GIES

Global Innovation Ecosystem

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What is the ‘New Economy’?

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Economic Growth in the Information Age

INTRODUCTION:

Prices of Information Technology

THE INFORMATION AGE:

Faster, Better, Cheaper!

ROLE OF INFORMATION TECHNOLOGY:

IT Prices and the Cost of Capital

AMERICAN GROWTH RESURGENCE:

IT Investment and Productivity Growth

ECONOMICS ON INTERNET TIME:

The New Research Agenda

THE INFORMATION AGE: Faster, Better, Cheaper!

MOORE (1998): "If the automobile industry advanced as rapidly as the semiconductor industry, a Rolls Royce would get half a million miles per gallon, and it would be cheaper to throw it away than to park it."

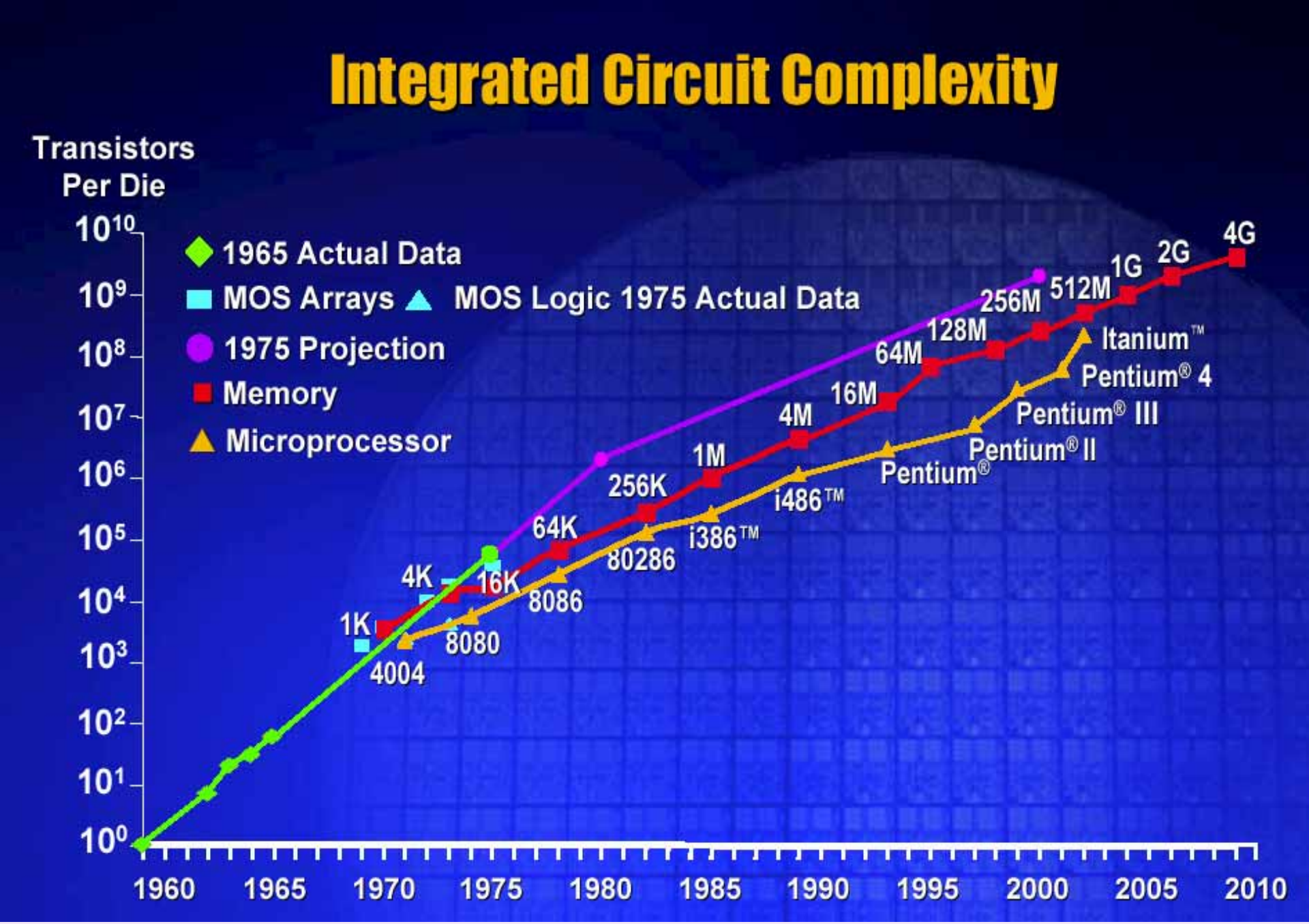
INVENTION OF THE TRANSISTOR:

Development of Semiconductor Technology.

