

# Trends in California's Economy: Implications for the Future

by Roger G. Noll

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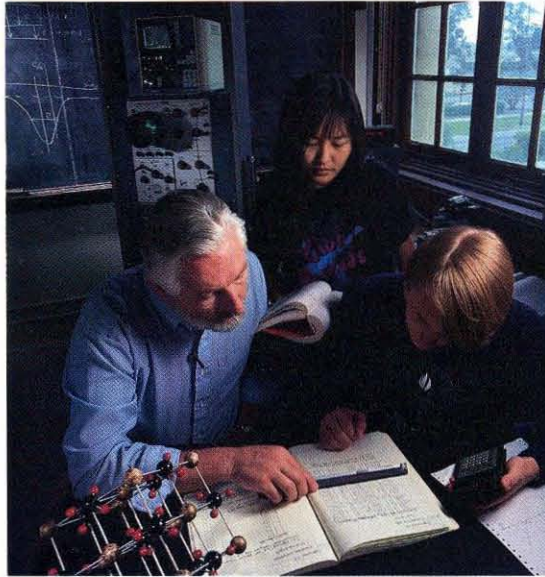
Everything important in American life is captured in our most influential cultural institution, the television commercial. In contemplating my assignment for this august event, the television commercial that came to mind was the beer advertisement in which an old codger, sitting in a 19th-century western bar, is listening to a conversation about the future. Finally, he offers his insights to a highly skeptical audience: "One hundred years from today, men will walk on the moon and only little girls will ride horses." I cannot hope to offer any insights about the future of California that are either as accurate or as compelling as the old codger's forecast. I cannot predict the state of the California economy two years from now, let alone in several decades. Moreover, anyone who tried to make such a prediction would have to be either dishonest or foolish.

One of the most important features of long-term economic development everywhere, including California, is its dependence on technological change. To forecast the ways we will occupy our work and leisure time requires forecasting the successful innovations in products and production methods of the future. To forecast technological change requires denying two core aspects of the innovative process: (a) the unpredictability of both new scientific discoveries and the uses that will be made of them; and (b) the dependence of the innovative process on having a cadre of very smart, well-trained people who are left by themselves to exercise their creativity without external second guessing. To illustrate the former, consider the debate about the value of recombinant DNA research that took place in the mid-

1970s. Both opponents and proponents of this innovative research method made forecasts of its consequences. The former predicted deadly new organisms that would upset the ecosystem and perhaps bring an incurable human pandemic, and the latter forecast new miracle cures for cancer and other diseases. In reality, the first major practically significant results were not emphasized by either side—the development of fruits and vegetables with longer shelf lives that can be picked when ripe. As an example of the latter, consider the forecast in 1950 by an executive of the then-leading computer company that the ultimate total world demand for computers was likely to be under one hundred.

Because long-term economic development depends upon a loosely managed, unpredictable process, it cannot, in principle, be forecast. This unpredictability of the future makes the job of an economist at a visions conference especially difficult. Consequently, I have adopted a more modest goal than forecasting the future of the California economy. Instead, my aim is to outline a strategic plan for California, much as an innovative company in a high-technology industry would have a long-term business plan. Specifically, a strategic plan has three elements. The first is an honest assessment of capabilities; in this case, what are California's strengths and assets? The second is an assessment of the opportunities for the future, based on the core values (not the specific tastes and desires) that people are likely to have in their future. The third is an identification of the commonalities in the first two assessments, and a coherent

**Don Skelton, an engineer in Caltech's Division of Physics, Mathematics, and Astronomy, works on a problem with two students. California's higher educational system is the strongest in the world.**



set of actions to take advantage of them.

In the context of this conference, the assets and opportunities of California are largely determined by the constraints placed upon the state's development by the environment, natural resources, and population growth. In addressing the relationships between resources and growth, I will organize my thoughts around the issue of sustainability: how many people can live in California indefinitely at a contemporary middle-class standard of living? In this context, the standard of living is defined in the economist's (not the accountant's) sense, and so incorporates people's personal monetary measures of nonmarketed aspects of the quality of life, such as the value of a cleaner environment. My principal conclusion is that the sustainable level of per capita income in California is high—probably quite a bit above per capita income today. The problem facing California is not that it faces some sort of Malthusian deprivation due to its resource constraints in relation to its population. But, California is by no means guaranteed to succeed in attaining its sustainable level of economic well being. The problem has to do with our strategic plan—our ability to organize ourselves in an effective way to make the best use of the resources and other advantages that we possess.

