

# *The Positive Sum Strategy*

*Harnessing Technology for  
Economic Growth*

Ralph Landau and Nathan Rosenberg, editors

NATIONAL ACADEMY PRESS  
Washington, D.C. 1986

---

# Contents

---

EDITORS' OVERVIEW . . . . .	1
<i>Ralph Landau and Nathan Rosenberg</i>	

## TECHNOLOGY AND THE DYNAMICS OF ECONOMIC GROWTH

THE IMPACT OF TECHNOLOGICAL INNOVATION: A HISTORICAL VIEW . . . . .	17
<i>Nathan Rosenberg</i>	
MACROECONOMICS, TECHNOLOGY, AND ECONOMIC GROWTH: AN INTRODUCTION TO SOME IMPORTANT ISSUES . . . . .	33
<i>Michael J. Boskin</i>	
MICROECONOMICS AND PRODUCTIVITY . . . . .	57
<i>Dale W. Jorgenson</i>	
DYNAMIC COMPETITION AND PRODUCTIVITY ADVANCES . . . . .	77
<i>Burton H. Klein</i>	
THE EFFECT OF RECENT MACROECONOMIC POLICIES ON INNOVATION AND PRODUCTIVITY . . . . .	89
<i>Charles B. Reeder</i>	
MACROREALITIES OF THE INFORMATION ECONOMY . . . . .	93
<i>Stephen S. Roach</i>	

HARNESSING TECHNOLOGY FOR GROWTH . . . . .	105
<i>Robert Malpas</i>	

**POLICY, LAW, SCIENCE, AND EDUCATION:  
THE FRAMEWORK OF TECHNOLOGICAL CHANGE**

TECHNOLOGY AND ITS ROLE IN MODERN SOCIETY . . . . .	115
<i>Stephen D. Bechtel, Jr.</i>	

NATIONAL SCIENCE POLICY AND TECHNOLOGICAL INNOVATION . . .	119
<i>Harvey Brooks</i>	

THE ROLE OF THE LEGAL SYSTEM IN TECHNOLOGICAL INNOVATION AND ECONOMIC GROWTH . . . . .	169
<i>Milton Katz</i>	

THE BHOPALIZATION OF AMERICAN TORT LAW . . . . .	191
<i>Peter W. Huber</i>	

FROM UNDERSTANDING TO MANIPULATING DNA . . . . .	213
<i>James D. Watson</i>	

THE PHYSICAL SCIENCES AS THE BASIS FOR MODERN TECHNOLOGY . . . . .	227
<i>William O. Baker</i>	

TECHNOLOGICAL EDUCATION . . . . .	255
<i>Joseph M. Pettit</i>	

BASIC RESEARCH IN THE UNIVERSITIES: HOW MUCH UTILITY? . . .	263
<i>Donald Kennedy</i>	

**THE ECONOMICS OF INNOVATION**

AN OVERVIEW OF INNOVATION . . . . .	275
<i>Stephen J. Kline and Nathan Rosenberg</i>	

MICROECONOMICS OF TECHNOLOGICAL INNOVATION . . . . .	307
<i>Edwin Mansfield</i>	

MACROECONOMICS AND MICROECONOMICS OF INNOVATION: THE ROLE OF THE TECHNOLOGICAL ENVIRONMENT . . . . .	327
<i>Ann F. Friedlaender</i>	

<i>CONTENTS</i>	<i>xiii</i>
TECHNICAL CHANGE AND INNOVATION IN AGRICULTURE . . . . .	333
<i>Vernon W. Ruttan</i>	
TECHNOLOGY ADOPTION: THE SERVICES INDUSTRIES . . . . .	357
<i>James Brian Quinn</i>	
TECHNOLOGY DIFFUSION, PUBLIC POLICY, AND INDUSTRIAL COMPETITIVENESS . . . . .	373
<i>Paul A. David</i>	
DETERMINANTS OF INNOVATIVE ACTIVITY . . . . .	393
<i>Keith L. R. Pavitt</i>	

**THE ORGANIZATION OF TECHNOLOGICAL ADVANCE:  
ENTREPRENEURSHIP AND THE MANAGEMENT OF  
INNOVATION**

PROGRAMMED INNOVATION—STRATEGY FOR SUCCESS . . . . .	399
<i>H. W. Coover</i>	
THE CHEMICAL INDUSTRY: CHALLENGES, RISKS, AND REWARDS . . . . .	417
<i>Edwin C. Holmer</i>	
ENTREPRENEURSHIP AND INNOVATION: THE ELECTRONICS INDUSTRY . . . . .	423
<i>Gordon E. Moore</i>	
ENTREPRENEURSHIP AND INNOVATION: BIOTECHNOLOGY . . . . .	429
<i>Robert A. Swanson</i>	
IMPACT OF ENTREPRENEURSHIP AND INNOVATION ON THE DISTRIBUTION OF PERSONAL COMPUTERS . . . . .	437
<i>David A. Norman</i>	
MAKING THE TRANSITION FROM ENTREPRENEUR TO LARGE COMPANY . . . . .	441
<i>William R. Hewlett</i>	

**FINANCING INNOVATION**

CULTIVATING TECHNOLOGICAL INNOVATION . . . . .	443
<i>William J. Perry</i>	

THE ROLE OF LARGE BANKS IN FINANCING INNOVATION . . . . .	453
<i>John S. Reed and Glen R. Moreno</i>	
A VIEW FROM WALL STREET . . . . .	467
<i>Robert H. B. Baldwin</i>	
TRENDS IN FINANCING INNOVATION . . . . .	473
<i>James D. Marver</i>	

### TECHNOLOGY AND INTERNATIONAL ECONOMIC COMPETITION

TECHNOLOGY AND TRADE: A STUDY OF U.S. COMPETITIVENESS IN SEVEN INDUSTRIES . . . . .	479
<i>N. Bruce Hannay</i>	
GLOBAL COMPETITION—THE NEW REALITY: RESULTS OF THE PRESIDENT'S COMMISSION ON INDUSTRIAL COMPETITIVENESS . .	501
<i>John A. Young</i>	
THE NEED FOR NATIONAL CONSENSUS TO IMPROVE COMPETITIVENESS . . . . .	511
<i>Albert Bowers</i>	
INNOVATION, JOB CREATION, AND COMPETITIVENESS . . . . .	517
<i>Ruben F. Mettler</i>	
DANGERS IN U.S. EFFORTS TO PROMOTE INTERNATIONAL COMPETITIVENESS . . . . .	527
<i>George C. Eads</i>	
GOVERNMENT POLICIES FOR INNOVATION AND GROWTH . . . . .	535
<i>Ed Zschau</i>	
THE JAPANESE CHALLENGE IN HIGH TECHNOLOGY . . . . .	541
<i>Daniel I. Okimoto</i>	
THE MACROECONOMIC BACKGROUND FOR HIGH-TECH INDUSTRIALIZATION IN JAPAN . . . . .	569
<i>Masahiko Aoki</i>	
CAPITAL FORMATION IN THE UNITED STATES AND JAPAN . . . . .	583
<i>Ralph Landau and George N. Hatsopoulos</i>	
CONTRIBUTORS . . . . .	607
INDEX . . . . .	623