase the number of demanders or reduce the number of alternate suppliers) for a firm's product. Policymakers also possess limited ability to improve the input markets needed by a firm. Policymakers have the greatest ability to alter the government provision of goods and services that benefit a business, or alter the tax and regulatory policies that cost a business.

When holding sales constant, profit maximization is the same as cost minimization. Thus, businesses prefer lower taxes, lower labor costs, and less regulation that would force them to alter their production methods from the least costly method. Everything else equal, firms also prefer high-labor productivity and access to government-provided infrastructure, goods, and services they use in production. Government-provided inputs used in production allow a firm to produce the same number of goods and services with fewer purchased inputs, thereby lowering costs and raising profits.

Most data-driven studies that assess what variables influence where a manufacturing firm locates, and whether variables influenced by public policy can exert an influence, rely upon this model of profit maximization to determine which variables to examine. Next, we discuss several categories of the variables widely cited as likely to influence the location choice of a firm, limiting our consideration to those that are possibly influenced by the decisions of state policymakers.

LABOR COSTS

The relationship between the observed cost of labor in a state and the interstate location decision of manufacturing firms is not clear-cut. Lower wages and benefits are not attractive to a firm's bottom line if they are the result of less skilled or educated workers. Using regression analysis, Bartik (1985) found (holding other location factors constant) that higher wages were a negative influence on the probability of locating a new branch plant in a state. Little (1978), and Lugar and Shetty (1985), deduced through sound empirical studies that state wage differentials influenced foreign manufacturing investment more than domestic. These findings contrast with Glickman and Woodward (1987), who observed that wage differentials across states did not affect the observed differences in the employment growth of foreign-owned firms. Unfortunately, because these studies have varyingly controlled for the positive factors (higher skills, higher education, healthier, etc.) and negative factors (lack of labor supply, unionization, etc.) that can drive labor costs higher in a state, little consensus has been reached on the influence of high wages on the degree of manufacturing activity in a state.

UNIONIZATION

Empirical studies have tried to isolate the independent influence of statewide unionization on intrastate manufacturing location decisions. Carlton (1979, 1983) was one of the first to examine whether the presence of state laws restricting union activity affected business location decisions between states. Later researchers improved upon Carlton's analysis by using the unionized percentage of the private workforce as a separate variable in their regressions. Bartik (1985) found that high-unionization levels within a state serve as a strong deterrent to the formation of new branch plants. These results mirror those reported earlier by Newman (1983) and Plaut and Pluta (1983), who both record an average union elasticity of about -0.4.[4] Similarly, Woodward (1992) argued that foreign manufacturing firms perceive the presence of unions as an impediment to their own corporate "culture" and discourage foreign direct investment. Likewise, Glickman and Woodward (1987) discovered that the presence of state right-to-work legislation negatively affected the growth of foreign firms in a state.

In contrast, Coughlin, Terza, and Vachira (1991) found a positive relationship between higher rates of unionization and foreign direct investment in a state. They noted that this positive effect may be the result of an interaction between unionization and lower rates of unemployment. Beeson and Husted (1989) also reported a correlation between higher rates of unionization and greater productive efficiency in manufacturing at the state level. Dalenberg and Partridge (1995) found a very small, but positive and statistically significant, effect for unionization on state business activity. As just described, there exists a mix of empirical findings regarding the influence of unionization in a state on industrial activity in that state, with a slightly greater number of studies finding a negative influence.

TRANSPORTATION NETWORKS

By facilitating the movement of inputs from suppliers and goods to consumers, the transportation infrastructure of a state or region can significantly affect a manufacturing

firm's profit margins and hence its location decision (see California Infrastructure Coalition (2005); California Performance Review (2004)). Woodward (1992) argued that a measure of firms' accessibility to regional and national markets is the presence of transportation linkages and reported evidence that greater linkages of this form correlate with greater manufacturing activity. Interstate highways are especially attractive for firms, given their role in connecting nonurban counties to larger markets. Moriarity (1983) earlier found a similar role for transportation access in the location decision of foreign firms at the substate level. Bartik (1985) included a transportation variable in his study as a proxy for public services and found that it exerted a positive influence on a measure of business activity.

