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Foreign Trade and California's Economic Growth: Issues and Research Approach

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**Foreign Trade and California's Economic Growth:**

**Issues and Research Approach**

by

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**(First in a series of working papers on the general topic of *Foreign Trade and California's Growth*, by Dwight M. Jaffee, Cynthia A. Kroll, Ashok Deo Bardhan, Josh Kirschenbaum, David Howe)**

Working Paper: 98-257

February 1998

**Foreign Trade and California's Growth**  
*A Series of Working Papers*

This working paper is part of a series of papers that report on the results of a 15-month research project funded by the California Policy Seminar under its Policy Research Program. The full series of working papers is listed here.

Kroll, Cynthia A. *Foreign Trade and California's Economic Growth: Issues and Research Approach*, Working Paper 98-257. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Jaffee, Dwight M. *International Trade and California's Economy: Summary of the Data*, Working Paper 98-258. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Jaffee, Dwight M. *International Trade and California Employment: Some Statistical Tests*, Working Paper 98-259. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Kroll, Cynthia A., and Josh Kirschenbaum. *The Integration of Trade into California Industry: Case Studies of the Computer Cluster and the Food Processing Industry*, Working Paper 98-260. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Bardhan, Ashok Deo, and David K. Howe. *Globalization and Labor: The Effect of Imported Inputs on Blue Collar Workers*, Working Paper 98-261. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Bardhan, Ashok Deo, and David K. Howe. *Transnational Social Networks, Transportation Costs, and the Geographic Distribution of California's Exports*, Working Paper 98-262. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Kroll, Cynthia A. *Foreign Trade and California's Economic Growth: A Summary of Findings and Directions for Policy*, Working Paper 98-263. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

The work is also reported in two publications of the California Policy Seminar:

The research is summarized in depth in Cynthia A. Kroll, Dwight M. Jaffee, Ashok Deo Bardhan, Josh Kirschenbaum and David K. Howe, *Foreign Trade and California's Economic Growth*, California Policy Seminar, Berkeley, 1998. A much briefer summary is available in a California Policy Seminar *Policy Brief* of the same title.

## Acknowledgments

My colleagues on this project, Dwight Jaffee, Ashok Bardhan, Josh Kirschenbaum and David Howe, conducted much of the research introduced by this paper, and read and commented on earlier drafts. Many other people contributed to the success of the entire project. Funding from the California Policy Seminar, made this project possible, and the helpfulness of the California Policy Seminar staff, including Andres Jimenez, Holly Brown-Williams, Joan Lichterman, Alvin Averbach and Andrea Spurgeon, in arranging contacts and meetings and nursing the work through various draft stages smoothed the course of the project. Jesse Kerns provided able research assistance at several stages of the project, but most particularly in completing the case studies and gathering information on state policies. We assembled a review committee, who took part in several meetings, made suggestions on research design, and carefully reviewed draft documents. We particularly want to thank those who “stayed the course” for the entire project, including Ed Kawahara and Lloyd Day of the California Trade and Commerce Agency, Gus Koehler and Rosa Moller of the California Research Bureau, and Ken Budman and Bob Marr of the Employment Development Department. We also received very useful comments early in the process from Patricia deCos, John Decker, Roger Dillon, Richard Holden, and Nick Vucinich. Ann Veneman, Secretary of Food and Agriculture played a special role in the study by providing a supportive letter during our case study work. David Hegwood and Cher Wattie of the Agricultural Export Division of the California Department of Food and Agriculture were also very helpful. John Harley and David Cater of the California Trade and Commerce Agency were accommodating in meeting our many data requests. Robert Feenstra of the University of California at Davis and Gordon Hanson of the University of Texas at Austin introduced us to valuable data sources and to their analytic framework. David Card of the University of California at Berkeley helped us fine-tune our models. CFOs, other officers and support staff of many California computer and food-processing firms patiently worked their way through our interview process and ensured that our questions were answered. Because we promised the firms confidentiality, we cannot name the individuals personally here, but many of the state’s major computer and food processing firms assisted in the study. Representatives of trade organizations also contributed time and information to our study, including Joseph Rollo of the Wine Institute, and representatives of the California Food Processors League and the American Electronics Association. We also received assistance in obtaining and understanding data from many individuals at the US Department of Commerce (especially the Census Bureau, International Trade Agency, and Customs), the US Bureau of Labor Statistics, and the Oakland and Los Angeles/Long Beach Port Authorities. Many others spent time reviewing our work, including Robert Edelstein, Nancy Wallace, and members of the UC Berkeley Business Administration real estate seminar, AnnaLee Saxenian of UC Berkeley’s Department of City and Regional Planning, and Michael Teitz and David Lyon and other members of the Public Policy Institute of California. Finally, our policy discussion was informed by the thoughtful ideas of Michael Oden, of the University of Texas at Austin, and the wealth of information on state programs provided by Carol Conway of the Southern Growth Policies Board. We of course take full responsibility for the use of the data and interpretation of findings.

## **Foreign Trade and California's Economic Growth: Issues and Research Approach**

### **Abstract**

This paper serves as an introduction to a series of working papers on foreign trade and California's growth. Foreign trade is generally considered of importance in understanding national economies, but has received much less systematic attention with regard to subnational economies, such as states. California, with rising trade levels and an increasingly international population, is particularly likely to feel the effects of globalization. This research, funded by the California Policy Seminar, takes a comprehensive look at the role of foreign trade and other global linkages in California's economy, in terms of both industry characteristics and state policy. Six working papers examine i) the data sources available on foreign trade at the US and state levels, ii) the role of foreign trade in California's employment and output growth; iii) the detailed experiences of two industry groups—computers and food processing; iv) the effect of imported inputs on the share of employment and wages held by blue-collar workers; v) factors linking California through trade to other countries; and vi) policy issues surrounding trade for California. This introductory working paper concludes with a brief summary of research findings.

# **Foreign Trade and California's Economic Growth: Issues and Research Approach**

## **Introduction**

Foreign trade is playing an increasingly large role in the US economy and an even larger role in California's economy. There is some disagreement in academic circles as to the importance of this phenomenon, either in understanding the future growth of California's economy or in determining directions for state economic development policy. There is greater disagreement in political circles over whether trade benefits or displaces California businesses and workers. While there is extensive literature on the role of trade in the US economy and case studies exist of the impacts of trade on specific industries or locales, until now there has been no comprehensive study of the implications of foreign trade for a state's economy.

In 1996 and 1997, under a grant from the California Policy Seminar, the Fisher Center for Real Estate and Urban Economics conducted a study of the role of foreign trade in California's economy. The series of working papers that resulted from this study examine in detail the implications of expanding foreign trade for the level and composition of output and employment in California. Our research leads us to the conclusion that foreign trade has a significant effect in expanding California's growth industries, based on the export capacity of these industries and on the state's Pacific Rim location. We also find that foreign trade is contributing to the reshaping of job opportunities within the state, from manufacturing to nonmanufacturing and from blue collar to white collar jobs.

We report the results of our research in a set of seven working papers. These papers address the issue of foreign trade and the state's economy at both the macro and

micro levels. Our study relies on a variety of research techniques, from individual interviews and case studies of firms to regression analysis using trade data across several hundred industries.

This is the first working paper in the series. In this paper, we lay the framework for the full report. We begin with a discussion of what is currently understood about the implications of foreign trade for subnational regions such as states. We then present an overview of California's situation in the global economy today. We follow with a road map of our research approach that includes a brief description of each paper in the series and of the primary research methods. The paper concludes with a few words about the study's findings.

### **Foreign Trade from a State Perspective--Does it Matter?**

Economic theory divides into several camps over the question of the importance of foreign trade in shaping a nation's or a subnational region's economy. The prevailing view in economics has been that foreign trade in a free market environment improves overall economic welfare by allowing geographic areas to concentrate on producing items for which they have the strongest comparative advantage, and using the surplus from trade to purchase items they do not produce.<sup>1</sup>

This viewpoint has been challenged from several directions. As described in an article by Deardorff (1984), empirical studies offer conflicting evidence on whether that actual export and import activity can be explained by theories of comparative advantage.<sup>2</sup>

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<sup>1</sup> Markusen and Melvin 1988.