The value of focusing on the sustainability question is that it identifies the challenges that our resource base will force us to face. To sustain a high standard of living in the face of a finite resource base will require transitions in the economy and the way we live our lives—but not, on balance, a significant sacrifice in our welfare

unless we mismanage our assets.

The beginning of a strategic plan is an assessment of assets, and here California looks very strong. Much recent research in economics demonstrates that an area's historical economic base is an important factor in determining its future. California benefits from being at the center of the industries and technologies that are most likely to be the fastest growing in the next decade or two, notably biotechnology and microelectronics. In addition, it benefits from having the strongest higher educational system in the world. In recent years, it has become fashionable to attack universities as irrelevant and excessively expensive, and to deny that they make any contribution to a nation's economic welfare. Although universities do tend to be poorly managed from a business perspective, this view is, nonetheless, poppycock. American universities are universally recognized as the best in the world, and all of our leading economic competitors send most of their best students to the U.S. for some part of their training (usually as graduate students and postdoctoral fellows). University education happens to be one product of the U.S. that is highly successful in foreign sales, largely because elsewhere in the world the importance of education and research, especially in science and engineering, in long-run economic growth is uncontroversial. Recent economics research finds that American companies still lead the world in product innovations and radical process innovations, and that the U.S. has the highest rate of return to investment in basic research. These strong performance indicators are plausibly tied to the unique feature of American higher education—it links education and research, and teaches students how to work independently and creatively. Moreover, research on firm-location decisions reveals that high technology companies prefer to locate their research facilities near great universities. The history of the Silicon Valley illustrates this principle. It was started on the Stanford campus by Stanford faculty and alumni, and even today many of the biggest Silicon Valley companies—Hewlett-Packard, Syntex, Varian, etc.—occupy Stanford land. California's universities rank at the top in science and engineering education, and so give the state a significant advantage for the future—assuming that these universities survive the current wave of public disinvestment in both Washington and Sacramento.

California's third asset is locational. California is the primary point of contact between the United States and the rapidly growing nations of the Far East. Not only is it physically closest to these nations, but it is culturally the closest as well,

owing to the relatively large number of Asians who live in California. Indeed, these two factors have led companies from the Far East to make significant investments in California. Whereas some fear international ownership of California industries, it has two very positive features. The first is that it makes up for the dangerously low savings and investment rates in the U.S. We simply are not investing enough in the future to retain a strong, internationally competitive economy. Without investments from abroad, the future of the country would be far more bleak. The second is the fact that these investments represent a commitment of these dynamic Asian companies to the future welfare of California. Investing in a nation undergoing Malthusian decline is not an attractive proposition. Far better to invest in a community that will be wealthy enough to buy your VCRs, TVs, autos, and other consumer products. The heavy investment by Japanese and other Asian companies in California is an important signal that people who have a longer time horizon than we do regard us as having an attractive future.

A similar natural advantage arises from the North American Free Trade Agreement. Greater economic integration with Mexico gives California a natural advantage that is similar to its advantages with the Far East. By location and culture California is best placed to be a focal point of economic relations with Mexico. In the 21st century, north-south trade in the Americas is likely to be every bit as important as trade with the Far East is today. Integration of complex manufacturing processes, where less skilled, more routinized and lower paying tasks are performed in Mexico and more complex, better paid tasks in the U.S., is already arising in California and Texas in connection with the *maquiladores* projects along the Mexican border, and will only be further encouraged by NAFTA.

California's cultural advantages with respect to Asia and Latin America point to another asset for the state. Whereas racial and ethnic conflict is certainly a problem in California, it is less of a problem than nearly everywhere else. California is not only racially and ethnically diverse, it is also less segregated than nearly every other state and nation. Whereas the problems of racial and economic isolation in black and Latino ghettos is severe, nonetheless the extent of integration in middle-class neighborhoods, and especially in higher education, is great. The advantage inhering in this is not just that we stand some chance of solving the problems of our own divisions, but—probably more important for our economic future—California businesses are advantaged in

dealing effectively with businesses in other countries because they are more likely to employ people who understand foreign cultures (and speak the language).