Fisher (1997) reviewed the literature on transportation's effects on economic growth (controlling for other public services such as highways, education, and public safety) and found that nearly 70% of previous studies yielded a statistically significant and positive influence for transportation. Of the 15 studies reviewed by Fisher, 8 reported a statistically significant positive relationship between the presence of transportation/highways in a state and the state's economic development.

With the exception of the findings recorded by Dalenberg and Partridge (1995) that highway and other public spending had a negative effect on economic growth, transportation networks in previous empirical studies exert a near uniform positive effect on a state's economic development. However, this is not true of other types of public spending, such as on education or public safety, in which the empirical results are mixed.

STATE AND LOCAL TAXES

As discussed by many previous reviewers (Anderson & Wassmer, 2000; Bartik, 1991, 1992; Fisher & Peters, 1997; Papke, 1993; and Wasylenko, 1997) of the extensive economic literature on the impact of state and local taxes on business, decision makers must exercise care in their interpretation of findings for policy purposes. Many of these studies look at the impact of state and local taxes on economic activity or economic growth (as measured by employment or income growth) rather than specifically on business creation or location. These studies report findings using the concept of elasticity, or the percentage effect in state and/or local business activity expected to occur after a 1% change in state and/or local taxes.

Luger and Shetty (1985) noted that the importance that taxes exert upon business location decisions depends upon the type of industry studied. Wasylenko (1997) observed that manufacturing industries are not as tied to locating in one region or state because they typically sell their products in national and international markets. Such firms are naturally more migratory and thus responsive to differences in cost factors influenced by subnational government tax choices. This theoretical argument concurs with the findings of other researchers that manufacturing location decisions are more sensitive to taxes than nonmanufacturing location decisions (Anderson & Wassmer, 2000; Fisher, 1997; Testa, 1989; Wasylenko & McGuire, 1985).

Research that studies the effect of taxes on economic growth focuses on detecting its influence at either the intraregional (within a state or metropolitan area) or interregional level (between states or metropolitan areas). The consensus among empirical researchers

is that differences in the rate of taxation across potential locations within a given region or state are much more likely to exert an influence on business location choices than differences between regions or states. As argued by Bartik (1991), and Anderson and Wassmer (2000), the reason is that other factors that influence where a firm locates are held constant across possible interregional or interstate locations. Differences in taxes paid are more likely to be the swing factor in determining whether a firm chooses a location in one city as opposed to another in the same metropolitan area or same state. In support of this belief, Papke (1995) found that for six states in the Great Lakes Region, net of tax returns on investment for various types of manufacturing were similar enough that one state could not be preferred over another.

Wasylenko (1981) suggested that taxes have a significant negative effect on business formation at the intrastate level. Newman (1983) observed state corporate income taxes also had an effect on business location decisions at the interstate level. A further study by Newman and Sullivan (1988) tentatively concluded that there was a negative tax effect, but only under certain model specifications at the interstate level. Bartik (1985) argued that state taxes on corporate profit had a negative and significant effect on manufacturing branch plant formation at the intrastate level. Helms (1985) observed that a state's tax pattern would have a significant effect upon its ability to attract and retain businesses, particularly if the tax revenue funds transfer payments. Papke and Papke (1986) found that tax differentials may play an important role in business location decisions because higher taxes consistently deter business activity. Bartik (1989) examined the effect of taxes on start-up firms and mentioned a statistically significant negative effect, particularly for property taxes.