<sup>2</sup> More recently, tests by Bowen et al, 1987, of the basic factor abundance model failed to confirm the theory of competitive advantage, while a more recent paper by Prash (1995) argues that theories of

International trade theory, recognizing capacity and labor force constraints, as well as counter-cyclical fiscal or monetary policy, argues that trade should not affect the aggregate level of employment and output, although it will affect the composition.<sup>3</sup> This composition could extend not only to the mix of industries but also to the mix of activity among subnational regions (such as California).

Political discussions often ignore the academic analyses altogether--whether theoretical or applied. The potentially negative effect of imported goods on domestic employment is the focus of many discussions on national trade policy, while at the state level, "foreign policy" is often confined to the promotion of export activity by local firms. Yet at both the national and state level, to evaluate these concerns, it is important to evaluate the employment effects of both exports and imports, and to consider the wide range of indirect effects that trade may have on employment.

Discussion of the role of trade in a subnational region's economy has evolved from two different but related disciplines. One is the world of macroeconomics, where there is an increasing recognition that important differences emerge at the regional level. The other is the field of regional economics and economic geography, which draws on macro and microeconomic theories but is built around the assumption that spatial differences are key to understanding local economies. Each of these broad fields accommodates a variety of viewpoints, as discussed below.

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competitive advantage are inadequate to deal with a world of large international flows of capital. On the other hand, Nussair et al, 1995, develop an experimental approach that demonstrates behavior consistent with the theory of comparative advantage.



### *Macroeconomists Step into Regional Issues*

Macroeconomic theory indicates conditions under which wages, prices and exchange rates will adjust to maintain the economy at full employment.<sup>4</sup> In this case, increased globalization of a nation's economy would have no effect on employment levels, although it could affect relative wages and prices. Of course, these wage and price effects could themselves be a concern of state policy.

Many macroeconomists recognize that for a number of reasons, the assumptions underlying the theoretical model are not very good reflections of the issues that face a subnational region. This approach, for example, ignores the time needed for the economy to adjust and many of the flows that affect "full employment," such as the movement of marginal workers into and out of the labor force. There is also a growing awareness that spatial differences matter and that historic accident can lead to very long-term consequences for an area's economy. Krugman, for example, argues that a historic advantage in an industry can lead to long term advantages for one country in a particular product, and can reinforce patterns of trading among nations with similar resources.<sup>5</sup> In a separate work, he argues that regionalization and specialization are a natural consequence of free trade flows, pointing to the much wider range of variation among regions within the US than within the European Union, economies of similar size.<sup>6</sup>

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<sup>3</sup> As described in basic international trade textbooks such as Caves et al 1990.

<sup>4</sup> See, for example, Dornbusch and Fischer 1987.

<sup>5</sup> Krugman 1994.

### *Regional Economists Address Global Issues*

As Krugman recognizes, the idea that space and historic accident matter is not a new one. The disciplines of economic geography and many aspects of regional economics developed to provide an understanding of how spatial variation (from natural resources to geographic features) and location affect the formation and growth of economic activity. External trade is a key element of regional theory, because regions are open economies, where trade occurs freely across borders. Much of the traditional discussion of trade in a region does not distinguish between interregional and international trade.<sup>7</sup> Early work focuses on the role of export activity (the export base) in the growth of a region's economy. The original discussions of trade did not focus on the multi-spatial or multinational aspects of the production process.

More recently regional and industrial economists have drawn from discussions of globalization and the international division of labor to address the implications of international or multi-national activity at the regional level. The discussion is often based not on a concept of an economy always moving towards equilibrium but instead from a perspective that regional economics are undergoing frequent transformations. Authors such as Naponen, Graham and Markusen through case studies suggest that globalization is a key determinant of transformation in many different types of industries.<sup>8</sup> They further argue that these transformations have very significant impacts on subnational regions where these industries concentrate for historic reasons, and that the impacts are likely to be greater at the subnational than at the national level: "Any change in trading patterns

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<sup>6</sup> Krugman 1996.

<sup>7</sup> Tiebout 1962.

<sup>8</sup> Naponen, Graham and Markusen, 1993.

that diminishes what once was a regional comparative advantage will reverberate more powerfully on local economies than it does on the national economy.”<sup>9</sup>

A recently released set of papers edited by Cox presents a variety of theoretical and empirical pieces that directly address the spatial implications of globalization at the national and subnational level, arguing from varying points of view that:

... any assessment of the globalization debate has to take into account not just the deterritorializing forces, the emergence of a world of enhanced locational substitutability, but also the territorializing: those conditions, those social relations that result in enduring commitments to particular places, which can in turn be a source of competitive advantage and so serve to reinforce those commitments.<sup>10</sup>

### *The Questions for California*

While there is no agreement within the literature as to the importance and implications of foreign trade at the state level, the literature raises important questions in trying to understand the position of a state’s economy. The research we undertake here is based on the understanding that globalization is a complex process. Our research addresses the following questions:

- Is global trade a significant factor in the growth of California’s economy?
  - ◆ How does trade affect the level of employment and output?
  - ◆ What are the consequences of trade for the distribution of economic activity by sector?
- How do local firms adjust to compete in global markets?

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<sup>9</sup> Howes and Markusen, 1993, p. 10; Krugman makes a similar point (Krugman 1994, p. 223).

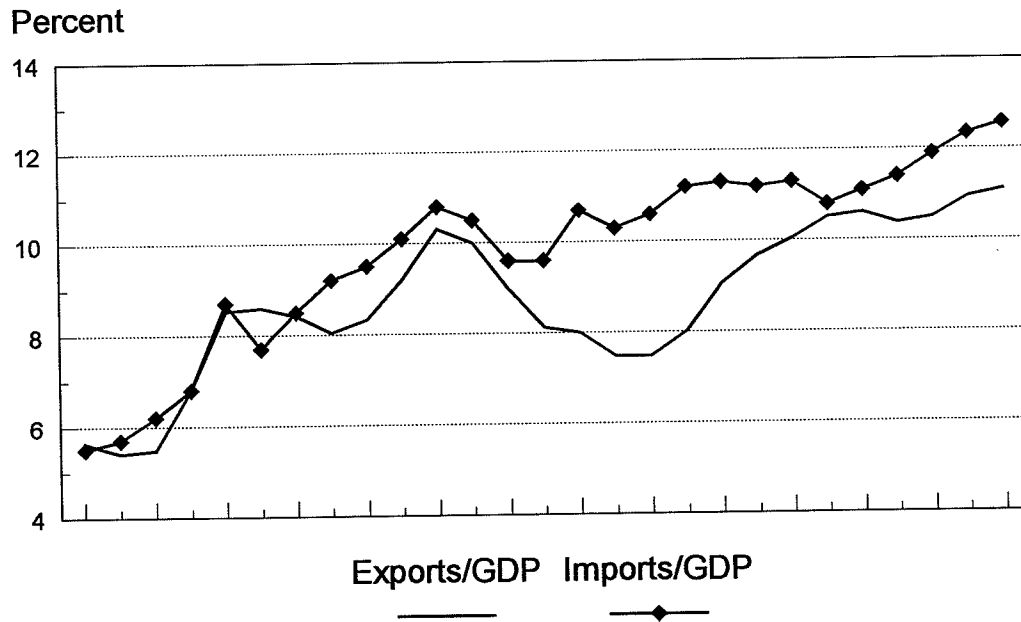
<sup>10</sup> Cox 1997, p. 5.