Thus, in surveying these assets, the state is well placed to succeed in the 21st century. That leaves the nature of our future left largely to the circumstances surrounding the last major asset—the natural resource base of the state. California is generally resource rich—with a couple of exceptions I will discuss below. For example, consider the effect on California of an edict to switch energy use in the state so that it relied exclusively on renewables. If the switch had to be immediate, the transition would be excruciatingly painful, because a massive investment would have to be made in energy conversion devices, largely from hydrocarbon fuels to electricity from renewable resources like photovoltaics, wind power, geothermal power, and hydroelectric generation. But in California these resources are ample to provide all current energy uses and then some. The main effect would be the cost, but even this would not be Draconian. Renewable energy is less than twice as expensive as energy from fossil fuels—and the difference is less still if one takes into account the environmental costs of fuel burning.

The most important resource constraints in California are water and air. California is an arid state, but it has plenty of water—if the water is managed sensibly. California's water problem arises not from excessive urban use—these consumers take less than 15 percent of California's supply. The problem is excessively wasteful agricultural use, such as growing water-intensive crops like alfalfa in the California desert. Many farmers pay only a few dollars per acre-foot for water, while urban businesses and residences pay \$200. If farmers could sell their water to the cities, and grow crops that require less water, they could be economically better off, farming would not decline, and the state would have ample water not only for cities but for restoring inland water quality. Moreover, more efficient water use would actually increase economic welfare, replacing the production of many crops in surplus (and so valueless) with far more highly valued economic activities. In this case, a more sustainable resource policy actually increases living standards.

In the southwestern corner of California, air is a severely overused resource. Los Angeles has the worst air quality in the nation, and San Diego is sliding into a severe problem. But again, the problem has more to do with the way we manage the resource than with a fundamental conflict

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between living standards and air quality. Thus far, policy in California has had two main themes: (1) beat hard on auto emissions through emissions standards on new vehicles, but do next to nothing to encourage less driving, the retirement of old autos, or, more generally, the use of the least polluting models and types of cars; and (2) reduce emissions from stationary sources, but do not risk doing economic harm to any industry. The second strategy is partly the fault of the federal Clean Air Act, but it is also the fault of state policy—which is to protect small businesses and polluting industries against policies that might cause them to relocate. As an illustration of how our problems are in large measure of our own doing, California is busily undertaking policies that actually encourage the expansion of electric generation facilities inside Los Angeles and San Diego that burn hydrocarbon fuels and that are a significant contributor to air pollution. Why? Because it is almost impossible to build new generation facilities anywhere (even places that have no air pollution problem), expanding existing facilities is often the only viable option, even though the environmental costs of expanding facilities in Los Angeles vastly exceeds the environmental costs of locating new facilities in the desert.

Water, air, and eventually other natural resources all require economically sensible management to achieve a sustainable economy. To understand how to develop these policies requires making good use of simple economics. As Alfred Kahn once said, in some circumstances a “tyranny of small decisions” causes all to be worse off, as best exemplified by Garrett Hardin’s “tragedy of the commons.” From one person’s point of view, the best decision regarding, say, a fishery may be to catch as many fish as possible; however, if all fishermen follow this strategy, all can suffer from a reduction in the fish population. The tragedy of the commons arises not because people are evil, misguided, or shortsighted, but because no individual adds significantly to the problem of overuse of the natural environment. Because a single person’s contribution to the problem is small and mostly affects anonymous others, it is simply not taken into account in choosing individual actions. But collectively, when fully informed, people perceive that their individual best interests are to agree to curtail use of the commons, and embark on a cooperative plan to achieve this end.

A rational strategic plan for California must include strategies for managing the state’s resources so as to cope effectively with potential commons problems. This strategic plan, if economically rational, would produce a future

world that people who are fully informed would generally agree is preferred to all other possible futures. Moreover, because some resources are now so badly mismanaged—squandered for low-valued uses—the best available futures are likely to be regarded as preferable to the present as well. The barrier to constructing and adopting this plan is partly that people are not likely to be fully informed when they make these choices, and partly that the political institutions of the state may not work very effectively in developing and implementing such a plan even if people are informed.