Wasylenko (1997) identified 74 interregional and/or interstate tax studies with most studies showing a negative tax elasticity of economic activity (i.e., lowering the tax rate would result in an increase in economic activity). Studies that found statistically significant negative elasticities include Bartik (1989); Brown, Micszkowski, and Syron (1980), McConnell and Schwab (1990), Munnell (1990), Papke (1991), and Wasylenko and McGuire (1985). Phillips and Goss (1995) performed one of the only formal meta-analyses found in the literature on the effects of taxation on business location. Their results generally confirm the previously discussed conclusions that the influence of taxes on business location is greater at the intrastate than interstate level, and that taxes are more likely to influence the location of manufacturing than commercial activity. Therefore, a review of the empirical literature reveals that, in certain instances, the level of subnational taxation influences the location decision of a manufacturing firm.

When firms were surveyed, they unsurprisingly responded that lower taxes were a key variable in their location decision without explicitly acknowledging the benefits that also accrue to them from the programs that taxes finance. It is for this reason that Wasylenko (1997) examined over 70 previous studies to ascertain the role taxes play in stimulating economic development by attempting to explain why the estimates of tax effects vary so widely across those studies. After discussing the nonfiscal variables (such as labor costs, energy costs, unions, and agglomeration economies) that previous studies have included in their analyses of what influences a firm's location decision, Wasylenko then dissected

how previous studies have included fiscal policy variables. He noted how the quality and quantity of public services are measured, as well as the fact that certain industries may value some services and not others, which complicates the interpretation of different analyses. For example, most surveys report that firms value transportation infrastructure, and high-quality primary and secondary education for their ability to move inputs and goods and attract workers, respectively, while firms do not value government spending on welfare and prisons. An additional complication is whether the measurement of fiscal policy variables is as nominal rates or by the ratio of revenue collected to personal income or population. He concluded that the imprecision with which most explanatory variables are measured is an ongoing problem in this area of research. However, Wasylenko did note an important lesson that emerges from the data. Intraregional studies consistently report higher elasticity values than interregional studies. Studies that analyze a smaller geographical area are likely to see less variation in nonfiscal variables since jurisdictions in the same geographical area will have access to the same labor force or transportation infrastructure, but they can distinguish themselves from other locations through the use of distinct local fiscal policies.

As seen in summary Table 4, the preceding review of the literature reveals that high levels of transportation networks and regional markets are likely to act as attracters of manufacturing activity to a state, and that the level of taxation imposed upon a manufacturing entity within a state is likely to exert a negative influence (albeit relatively small) on the amount of industrial activity observed in a state. The problem with putting this information to use in designing manufacturing friendly policies in a state is the difficulty and expense, or both, in manipulating these statewide variables in a manner that attracts additional, or retains existing, manufacturing activity. The next section examines the cumulative effect of these variables on the performance of California's manufacturing sector compared with manufacturing at the national level.

Table 4. Summary Effects of Variables on Firm Location Decisions
(As Predicted by Empirical Literature)

POLICY VARIABLE	PREDICTED EFFECT
Labor Costs	*Generally negative, though complicated by positive correlation between high wages and high labor productivity*
Unionization	*Mixed results, though leaning to negative*
Transportation	*Almost uniformly positive*
Regional Markets	*Positive*
State and Local Taxes	*Negative but likely small influence*

SHIFT-SHARE ANALYSIS

A shift-share analysis can separate the overall growth or decline in an economic variable for a state into a state-specific component and a national component. Shift-share analysis is not a behavioral model. It does not explain why a state grows or declines differently than the nation. It merely utilizes a well-accepted framework for identifying these two components of growth or decline (Andrikopolous, Brox, & Carvalho , 1990). We next use shift-share analysis to provide insights into the recent employment performance of specific industrial sectors in California.[5] The components of growth calculated for the various industries are as follows:

(1) a "national share" (N) or the effect of the national overall growth rate component;

(2) an "industrial mix" (IM) or the effect of the industrial structure in California as compared with the nation;

(3) a "competitive effect" (C) or the amount of growth not due to N or IM.

NATIONAL SHARE COMPONENT

The national share (N) reflects expected growth in the state had it grown at the same rate as the nation. The calculation of N involves multiplying the base-year employment in each economic sector by the growth rate of total national employment between the base year and terminal year.