- ◆ How do trade flows affect firms' location decisions?
  - ◆ Have firm production processes changed with expanding trade?
- What are the consequences of trade for the occupational distribution within industries?
  - ◆ What is the role of trade in occupational segmentation among firm locations?
  - ◆ Do trade flows affect the distribution of wages and employment between production and non-production workers, within and across industries?
  - ◆ Does foreign trade contribute to growing inequality in relative wages and in the demand for different types of labor?
- How are California export industries linked to economic conditions in other parts of the world?
  - ◆ How influential are a Pacific Rim location and an immigrant population in determining the level and direction of trade?
  - ◆ What factors make California's trade experience different from other states?
- Is state government assistance desirable either to encourage trade or to deal with the impacts of trade? What are the options?

## An Expanding Role for Foreign Trade

There is no doubt that foreign trade is growing, both in the US and in California. As shown in Figure 1, foreign trade is growing relative to US GDP.<sup>11</sup> In current dollars, exports and imports were each equivalent to about 5.5 percent of US GDP in 1970. By the mid 1990s, exports rose to 10.5 percent of GDP, while imports rose to 12 percent.

**Figure 1**  
**U.S. Imports and Exports as a Share of GDP**  
**1970-1996, Current Dollars**



Source: US Dept. of Commerce, authors' calculations

Foreign trade is growing particularly quickly in California. We estimate that for California, exports of goods and services as a share of GSP increased from 8 percent of

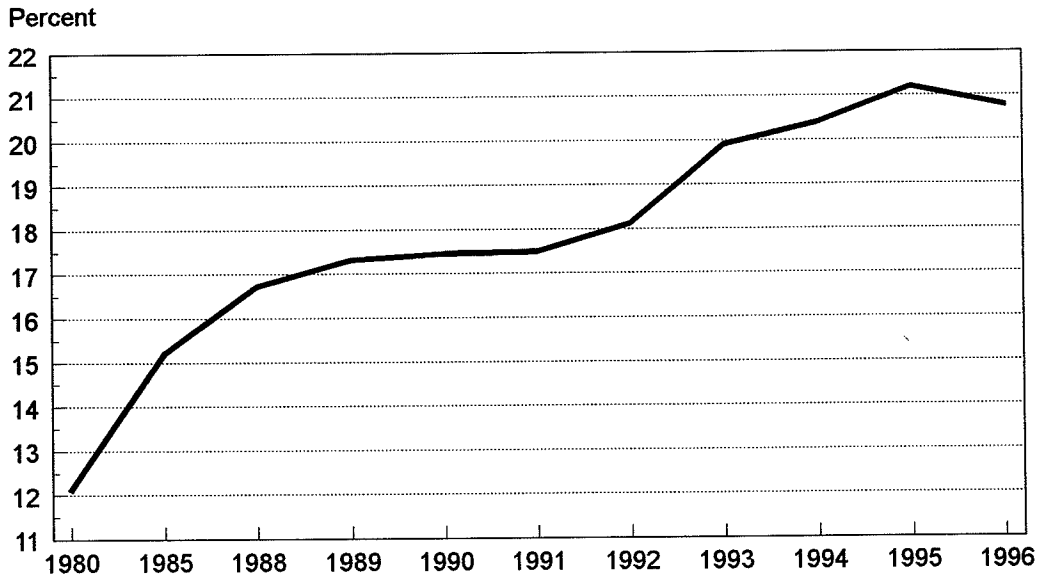
<sup>11</sup> Bardhan, Kroll and Jaffee, 1995.

GSP in 1987 to over 15 percent in 1995 (see Figure 2). In addition, trade through California's ports has risen dramatically. California accounted for 12 percent of total shipments through ports in 1980, and for 21 percent by 1995 (see Figure 3).



Source: Calculated using data from California World Trade Commission;  
California Dept. of Finance.

**Figure 3**  
**Share of Foreign Trade Merchandise**  
**Moving through California Ports**



Source: US Bureau of Census; Dept. of Commerce; authors' calculations

A glance at a few basic statistics suggests some hypotheses for the growing role of trade in California's economy. First, high tech sectors, including computers, electronics, instruments and aerospace, dominate shipments from California ports and also show up as by far the largest export sectors for the state. (Shipments from ports reflect not only the output of the state but also of other states that ship through that port). High tech sectors account for over half of shipments through California's ports and for an estimated 70 percent of merchandise exports directly from California businesses. These are sectors where California dominates US production. California accounts for close to one quarter of US employment in computer production and electronic components. They are also

sectors that play a large role in the state's economy. About 40 percent of California manufacturing employment is in high-tech sectors.

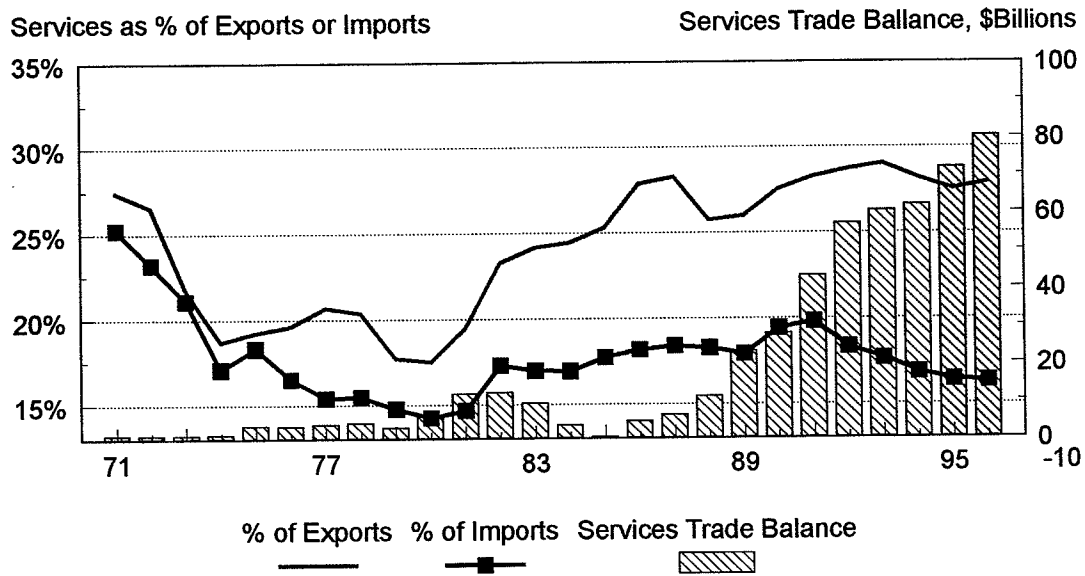
Second, although there are no direct measures of services exports or imports at the state level, California has a dominant position in several services sectors that have had strong export activity. The state accounts for over 70 percent of US motion picture production and 30 percent of computer programming sectors. Tourism is a significant employer in the state and (by our estimates from other research) accounts for \$7 billion in exports.<sup>12</sup> The US as a whole has a growing positive balance in services foreign trade (see Figure 4). With its dominance in strong exporting services, we would also expect California to have relatively an even stronger positive trade balance in services.

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<sup>12</sup> Estimated in data presented in Kroll and Bardhan, 1996.



