

## HOW TO IMPROVE U.S. PRODUCTIVITY

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Americans have gotten used to the idea that, despite fluctuations in the business cycle, our economy is and will continue to be the most productive in the world. But that conviction, like so many others in these unsettled economic times, is being challenged. Some economists now believe that our lagging productivity may not be a temporary phenomenon but a long term problem, with ominous implications for the future.

Productivity growth is the most important factor governing how fast the economy can expand and how much living standards can rise over time. During the past two decades, U.S. productivity growth has slowed, from an annual average rate of 3.1 percent between 1947 and 1973 to an average of just 1.1 percent since then.

One of our most powerful advantages in addressing America's productivity problem is our research universities and their capacity to create new products, new processes and ultimately new jobs for our citizens.

Biotechnology is a prime example. The industry was born in California during the 1970s, when a joint team of researchers from the University of California at San Francisco and Stanford University successfully spliced the first gene. Today biotechnology is a \$13 billion industry in which California leads the world. The University of California's nine campuses are a powerful magnet for private investment in biotechnology firms. One-third of all U.S. biotechnology companies are located in California and within 35 miles of a UC campus. One in six California biotech companies was started by UC scientists including the largest three. And those three companies alone provide 7,000 jobs for Californians, \$283 million in state and federal income taxes and \$3.7 billion in sales -- half the U.S. biotech total.

California has achieved international leadership in biomedical applications of biotechnology. Biotechnology improvements will enhance virtually every aspect of California's world-class agricultural sector. Marine biotechnology will harvest pharmaceuticals, goods and new materials such as coatings and adhesives from the state's Pacific coast. Biotechnology will also bolster California's growing environmental industry, with sensitive new methods to detect and eliminate toxic substances.

UC already has a number of successful programs that are boosting productivity and helping create jobs, such as UC MICRO, which aids California electronics companies in developing the technologies for new products, and UC CONNECT, which links high-technology entrepreneurs with financial, technical and managerial resources.

But right now far too little is being invested in building the bridges to link research performed in universities and its application by business and industry. California needs to invest in the emerging industries that are replacing our defense-based and other declining industries. Biotechnology, pharmaceuticals, agriculture, communications -- all of these are generating research breakthroughs that will have major commercial applications, creating new jobs and increasing state revenues.

We are living in one of the most exciting periods of intellectual discovery in history, and the economic potential of the explosion of knowledge is tremendous. The bridge from universities to industry is key. Given the improved prospects for California's economy, this is a strategic time to invest in university/industry partnerships that put the products of university research directly to work in the economy. There is always the risk that an exciting new idea will not pan out, that even research close to commercialization will run into a dead end. The far greater risk, however, is not to try.

It is a well-established fact that half or more of economic growth is the result of investments in research and development. The application of knowledge may be the best of the few remaining strategic advantages the United States enjoys over our international competitors. The challenge for California is to lead the world in applying knowledge, just as we have led the world in creating and discovering it. To do so is the best guarantee that California and the nation will be facing not the end of our leadership in the international high-tech marketplace but the beginning of a dynamic new era of intellectual and economic productivity.