INDUSTRIAL MIX COMPONENT

Industry mix (IM) refers to the initial industrial structure of a given state. The industrial mix component measures the influence of fast or slow growing industries within a state economy. If a state is growing faster than the national average, it may be due in part to a concentration of rapid growth industries. For example, the service sector of the national economy has been growing faster than all other national economic sectors. Given that a large proportionate share of California's economy is in service-related industries, it would not be too surprising to find California's rate of economic growth far exceeding national growth. However, this might not be a sign of a healthy economy, because a reversal in this one economic sector could cause overall state economic reversal. By isolating the industry mix component, it becomes clearer when positive and diversified growth is occurring.

COMPETITIVE COMPONENT

The competitive (C) component for a specific industrial sector is the most important to examine in terms of state-specific effects on a particular industry. A positive C for a specific industry (sometimes called the state share) is an indicator of a state's competitiveness with other states for a particular economic sector. Economists therefore consider the competitive component as the dynamic element in state employment increases (Andrikopoulos et al., (1990); Curtis (1972); Kalbacher (1979); and Petrulis (1979)).

METHOD

We analyzed two periods, 1998–2001 and 2002–2005. The 2001 break accounts for the economic difficulties and recessionary pressures the nation and California were experiencing at that time. Data beyond 2005 were unavailable at the time of the study. In the analysis, the industry mix (IM) component is positive for industries that grew above the overall national average during the periods. The competitive component (C) is positive if the industry in California out-performed the industry at the national level. Overall, when comparing California with the United States during the periods under consideration, California benefited from competitive local factors that counteracted dampened employment growth in national manufacturing sectors. This is clear from the information in Tables A1 and A2 offered in the Appendix.

Appendix Table A1 decomposes California's job growth in comparison with that of the nation's employment as a whole. With rare exceptions, California's unique competitiveness reverses the downward trend in manufacturing in both periods and one observes overall manufacturing increases for most subsectors in California across the two periods. The exceptions to the employment growth pattern in the most recent 2002–2005 period were Food, Beverage, and Tobacco Products; and Chemical Manufacturing. Also important to note from the shift-share analysis are the following:

- Positive state factors helped most California industries grow faster at the state level than the national level.
- Durable Goods experienced the greatest decline nationally; however, strong state factors help this industrial sector out-perform Nondurable Goods.
- Computer, Transportation, and Apparel had the greatest percentage of employment growth between 2002–2005, both in actual workers and in growth attributable to state factors.

Appendix Table A2 results have used shift-share to examine the effect of the within-manufacturing differences in employment attributable either to California or the sector itself. The national trend toward loss in manufacturing employment, which manifested itself in the industrial mix columns in the previous tables, is in the national columns in this table. If employment in the manufacturing sectors in California had grown at the same rate as the national manufacturing sectors, then California would have lost jobs in all subsectors across both periods. Since California mostly gained manufacturing jobs during these two periods, additional factors must be in play. The industry mix column provides evidence for the relative strength or weakness of each subsector versus manufacturing in general. As can be seen, there are a number of sectors (i.e., Textiles; Apparel, Printing and Paper) that lost employment nationally at a faster rate than the manufacturing sector as a whole. Other sectors, such as Food and Printing and Furniture, did better than the overall manufacturing rate. Thus, the industry mix column reveals California employment changes resulting from changes in the relative importance of each particular subsector nationally.

The largest and most notable value here is the large employment loss component in 2002–2005 within the Computer and Electronics sector, attributable to the increasing internationalization of such manufacturing.