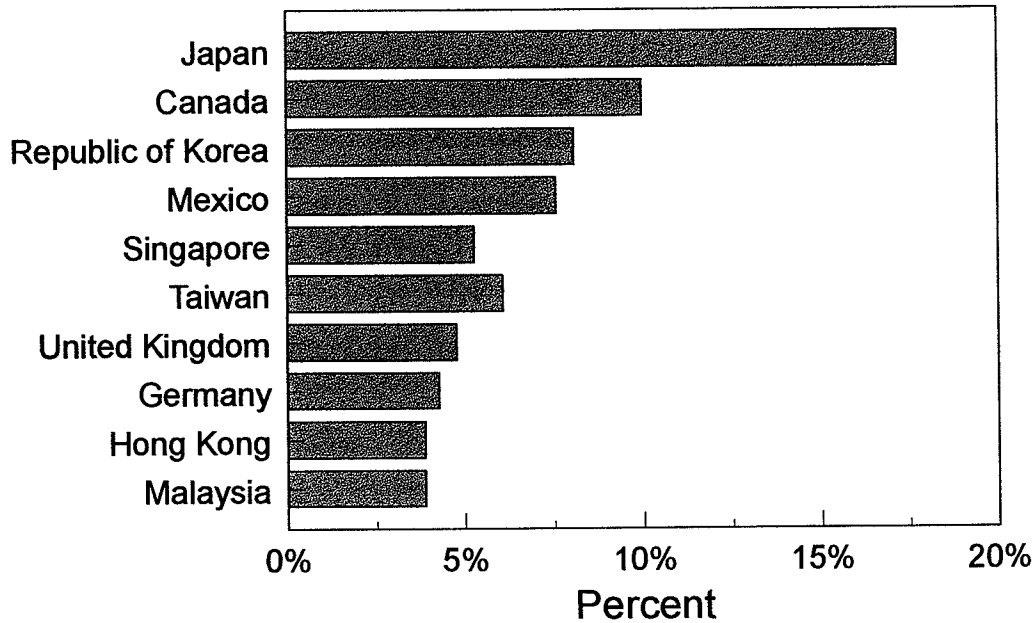
**Figure 4**  
**Services as a Share of Exports and Imports,**  
**and Growing Trade Surplus in Services**



Source: US Dept. of Commerce, Survey of Current Business and authors' calculations.

Third, California's Pacific Rim location suggests that the state is particularly likely to experience rising trade. Asian countries are the primary customers of California exports, as shown in Figure 5. These countries have among the fastest rates of growth of GDP in the world. With growth of this customer base, we would expect California's trade share to increase. (Current financial crises in Asia may slow this growth in the short term, but in the long term, Asian countries show a great deal of growth potential).

**Figure 5**  
**Destination of California Exports by Country**  
**(10 Largest Customers, Percent of Total California Exports)**



Source: Authors using data from MISER.

Fourth, we would expect trade growth to be two-sided. While export opportunities are growing in California, imports are also affecting California's economic outlook. Imports in computer hardware sectors are playing an increasing role in supplying the domestic US market, to the point where a positive trade balance nationwide in 1991 has shifted to a much larger negative balance by the mid-1990s. Other California sectors that face import competition because US imports are high include travel, textiles and apparel and electronic equipment.<sup>13</sup>

<sup>13</sup> In travel, a recreational visit by a US resident abroad is counted as an import.

Fifth, the changing institutional environment for trade worldwide is affecting sectors and regions of importance to California. While opinions differ as to the net benefits or costs of NAFTA, there is no doubt that the agreement has expanded trade between California and Mexico. Trade agreements related to information technology and intellectual property rights have the potential to expand opportunities for technology related export firms in California. Proposals for the Asia-Pacific Economic Cooperation Forum (APEC) could also increase trade throughout the Pacific Rim countries.

There is strong evidence, then, that trade is of growing importance to California. However, the measures presented here are basically static ones, summarizing the overall levels for the state's economy. To date, there has been much less information on the dynamics of these factors. This set of working papers focuses on how changes in export and import activity, as well as the internationalization of the production process of firms affect the growth and composition of California's economy.

## **Approaches to Understanding Trade from a California Perspective:**

### **The Working Paper Series**

We have outlined a fairly complicated set of questions regarding trade and the California economy. We address these questions in a series of seven working papers, of which this is the first. The primary purpose of this first working paper is to provide an overview of and some background on the series of papers.

In the second working paper of the series, "International Trade and California's Economy: Summary of the Data," Dwight Jaffee describes in detail the data necessary to analyze foreign trade at both the statewide and national level. He identifies a variety of

data sources available at the US and state level and discusses methods for estimating data, which is not reported at the state level. Tables appended to the chapter give detailed data on output and employment at the California level and trade flows by industry at the US level.

In a companion working paper, *International Trade and California Employment: Some Statistical Tests*, Jaffee analyzes the impacts of foreign trade flows on output and employment for the US as a whole and for California. The paper concentrates primarily on imports and exports within manufacturing sectors but also traces some effects beyond manufacturing to closely related services sectors.

In “*The Integration of Trade into California Industry: Case Studies of the Computer Cluster and the Food Processing Industry*,” the fourth paper in the series, Kroll and Kirschenbaum report on detailed case studies of two of California’s significant export sectors--the computer cluster and food processing. The two industries offer a strong contrast in the degree of importance of global linkages to the rate of growth, employment structure, and location patterns of the industry.

In “*Globalization and Labor: The Effect of Imported Inputs on Blue Collar Workers*,” the fifth working paper in the series, Bardhan and Howe examine the impacts of the increasing globalization of production on the employment and wage structure in manufacturing sectors. Their work concentrates specifically on the effects of one aspect of globalization, the rising levels of imported inputs, on the payroll and employment shares of production workers.

In the sixth working paper, “*Transnational Social Networks, Transportation Costs, and the Geographic Distribution of California's Exports*,” Bardhan and Howe look at the

factors determining the level of exports from California to each of (approximately) 190 foreign nations. They consider characteristics of the importing nations, such as GDP and per capita income, characteristics of California, such as the number of immigrants from the importing nation residing in California, and linking factors, such as distance, in explaining the level of exports to each country.

The final working paper, “Foreign Trade and California's Economic Growth: A Summary of Findings and Directions for Policy,” summarizes the main findings of the study, discusses the broader implications for the state’s economy overall, and identifies policy issues related to the role of foreign trade in California’s economy. In this paper, Kroll categorizes manufacturing and services industries by the level of trade flows and discusses the impacts these flows are likely to have for industry growth and production structure at the state level. She then describes the tools that have been used by states to deal with the opportunities and impacts of foreign trade and discusses these tools in the context of California.

### **Method of Approach**

We rely on several different research approaches in our analysis. While individual authors took primary responsibility for research design and authorship of each working paper, these remained part of a single study. All authors participated in the design and interpretation of each individual paper and of the project as a whole. The findings among sections are consistent, and the results of one paper are used to inform the interpretation of findings in other chapters. We use research methods from several different disciplines

in our approach, including both econometric analyses, where appropriate and feasible, and detailed case study analysis based on selective interviews.

### *Data Collection and Estimation*

Measuring trade flows and other global linkages in California is not a simple task. Even baseline data on sales, employment, and wages is not available at a detailed level annually for all sectors, although manufacturing sectors are fairly well documented. Even for manufacturing sectors, however, there are some problems with consistency between sources. US trade data have only recently become available on the same SIC code basis used for employment data, and import data are not available at all for California (except for exports and imports through California ports, which are not necessarily produced or consumed within the state). In “International Trade and California’s Economy: Summary of the Data,” Jaffee discusses in detail the data that underlie our research and the estimation techniques used when data was missing.

### *Econometric Analysis*

Three of the working papers make use of econometric analysis. In “International Trade and California Employment: Some Statistical Tests,” Jaffee uses a pooled cross-section, time-series, analysis to estimate the effects of export and import flows on sales and employment across manufacturing sectors. This working paper also makes use of descriptive statistics to extend the findings to services sectors. In “Globalization and Labor: The Effect of Imported Inputs on Blue Collar Workers,” Bardhan and Howe do a cross-sectional analysis, across manufacturing sectors, of the impacts of the change in

import penetration of intermediate goods on the production workers' share of payroll and employment. In "Transnational Social Networks, Transportation Costs, and the Geographic Distribution of California's Exports," Bardhan and Howe conduct a cross sectional analysis across countries of the influence of proximity, foreign immigrants, size of the economy, and per capita income on the level of exports from California to foreign countries. They compare the results to a similar model for New York State. A key finding is that the distribution of the immigrant populace by country of origin can be as important as distance and shipping costs in determining a state's foreign trading partners.

### *Case Study Research*

In "The Integration of Trade into California Industry--Case Studies of the Computer Cluster and the Food Processing Industry," Kroll and Kirschenbaum rely on interviews and trade literature, as well as industry data, to describe the degree of global transformation in two very different industries. They interview a sample of the largest firms in both the broadly defined computer cluster (including software and hardware firms) and the food processing industry, as well as the fastest growing firms in the computer cluster. Their interviews cover the exporting and importing practices of firms, location decisions and policy concerns.