THE INTEGRATED CIRCUIT:

Memory Chips; Logic Chips.

MOORE'S LAW: The number of transistors on a chip doubles every 18-24 months(Pentium 4, released November 20,2000, has 42 million transistors).



Source: No Exponential is Forever, Gordon Moore `ftp://download.intel.com/research/silicon/Gordon_Moore_ISSCC_021003.pdf`)

HOLDING QUALITY CONSTANT
Matched Models and Hedonics

SEMICONDUCTOR PRICE INDEXES:

Memory and Logic Chips.

COMPUTER PRICE INDEXES:

The BEA-IBM Collaboration.

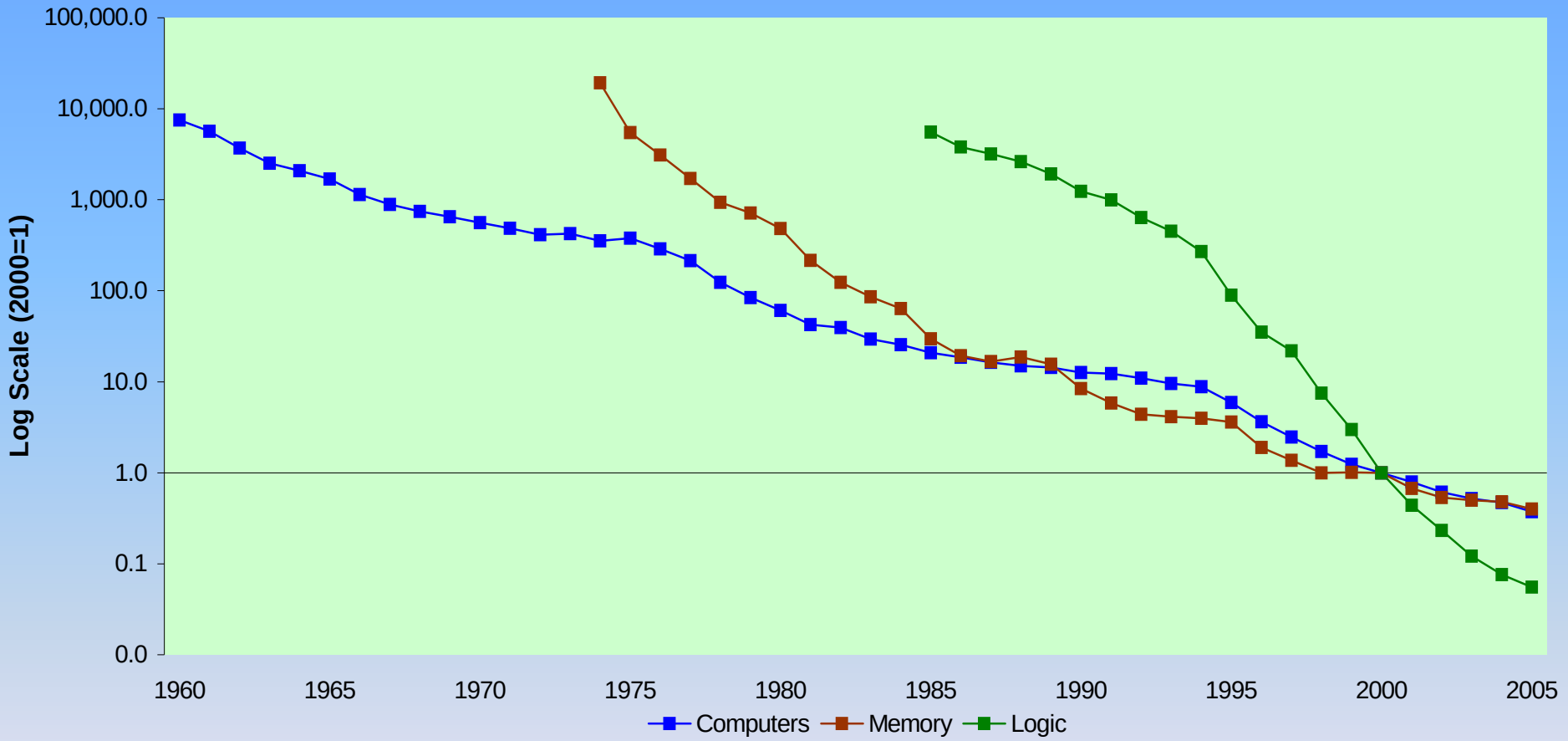
COMMUNICATIONS EQUIPMENT:

Terminal, Switching, and Transmission.