The state share column in Table A2 shows unique state factors at work. It is the state's comparative advantage that ultimately yields mostly positive employment growth within these manufacturing subsectors in California. This is particularly true in the Computer and Electronics, Transportation, and Printing sectors. Chemical Manufacturing is notable for being one of the few sectors to have negative state factors work against it in the 1998–2001 series and negative national factors in the 2002–2005 series. Though the Transportation, Apparel, and Textile and Computer/Electronics industries struggled nationally, they posted strong gains in California. Transportation and Fabricated Metal products stand out as industries with both strong local factors and in-

Table 5 2002–2005 California Manufacturing Employment Changes Due to National and State Factors

INDUSTRY SECTOR	NATIONAL JOB CHANGE	NATIONAL % CHANGE	CALIFORNIA JOB CHANGE	CALIFONRIA % CHANGE
Manufacturing	-1.012,000	-7.2%	192,500	11.7%
Food, Beverage, and Tobacco Products	-75,000	-4.6%	-2,300	-1.2%
Textile Product Mills	-98,000	-26.0%	5,100	15.8%
Apparel	-107,000	-35.5%	30,800	30.3%
Wood Products	-2,000	-0.3%	3,600	8.9%
Paper Mfg.	-59,000	-12.5%	4,700	14.9%
Printing and Related Support Activities	-61,000	-9.4%	13,500	19.4%
Petroleum and Coal Products Mfg.	-7,000	-6.4%	2,000	12.9%
Chemical Mfg.	-51,000	-5.9%	-300	-0.3%
Plastics and Rubber Products Mfg.	-44,000	-5.5%	8,500	13.3%
Nonmetallic Mineral Product Mfg.	-15,000	-3.0%	500	1.0%
Primary Metal Mfg.	-39,000	-8.5%	3,400	12.6%
Fabricated Metal Product Mfg.	-23,000	-1.5%	20,800	14.1%
Machinery Mfg.	-61,000	-5.3%	11,500	12.4%
Computer and Electronic Product Mfg.	-183,000	-14.1%	53,200	14.5%
Electrical Equipment and Appliance Mfg.	-62,000	-14.4%	2,300	5.7%
Transportation Equipment Mfg.	-54,000	-3.0%	21,600	15.7%
Furniture and Related Product Mfg.	-37,000	-6.6%	6,800	9.9%
Miscellaneous Mfg.	-34,000	-5.2%	6,800	7.2%
Durable Goods	-510,000	-5.7%	130,400	12.3%
Nondurable Goods	-501,000	-9.6%	62,100	10.6%

creased national pressure for employment growth. The greatest changes in state share factors between the two periods occurred in the Food/Beverage sector (negative), Fabricated Metal sector, Printing sector, Computer/Electronics sector, and the Miscellaneous Manufacturing sector. This indicates a strengthening of these sectors versus the others, with the exception of the Food/Beverage sector.

Table 5, calculated from the previous shift-share analysis, shows that manufacturing sectors in the state have outpaced the rest of the United States for purely California-specific reasons. This is most evident in the Transportation, Apparel, and Textile and Computer/Electronics industries. Both of these struggled nationally but posted strong gains in California between 2002 and 2005. Additionally, Transportation and Fabricated Metal products stand out as industries with both strong state factors and increased national factors causing employment growth.

CONCLUSION

As shown by the results in Table 5, California is in a unique position to chart its industrial future because it has weathered past economic downturns more effectively than other states and will likely do the same over the current recession. The results of our shift-share analysis demonstrate the **relative** success of California's manufacturing. We purposefully emphasize relative in comparison with other states and not **absolute** success**,** as done by others concerned about manufacturing trends in the state. California's relative success is attributable to statewide factors that naturally bless California (location and climate) and public policies toward business that are not too far out of line with the average (as documented in the more holistic CNBC business climate study). Kolko and Neumarck (2007) also documented California's relative success in manufacturing through a recent study for the Public Policy Institute of California that shows the state's 1992–2004 loss in manufacturing as primarily the result of firm closures and not firm relocations out of state. Not surprising, given the theoretical arguments and empirical evidence we have cited, firm movements between adjacent counties within the state and toward inland California dominate the types of manufacturing firm relocations observed in the state over this period. Nevertheless, we must conclude our perspective on manufacturing in California with the caveat that California's policymakers would be wise to heed some general advice whenever they craft public policies that could potentially impact the desirability of a manufacturer remaining in the state.