### *Policy Analysis*

Policy implications are implied or discussed directly in several parts of the study. The findings of each chapter develop information that is important in determining policy directions. The results of Jaffee's second working paper (Jaffee 1998b) suggest that

international trade provides benefits of both the direct effects of export activity and the indirect effects of increased import activity. The Bardhan and Howe paper on production workers (Bardhan and Howe 1998a) highlights the shifts that occur between production and non-production workers in each industry as a result of globalization. Their location analysis (Bardhan and Howe 1998b) highlights the importance of the Pacific Rim location and of immigrant demographics for California's trading patterns.

Both the case studies (Kroll and Kirschenbaum 1998) and the final working paper of the series, "Foreign Trade and California's Economic Growth: A Summary of Findings and Directions for Policy," offer direct discussion of policy directions. Kroll and Kirschenbaum summarize the concerns expressed by case study respondents. In the working paper on policy, Kroll generalizes the findings from the case studies and the other technical papers, identifies alternative directions for state policy responses, and discusses California's existing programs within the framework of general state policy alternatives.

### *Consolidated Findings*

The use of a variety of different research approaches contributes to the robustness of our findings. Results of statistical analysis and of the detailed experiences of firms consistently show that globalization is influencing many aspects of the state's economy--from the rate of growth to the distribution of activity among sectors and of production processes within sectors. At the same time, the results indicate that the experience varies considerably among industries, with some industries becoming increasingly global and others continuing to concentrate on domestic production and sales. In "Foreign Trade and California's Economic Growth: A Summary of Findings and Directions for Policy," Kroll



summarizes the findings from each of the research chapters and indicates areas where further research is needed.

### **A Hint at the Results--Trade and Global Integration Matter**

Our research for California shows that foreign trade is significantly shaping California's economy. The effects are of several types:

- Foreign trade exports raise job levels in California. In contrast, foreign trade imports appear to have an ambiguous effect on California employment levels, with direct losses somewhat mitigated by offsetting gains in productivity and in nationwide demand.
- Trade is affecting the structure of employment. The integration of jobs in with the global economy contributes to the shift of employment from manufacturing to services sectors.
- Global production and competition also contribute to the shift within sectors from production to non-production jobs.
- The results of some shifts are bi-polar. Sectors with strong trade flows (exports and imports a large share of output and domestic consumption) are changing most rapidly, establishing multi-national production locations and shifting production jobs out-of-state. Sectors that primarily sell to and buy from domestic markets, in contrast, show a tendency to increase their shares of production jobs and to maintain production in California.
- Despite this bi-polar pattern, trade is generating, not reducing job opportunities in California. Even as globalizing industries expand beyond California's

borders, several are also among California's fastest growing industries in terms of revenue and job growth within the state.

- With its Pacific Rim location and multi-national population, California is likely to see trade continuing to play a significant role in shaping the state's economy in the future.
- Because the impacts of trade are complex and affect many different aspects of the economy in different ways, the state will need a multi-dimensional approach to address the opportunities and concerns raised by an economy increasingly affected by global conditions.

A more detailed summary of the series of seven working papers that report on this study is provided in Appendix A of this working paper.

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**Appendix A**

**FOREIGN TRADE AND CALIFORNIA'S ECONOMIC GROWTH  
SYNOPSIS OF WORKING PAPERS**

**Dwight M. Jaffee, Cynthia A. Kroll, Ashok Deo Bardhan,  
Josh Kirschenbaum, David K. Howe**

Fisher Center for Real Estate and Urban Economics  
University of California, Berkeley

1998

**FOREIGN TRADE AND CALIFORNIA'S ECONOMIC GROWTH  
WORKING PAPER ANNOUNCEMENT**

**Cynthia A. Kroll, Dwight M. Jaffee, Ashok Deo Bardhan,  
Josh Kirschenbaum, David K. Howe**

Fisher Center for Real Estate and Urban Economics  
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Foreign trade is playing an increasingly large role in the US economy and an even larger role in California's economy. Our research, reported in a series of seven working papers, examines in detail the effects of expanding foreign trade for the level and composition of output and employment in California and the implications for state policy.

**Research Questions**

Our research is based on the understanding that globalization is a complex process. We address the following questions:

- 1) Is global trade a significant factor in the growth of California's economy?  
How does trade affect the level of employment and output?  
Does trade shift employment and output among sectors?
- 2) How do local firms adjust to compete in global markets?  
Do trade flows affect firms' location decisions?  
Does expanding trade change a firm's production process?
- 3) Does trade affect the occupational distribution within industries?  
What is the role of trade in occupational segmentation among firm locations?  
Do trade flows affect the distribution of wages and employment between blue-collar and white-collar workers, within and across industries?  
Does foreign trade contribute to growing inequality in relative wages and in the demand for different types of labor?
- 4) Where does California export and why? How influential are a Pacific Rim location and an immigrant population in determining the level and direction of trade?
- 5) Is state government assistance desirable either to encourage trade or to deal with the impacts of trade? What are the options?

(Further background on the research questions and basic statistics on trade in California are available in Cynthia A. Kroll, *Foreign Trade and California's Economic Growth: Issues and Research Approach*, Working Paper 98-257.)

## **The Aggregate Effect of Foreign Trade on California's Economy**

Global trade is of growing significance in California's economy. We estimate that for California, exports of goods and services as a share of GSP increased from 8 percent of GSP in 1987 to over 15 percent in 1995 (see Figure 1). In addition, trade through California's ports has risen dramatically. California accounted for 12 percent of total shipments through US ports in 1980, and for 21 percent by 1995.

High tech sectors, including computers, electronics, instruments, and aircraft, account for more than 70 percent of merchandise exported by California producers. Agricultural products, including food products and crops, are the next largest export sector (about 9 percent of merchandise exports). Foreign trade is also important to some of the state's major services sectors, including motion picture production, tourism, and (directly and indirectly) computer and data processing. Imports are not measured at the state level, but US data indicates that import competition is significant to a wide range of California industries, including computer hardware, electronic equipment, textiles and apparel, and travel.

The growth of exports in California in the past decade has been closely tied with the economic expansion of Pacific Rim countries. Asian countries, Canada, and Mexico are primary customers of California exports, as shown in Figure 2. Trade agreements, such as NAFTA and GATT, have expanded both export opportunities for California firms and opportunities for import competition. Proposals for the Asia-Pacific Economic Cooperation Forum (APEC) could further increase trade with Pacific Rim countries.

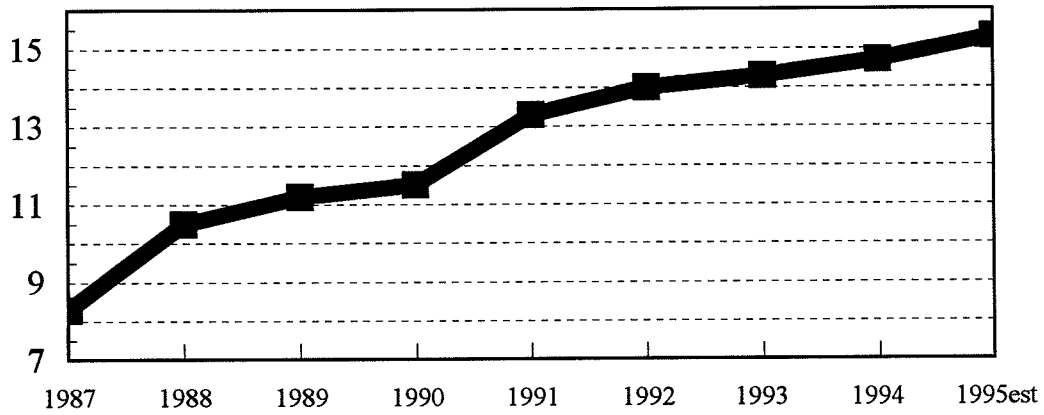
Our analysis takes into account the effects of both exports and imports on California's economy, extrapolating from US data when detailed information is not available for the state. Conceptually, one might expect that rising exports would help California while rising imports would hurt the state's economy. In fact, we found a much more complex situation, affecting both manufacturing and services sectors.