In essence, the California strategic plan requires a transition to a fully renewable resource economy over a short period for a few resources (water and in some places air), and to a longer list of resources over the next few decades (most importantly energy). One major weakness California faces in implementing such a policy is that it is integrated into a larger world economy that wastes resources; however, this circumstance only stands in our way for a few items. Obviously, a California that is sustainable cannot possibly specialize in resource-intensive products that others produce in a nonsustainable fashion. But in some cases—energy most clearly—a significant shift to renewable resources is going to be economically efficient for everyone sometime in the not impossibly distant future, so that a movement in that direction can position California well for the economic structure of the future—including selling the technologies of renewable energy and energy efficiency. In other cases, notably water and air, California has a special problem that it must solve or face a diminished standard of living.

Thus, California can find opportunity in some of its constraints, because these opportunities mesh well with a predictable future value. In the 21st century, greater emphasis on renewability and resource efficiency is a predictable value, not because environmentalism is sure to capture the political center, but because economic necessity will demand it. California’s air-pollution problem, in particular, can create a local market for less polluting energy conversion technologies, with a concomitant enhancement of the attraction of energy efficiency and renewables (because they are generally less polluting and, perhaps more importantly, can be licensed as new facilities outside the large urban centers).

Economists have developed useful ideas about how policies can ease this transition, avoiding economic shocks. Most fundamental is the notion that scarce resources ought to be appropriately priced; in California, it is nonsense to give

away air and water. Markets can be created where they are now limited or banned, such as the recent movement for trading water rights and air emissions permits. Likewise, emissions-reduction credits should be available for firms that can figure out ways to control currently unregulated sources. For example, a major source of air pollution in Los Angeles is products containing volatile organic chemicals: paints, solvents, hair spray, oven cleaner, deodorant, etc. In many cases, regulations have not been imposed either out of fear that to do so would cause serious economic harm to the companies that are sources of pollution or because the air-pollution regulators lack the resources to enforce regulation of a large number of small sources. But large companies are likely to find it cheaper to pay for solving these problems than to ratchet down further their already rigorous standards.

California's problem is not that the resource constraint is so binding that we face a significant economic penalty if we move to a system that is less wasteful of resources. The problem is a lack of will to cope with the problem in an efficient manner. We have known about our water problem, and how to solve it, for at least 25 years. We have known about the dimensions of the air quality problem, and how to solve it, for at least 15 years. And, in the past few years, the cost of far less environmentally damaging energy technologies has fallen dramatically—but we have cut back on research to bring these technologies to commercial readiness, and have not adopted policies that would make environmental costs figure fully into the calculus about which technologies to use. California's strategic plan, therefore, is not at all impossible to write, nor is it one that promises a dark future. But it is one that has proven difficult to implement. In the corporate world, the failure to implement so promising a plan would lead to bankruptcy—or, before that, a takeover. Maybe we should sell the entire state to the Japanese . . .

The rosy picture for California arises from some key strategic advantages for coping with the resource limitations facing the world in the future. Like most of North America, California is resource rich and has a low population density. But the nasty dark side of California's advantages is that most of the rest of the world is not so fortunate. The really difficult problems associated with sustainability arise in the poor, densely populated nations of the world. Suppose that California and the rest of the advanced, industrialized world succeeds in controlling its population and moving to a sustainable economy, but the remaining 80 percent of the world does not.

What, then, is our ethical obligation? Do we face a moral imperative to reduce significantly our own standard of living to feed the Malthusian maw of the rest of humanity? And, if so, what form should our assistance take?

The ethical problem posed by the condition of the poor nations of the world is by no means simple. In the end, the achievement of sustainability in these countries turns on their ability to control population growth. It is difficult to make a moral case that the advanced world is obligated to provide assistance to countries that will use it in a way that merely increases the number of people living at subsistence. But even if the ethical argument favors this form of assistance, I believe that it is politically unrealistic to expect Americans to volunteer for a diminishing standard of living in order to feed the Malthusian maw. The real challenge of sustainability, then, is not in California, or even the United States. It is in controlling population in poor countries. Many reject the idea that rich countries should be telling poor countries what to do. But, the tragedy of the worldwide commons is that the sustainability of our way of living ultimately depends on the sustainability of other economies, so that we have a legitimate stake in curbing the pressures of human population on global resources. If others do not control population, California can remain sustainable at a high living standard only if the resources made available to the poor countries are insufficient to permit a continuation of rapid growth in worldwide population. Both normatively and practically, this means conditioned aid to poor countries—the active inclusion of population issues in development assistance. □

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