First, policymakers need to remember that the presence of manufacturing activity in California offers unique economic benefits that justify public attention toward attempts at retaining firms. Second, it is true that manufacturers in the state do face higher labor costs, worker's compensation costs, energy costs, corporate tax costs, and regulatory costs than in some other states. But this disadvantage to manufacturing is offset in part by location, climate, quality of life, transportation, and access to capital and regional markets that place California somewhere in the middle of the states regarding its business climate (as determined by the CNBC assessment) and not at the bottom (as determined by the Tax Foundation and Pacific Research Institute). Third, it is not safe for California's policymakers to just

sit back and rest on these positive offsets as they attempt to minimize the loss in manufacturing activity over the next recession. According to the academic literature summarized in Table 4, manufacturing activity in a state very likely responds negatively to a decline in a state's regional markets and transportation infrastructure, to high wages paid to a workforce declining in skill and/or education, and to taxes levied on business that are far out of line with those being levied in neighboring states and/or with competing states that offer a similar menu of business amenities.

We finish by disagreeing with previous studies that blamed California's recent decline in manufacturing activity on purely unfriendly business policies. However, we must caution policymakers of the need to preserve the positives that enter into a calculation of California's business climate if they wish to continue to enjoy the state-specific advantages found in our shift-share analysis.

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NOTES

1 A full list of multipliers is at California Economic Strategic Panel (2002).

2 See http://www.lao.ca.gov/2006/cal_facts/2006_calfacts_pdf_toc.htm

3 Dardia and Luk (1999) make the same points.

4 This elasticity is the percentage effect in state and local business activity expected to occur after a 1% increase in state and local unionization rates in the labor force.

5 Three criticisms are leveled against shift-share analysis: (1) calculation of the structural component takes no account of linkages between the industries of a state and that, for example, a fast growing industry may promote growth in other industries which supply it, (2) industrial classifications are to some degree arbitrary, and (3) it offers no explanation of the residual or unexplained growth.

APPENDIX

Table A1. California Shift-Share Calculated Against U.S. Employment

		1998-2001				2002-2005			
USING NATIONAL EMPLOYMENT		NATL.	INDUSTRY MIX	STATE SHARE	TOTAL CA	NATL.	INDUSTRY MIX	STATE SHARE	TOTAL CA
30000000	Manufacturing	69,624	-160,025	14,0401	50,000	38,588	-149,124	303,036	192,500
311000	Food, Beverage, & Tobacco Products	8,918	-7,562	-1,955	-599	4,496	-12,939	6,143	-2,300
313000	Textile Product Mills	1,236	-7,049	9,313	3500	756	-7,413	11,757	5,100
315000	Apparel Manufacturing	3,795	-24,672	35,277	14,400	2,382	-29,001	57,419	30,800
321000	Wood Product Manufacturing	1,740	-3,063	3,123	1,800	948	-1,091	3,743	3,600
322000	Paper Manufacturing	1,282	-3,620	4,338	2,000	739	-4,259	8,220	4,700
323000	Printing and Related Support Activities	2,744	-3,510	5,466	4,700	1,628	-7,633	19,505	13,500
324000	Petroleum and Coal Products	676	-1,921	2,145	900	361	-1,291	2,929	1,999
325000	Chemical Manufacturing	3,934	-5,693	-4,540	-6,299	1,872	-6,330	4,158	-300
326000	Plastics and Rubber Products	2,592	-6,054	6,963	3,501	1,490	-4,836	11,846	8,500
327000	Nonmetallic Mineral Product	2,194	-1,836	-2,757	-2,399	1,079	-2,430	1,850	499
331000	Primary Metal Manufacturing	1,171	-3,802	2,531	-100	631	-2,738	5,507	3,400
332000	Fabricated Metal Products	6,581	-13,411	3,930	-2,900	3,449	-5,663	23,014	20,800
333000	Machinery Manufacturing	3,735	-10,882	13,048	5,901	2,175	-6852	16,177	11,500
334000	Computer and Electronic Product	14,827	-32,851	30,624	12,600	8,595	-53,918	98,523	53,200
335000	Electrical Equipment and Appliance	1,486	-2,451	4,466	3,501	936	-5,975	7,338	2,299
336000	Transportation Equipment	5,919	-15,165	10,747	1,501	3,229	-7,320	25,692	21,601
337000	Furniture and Related Product	2,656	-3,287	6,731	6,100	1,605	-5,873	11,068	6,800
339000	Miscellaneous Manufacturing	4,142	-5,870	3,628	1,900	2,215	-6,901	11,486	6,800
31000000	Durable Goods	44,440	-96,647	80,407	28,200	24,863	-82,512	188,048	13,0399
32000000	Nondurable Goods	25,184	-63,091	59,707	21,800	13,725	-65,306	113,682	62,101