On the export side, trade appears to increase output and employment for California manufacturing sectors, approximately in proportion to the share of sales accounted for by exports. On the import side, our quantitative analysis does not show a one-to-one corresponding loss in output and jobs, as imports rise as a share of domestic sales. We suggest two related explanations for this. One is the growing role of imports as inputs to California production, allowing the importing producers to expand operations. The second is the overall growth in demand for specific goods (for example, computers) as foreign competition lowers prices overall and drives up efficiency, leaving an expanded market for both US and foreign producers.

We use the computer sector as an example of ways in which trade may affect services sectors directly or indirectly. The computer services sector has a positive trade balance, and would benefit directly from overseas exports. Direct trade, however, is a relatively small part of computer sales. Indirect effects of trade may be much greater. The expansion of the computer hardware industry (in which trade plays a large role) has greatly increased the demand for software, both as operating systems and packaged programs. We estimate that at a minimum, expansion in software demand due to trade has produced enough jobs to counterbalance all of the computer manufacturing jobs lost in California between 1987 and 1995 (about 28,000 jobs). Less conservatively, trade may have expanded jobs in software by close to 80,000 during this period.

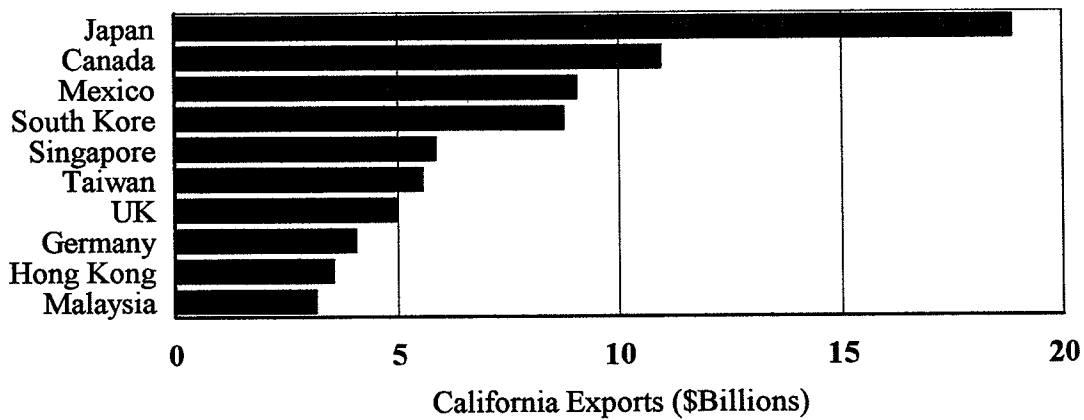
**Figure 1**  
**California Exports Of Goods and Services**  
**Share of Gross State Product: 1987-1995 E**

**Percent**



Source: California World Trade Commission; Dept. of Finance; author's calculations

**Figure 2**  
**Major Markets for California Exports, 1996**



Source: US Department of Commerce, International Trade Admin., MISER Series.



While the aggregate trade story for California is positive, the summary picture masks transitions that occur as a result of trade. Some individual sectors are clearly displaced by trade, while other sectors experience substantial shifts in the mix of labor force used. The effects are explored in further in the study.

(The data sources for this research are described in detail in Dwight M. Jaffee, *International Trade and California's Economy: Summary of the Data*, Working Paper 98-258. The statistical analysis underlying these findings is presented in Dwight M. Jaffee, *International Trade and California Employment: Some Statistical Tests*, Working Paper 98-259.)

### **Impacts at the Industry Level**

We examine two industries in detail, the computer cluster and food processing, to further understand the role of trade in economic growth in California. Our analysis draws on a number of data sources and on detailed interviews at the firm level.

California manufacturing industries can be divided into high trade flow and low trade flow sectors (as shown in Figure 3), depending on whether trade accounts for a large share of US shipments and US sales. Industries can be further divided into those with trade surpluses (exports exceed imports) and those with trade deficits (imports exceed exports). The computer cluster, on the manufacturing end, represents a high trade flow sector with a current trade deficit, while food processing is a low trade flow sector with an overall trade surplus. (One of the major food processing subsectors in California, beverages, has a trade deficit nationwide, because wine imports exceed exports at the US level). In addition to manufacturing, the computer cluster includes computer services activities, and food processing is closely linked to California agriculture.

We found that global linkages are integral to the rate of growth, location of growth, and characteristics of growth of the computer sector. Both overseas sales and imported inputs are important to the growth of the sector. Although many of the computer firms are quite young, they have quickly spread production activity beyond California borders. Most of the larger firms reported between one-third and two-thirds of sales abroad, with many of the products manufactured in the global market area where they are sold (e.g. Asia, Europe, North and South America). Imports play a significant role in production. Computer hardware firms estimated that 10-20 percent of their inputs was directly imported (as opposed to purchased from US distributors, from whatever geographic source). In addition, transshipments occur within companies, with components manufactured overseas used as inputs to products assembled in California.

Location characteristics varied by subsector and by market position of the firm. Software firms in general had fewer production sites abroad and used fewer imported inputs. However, larger software firms were more likely to resemble computer hardware firms in production strategies, using low cost Asian sites for duplicating disks or spreading production to several sites close to Asian and European markets. Within hardware firms, those with few competitors and customized products were less likely to have overseas production facilities. The youngest firms were also more likely to locate only in California.

Figure 3

**US Trade Balance and Size of Trade Flows, 1995  
California Manufacturing Sectors with 25,000+ Employees**

	<b>Low Trade Flow</b>	<b>High Trade Flow</b>
US Exports <b>Greater Than</b> US Imports	<i><b>QUADRANT I</b></i> 203 Preserved Foods 275 Commercial Printing 308 Misc. Plastics 344 Fabricated Str. Metal 359 Industrial Mach. NEC 376 Missiles/Space Veh. 381 Navigation Eq.	<i><b>QUADRANT III</b></i> 372 Aircraft/Parts 382 Measurement Inst. 384 Medical Instruments
US Exports <b>Less Than</b> US Imports	<i><b>QUADRANT II</b></i> 208 Beverages 251 Household Furniture 271 Newspapers	<i><b>QUADRANT IV</b></i> 233 Women's Outer Wear 357 Computers/Office Eq. 366 Communications Eq. 367 Electronic Components 371 Motor Vehicle Eq.

Global production influenced the characteristics of the labor force located in California. Professional, technical, and administrative staff were most likely to remain within the state, while overseas sites had primarily production and/or sales workers.

In contrast to the computer cluster, global linkages are much less significant in shaping California food processing. Many of the firms had been in business for 50 years or longer, and few had overseas production facilities. (Indeed, some were once multi-national firms which had sold off their out-of-state operations). In general, food processor sales were growing much more slowly than sales in the computer cluster.

With the exceptions of almond and citrus producers, most food processing firms exported 10 percent or less of their output. Many of the food processing firms had “niches” as high quality producers, based on the quality and reliability of California produce. Within these niches, they faced relatively little competition from producers in other nations, either in domestic or overseas markets (although there is some perception that a few overseas producers are beginning to compete in the high-end market).

Without the intense global competition found in the computer cluster, food processing is much less geographically segmented than computer manufacturing. Relatively few California food-processing firms have ventured into global markets as producers. The primary motive for establishing overseas plants appears to be access to specialized products rather than cost savings. With most food processing maintained within the state, the California workforce is divided primarily between administrative and production workers.

The case studies demonstrate that foreign trade may have a much stronger effect on some industries than on others (depending on the importance of trade flows to the industry). High trade flow sectors may find impacts of trade expansion on both the location of production and the mix of the labor force. Trade expansion will have less of an impact on low trade-flow industries, at least directly and in the short-term.