Table A2. California Shift-Share Calculated Against U.S. Manufacturing Employment

		1998-2001				2002-2005			
USING NATIONAL EMPLOYMENT		NATL.	INDUSTRY MIX	STATE SHARE	TOTAL CA	NATL.	INDUSTRY MIX	STATE SHARE	TOTAL CA
30000000	Manufacturing	-90,401	0	14,0401	50,000	-110,536	0	30,3036	192,500
311000	Food, Beverage, & Tobacco Products	-11,579	12,934	-1,954	-599	-12,879	4,436	6,143	-2,300
313000	Textile Product Mills	-1,604	-4,,209	9,313	3,500	-2,164	-4,493	11,757	5,100
315000	Apparel Manufacturing	-4,927	-15,950	35,277	14,400	-6,822	-19,796	57,418	30,800
321000	Wood Product Manufacturing	-2,259	937	3,122	1,800	-2,716	2,573	3,743	3600
322000	Paper Manufacturing	-1,664	-674	4,338	2,000	-2,117	-1,403	8,220	4,700
323000	Printing and Related Support Activities	-3,563	2,797	5,466	4,700	-4,665	-1,340	19,505	13,500
324000	Petroleum and Coal Products	-877	-368	2,145	900	-1,035	106	2,928	1,999
325000	Chemical Manufacturing	-5,107	3,348	-4,540	-6,299	-5,364	906	4,158	-300
326000	Plastics and Rubber Products	-3,365	-98	6,963	3,500	-4,268	922	11,846	8,500
327000	Nonmetallic Mineral Product	-2,848	3,205	-2,756	-2,399	-3,092	1,742	1,849	499
331000	Primary Metal Manufacturing	-1,520	-1,111	2,531	-100	-1,808	-299	5,507	3,400
332000	Fabricated Metal Products	-8,544	1,714	3,930	-2,900	-9,881	7,667	23,014	20,800
333000	Machinery Manufacturing	-4,849	-2,299	13,049	5,901	-6,231	1,554	16,177	11,500
334000	Computer and Electronic Product	-19,252	1,228	30,624	12,600	-24,621	-20,702	98,523	53,200
335000	Electrical Equipment and Appliance	-1,929	963	4467	3,501	-2,682	-2,356	7,337	2,299
336000	Transportation Equipment	-7,685	-1,561	10,747	1,501	-9,249	5,157	25,693	21,601
337000	Furniture and Related Product	-3,449	2,818	6,731	6,100	-4,598	330	1,1068	6,800
339000	Miscellaneous Manufacturing	-5,378	3,650	3,628	1,900	-6,345	1,660	11,485	6,800
31000000	Durable Goods	-57,702	5,495	80,407	28,200	-71,222	13,573	188048	130,399
32000000	Nondurable Goods	-32,699	-5,207	59,706	21,800	-39,314	-12,267	113,682	62,101