(Our fourth working paper, Cynthia A. Kroll and Josh Kirschenbaum, *The Integration of Trade into California Industry: Case Studies of the Computer Cluster and the Food Processing Industry*, Working Paper 98-260, provides a detailed description of each case study industry).

### **Impacts of Trade within Industries: Shifts in Blue-Collar and White-Collar Employment and Wages**

The case studies suggest that high trade flow industries that maintain a presence in California will often succeed in the global market place by adjusting their production process. Adjustments may include moving portions of production abroad and making greater use of imported inputs at home. Changes of this type are often done to reduce costs, and are likely to have implications for the occupational mix and wages of workers remaining in California. Within the computer cluster, this adjustment is apparent in the high shares of professional and technical workers in the California labor force as compared to the firms’ occupational distribution of labor worldwide.

The computer cluster is a case of an industry that has the opportunity to be quite footloose. To more broadly understand the role of globalization in the structural change of manufacturing industries in California, we looked at one indicator of structural change,

the production (blue-collar) worker share of wages and employment, and how it changes with measures of globalization.

For the manufacturing industry as a whole, the wage gap between blue-collar and white-collar workers has been growing, and the share of total payroll going to blue collar workers has been dropping. Building on econometric techniques of other researchers, we estimated the role played by imported inputs in these trends.

Our statistical analysis, across over 200 manufacturing sectors, shows that the increase in imported inputs accounts for between one fifth and one fourth of the loss in payroll share by blue-collar workers. Industries with pre-existing low shares of blue-collar workers were particularly vulnerable to further displacement, while those with high initial shares were more likely to see an increase in payroll share for blue-collar workers.

(We summarize the statistical analysis on imported inputs in Ashok Deo Bardhan and David K. Howe. *Globalization and Labor: The Effect of Imported Inputs on Blue Collar Workers*, Working Paper 98-261).

### **Exports, a Pacific Rim Location, and Immigrant Networks**

Both California's location and its population base contribute to the state's foreign trade emphasis. While data is not available on imports into California markets, an analysis of exports from California producers identifies the factors underlying the state's existing trade patterns.

Many of California's largest export markets appear to be determined by the size of the importing nation's gross domestic product (GDP) and the country's geographic location relative to California. Asian markets account for close to half of California exports, compared to about 30 percent at the national level. Japan is California's largest single export market. Canada and Mexico are also significant export markets for the state, together accounting for about 18 percent of exports.

Yet size and location are not the only explanatory factors, as determined by statistical analysis performed for this study. Other market factors, such as wealth (GDP per capita) and openness of a foreign market (exports and imports as a share of GDP) are important in determining the amount of trade of the country with California. The number of immigrants from the country settled in California was another significant factor in determining the level of exports to that country. Indeed, immigrant networks could significantly counteract the negative effects of distance in determining the level of exports from California to other countries.

Even after foreign market characteristics, distance and immigrant networks are taken into account, we found that California favored Asian nations as export destinations. One possible explanation of the Asian advantage is the relationship between California companies and Asian producers, where California products are exported to Asian producers or subsidiaries, which in turn ship items back to California producers.

(The analysis of export markets is covered in Bardhan, Ashok Deo, and David K. Howe, *Transnational Social Networks, Transportation Costs, and the Geographic Distribution of California's Exports*, Working Paper 98-262.)

## Foreign Trade and California Economic Development Policy

Our research demonstrates the complex effects of global trade on California's economy. While foreign trade clearly affects California's economy, it occurs not only through the opportunity to export to overseas markets, but through a myriad of other mechanisms, including import competition, imported inputs, foreign direct investment by California firms, and the investment by foreign firms in economic activities in California. None of these forms of expanding global trade has a simple, unidirectional positive or negative impact. Some of the cross-flows are summarized in Table 1. Exports, while adding jobs and revenue to California, may also lead firms eventually to shift a portion of production abroad. Production abroad, on the other hand, may allow the industry to grow at a pace that would have been impossible under the domestic cost structure, and may also allow the expansion of California based support industries. Imported goods compete with California producers (sometimes) but provide lower cost items for consumption by California customers and lower cost inputs for California producers.

State policy makers, in responding to the impacts and opportunities of trade will do so in an environment where the impacts and opportunities are closely intertwined. Furthermore, from the firm's point of view, export and import factors are only one set of elements affecting their growth. Firms may view state programs with regards to exports or imports as one part of a larger package of economic development resources (or possibly barriers) provided by the state.

California's trade-related programs can be roughly divided into three types, those *related directly with foreign trade*, those that focus more broadly on *competitiveness*, and programs that are concerned primarily with *firm retention*. California's foreign trade programs are almost entirely focused on the export aspects of trade. Foreign trade offices, trade missions, and marketing make up a large portion of state export-related activity through the Trade and Commerce Agency (TCA). The state also provides information to connect California firms with export resources at the national or local level and supplies some export finance assistance for small and medium-sized companies. In addition, the foreign trade offices have assisted foreign firms moving into the state.

A variety of state programs address the competitiveness of California firms (competing in either US or foreign markets). Many of the programs focus on education or employment training. These include initiatives at the public school level through the state Department of Education, support of public higher education facilities, and skills training programs through the community college system and the Employment Development Department. Beyond education and training, the state also addresses competitiveness through the California Economic Strategy Panel, through technical assistance programs to California firms, and through support for the development of new technologies.

Finally, in part because the "foreign trade" policy of other states may be to encourage California firms to move or expand out-of-state, California has a firm retention strategy. The core of the strategy is a program called the "Red Team" or "TeamCalifornia." This involves targeted assistance or intervention to encourage in-state locations for California firms considering out-of-state relocations or expansions.

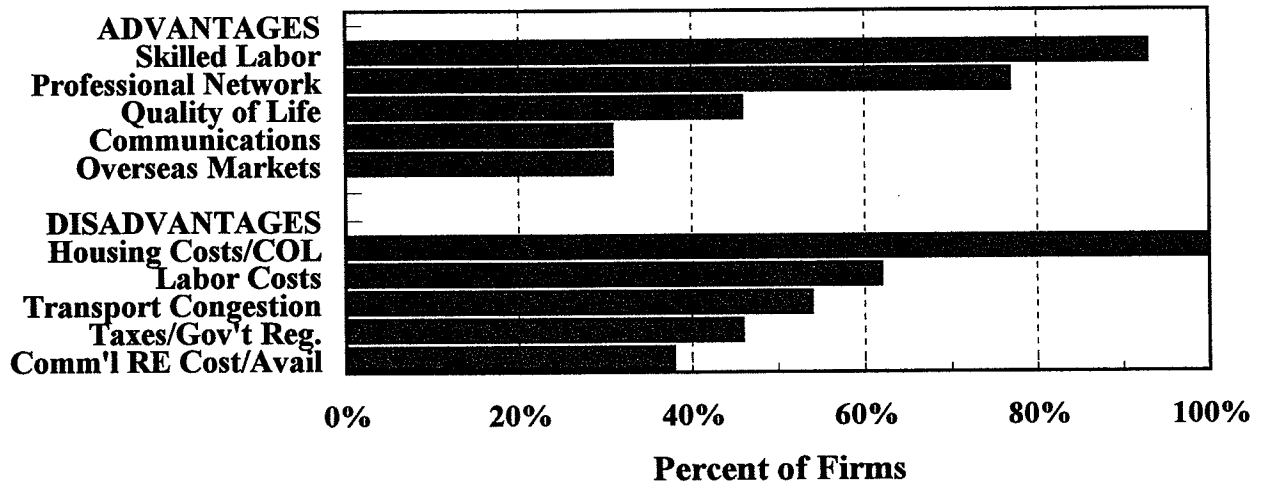
Our case study interviews suggested that the state's competitiveness and retention programs are of far wider significance to computer and food-processing firms than

programs specifically designed for the purpose of foreign trade promotion. The major advantages and disadvantages of a California location for firms in these sectors is summarized in Figures 4 and 5. Few of the large computer firms we interviewed make use of the state export programs, but many are concerned with the quality of education at the primary and secondary level and with the maintenance of a strong higher education system. Computer firms were users, as well, of the California “Red Team,” to find relocation sites and to deal with permitting issues. Food processing firms used federal rather than state export programs. Food processors were most concerned with government regulation, especially with regard to environmental standards and interactions between agricultural/industrial facilities and expanding urban residential areas.

While the state documents the level of service provided by many of its foreign trade and other programs, there are no overall assessments of the effectiveness of these programs. California is well on the way to developing a set of tools that can be used within the context of trade-related changes as well as more broadly for economic development goals. What remains is to develop a stronger vision of how to meet the changing needs generated by growing globalization in a framework that also addresses other challenges facing the state’s economy. Several factors are key to creating this vision:

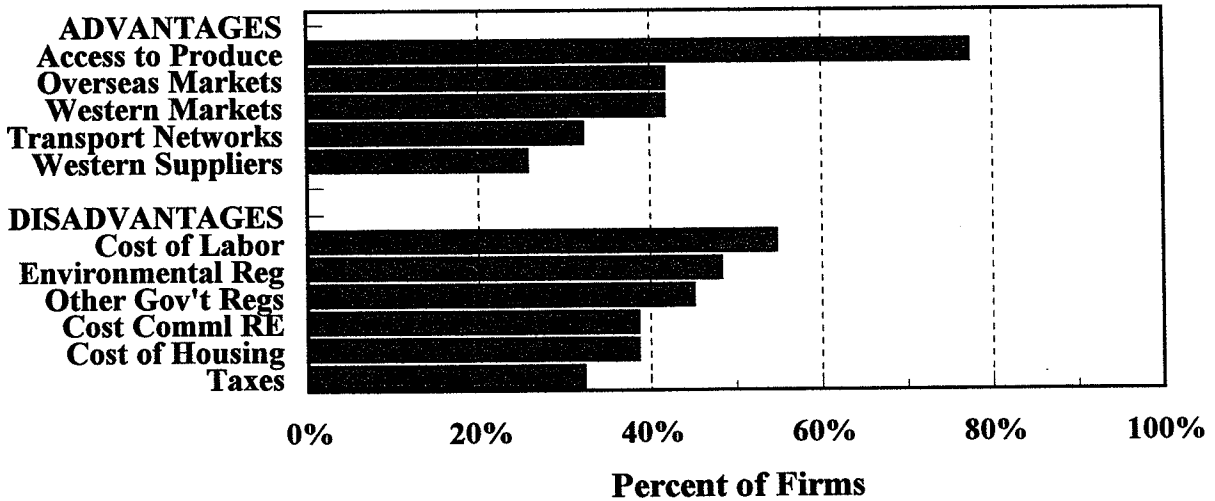
- *Identifying Needs and Setting Priorities:* The needs created by globalization are part of a broader set of demands facing California as the economy develops. Programs to promote exports, increase competitiveness of firms facing import competition, and retrain displaced workers should be developed in the context of the broader economic development needs of the state.
- *Recognizing the Complex Effects of Global Linkages:* Taking advantage of global linkages is not just a simple matter of assisting California firms in expanding exports and foreign firms to locate production in California. Exporters may soon become producers abroad, while foreign investors in California may soon become competitors in markets served by California firms. As the California economy transforms in response to global pressure, a state goal should be to ensure that companies and workers have the resources and training to prosper in the changing economy.
- *Anticipating the Effects of Change and the Needs of Industries:* A good understanding of how industries operate and what are their major concerns should enable state and local government to anticipate and address potential issues before they become “push” factors, leading firms to seek out of state sites. Overall, the state approach to expanding foreign trade, and to economic development more broadly, will be most effective if it is proactive. One respondent in our interviews commented that “The State needs to identify problems before they happen. Instead, state programs only start working when problems arise.” Careful monitoring and analysis of successful industries could identify long term concerns, such as capacity constraints in Silicon Valley and the search for new growing sites of expanding agricultural sectors such as wine, and allow the opportunity for strategic responses in anticipation of these concerns.

**Figure 4**  
**Advantages and Disadvantages of California Location**  
**Computer Firms**



COL: cost of living  
 Source: Interviews by Authors

**Figure 5**  
**Advantages and Disadvantages of California Location**  
**Food Processing Firms**



Source: Interviews by Authors

- *Identifying and Nurturing New Locations for Expanding California Clusters:* In addition to helping industries deal with expansion and congestion issues within the regions where they already concentrate, the state could work with businesses and communities to identify alternative regions within California where expanding industry could locate. For example, the expansion of a new University of California campus in the Central Valley with an emphasis on information technology could be coordinated with the expansion needs of growing high tech businesses. (We should note, however, that meeting the expansion needs of one industry may come into conflict with the land use needs of a different industry, as with agriculture in the Central Valley).
- *Including Adjustment Programs as a Key Element of Trade Policy:* Trade clearly causes adjustments for specific industries and for occupations within industries. The state can participate in programs that take advantage of resources ranging from educational institutions to facilities available at military bases to assist firms, industry groups, and individual employees in recovering from trade-induced changes.
- *Developing Programs in a Multijurisdictional Context:* While there are many unmet needs, there are also programs that appear duplicative, especially across government levels. The state could potentially play a strong role in coordinating resources at different government levels and in establishing networks of agencies that can meet different trade-related needs.
- *Including Monitoring and Evaluation as Part of Each Program Design:* It is important to track the changes affecting the state as a whole (e.g. increases and decreases in export activities), the changes experienced by industries or occupational groups within the state, and the activities of different programs, and to regularly evaluate whether the programs are providing appropriate services where the need is greatest. This can be best accomplished if general trends are regularly reported and if programs keep careful accounting of their activities and services.
- *Targeting Programs and Sharing the Costs of Trade Assistance:* Foreign trade overseas offices and missions are among the more costly economic development programs engaged in by the state. State resources will go further if the programs concentrate on businesses with a history of successful production for other markets and if at least a portion of the costs is recouped from successful clients.

California is fortunate in having many resources already in place and in having an economy that has shown resiliency in its ability to recover from severe structural changes. From the point of view of foreign trade, what remains is to balance the resources to meet the needs generated by increasing trade, recognizing that opportunities flow in both directions, into and out of California, and have differential effects on industries and workers within the state.

(Our final working paper, Cynthia A. Kröll, *Foreign Trade and California's Economic Growth: A Summary of Findings and Directions for Policy*, Working Paper 98-263, summarizes the findings of the four technical working papers and provides detailed information on state policy alternatives.)



## Further Information

A full listing of the working papers is included at the end of this summary.

The research for these working papers was funded by the California Policy Seminar, which also has two publications describing this study. The research is summarized in depth in Cynthia A. Kroll, Dwight M. Jaffee, Ashok Deo Bardhan, Josh Kirschenbaum and David K. Howe, *Foreign Trade and California's Economic Growth*, California Policy Seminar, Berkeley, 1998. A much briefer summary, similar to this announcement, is available in a California Policy Seminar *Policy Brief* of the same title.

## Working Paper Citations

Kroll, Cynthia A. *Foreign Trade and California's Economic Growth: Issues and Research Approach*, Working Paper 98-257. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Jaffee, Dwight M. *International Trade and California's Economy: Summary of the Data*, Working Paper 98-258. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Jaffee, Dwight M. *International Trade and California Employment: Some Statistical Tests*, Working Paper 98-259. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Kroll, Cynthia A., and Josh Kirschenbaum. *The Integration of Trade into California Industry: Case Studies of the Computer Cluster and the Food Processing Industry*, Working Paper 98-260. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Bardhan, Ashok Deo, and David K. Howe. *Globalization and Labor: The Effect of Imported Inputs on Blue Collar Workers*, Working Paper 98-261. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

Bardhan, Ashok Deo, and David K. Howe. *Transnational Social Networks, Transportation Costs, and the Geographic Distribution of California's Exports*, Working Paper 98-262. Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 1998.

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