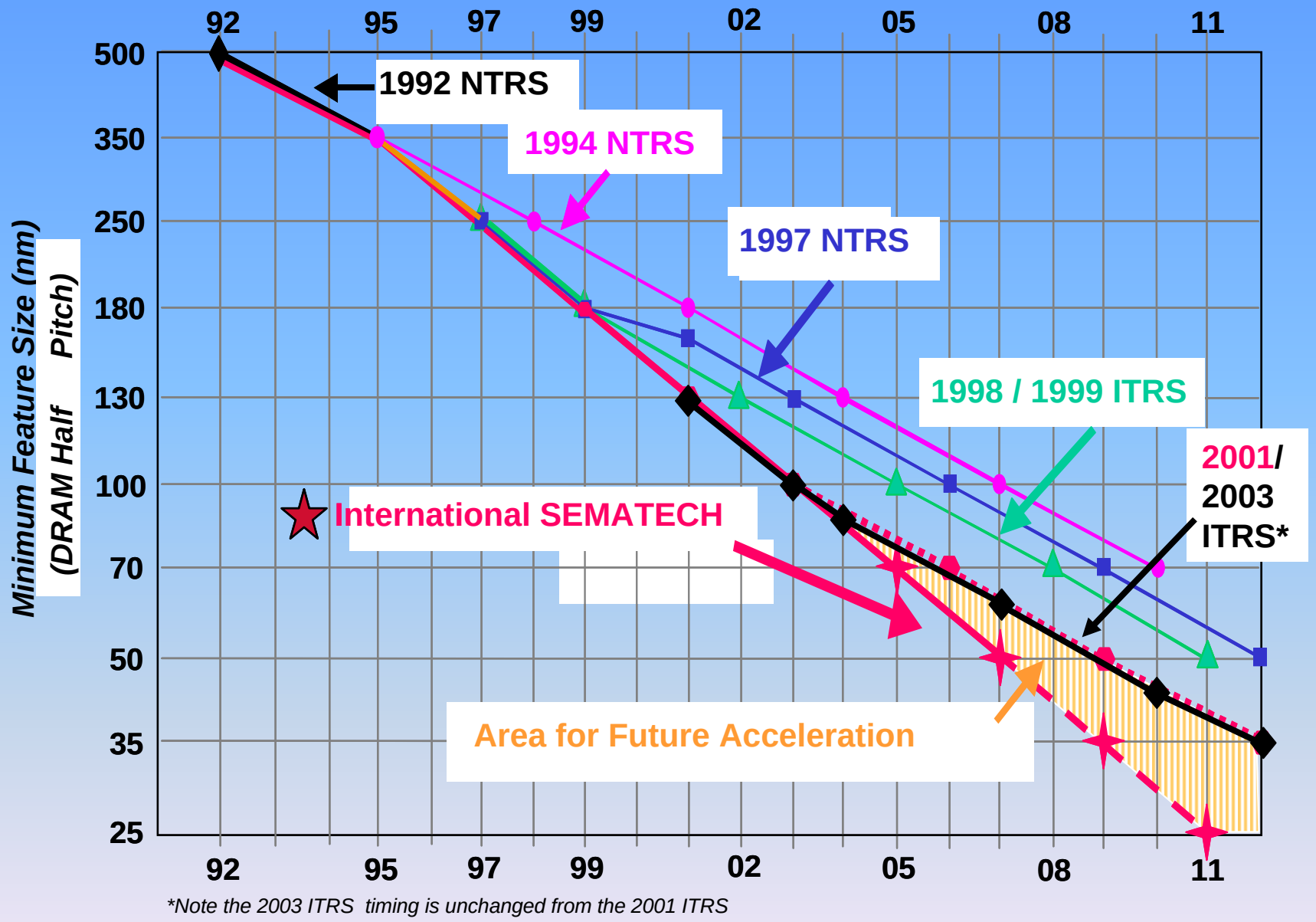
SOFTWARE:

Prepackaged, Custom, and Own-Account.

Relative Prices of Computers and Semiconductors, 1960-2005



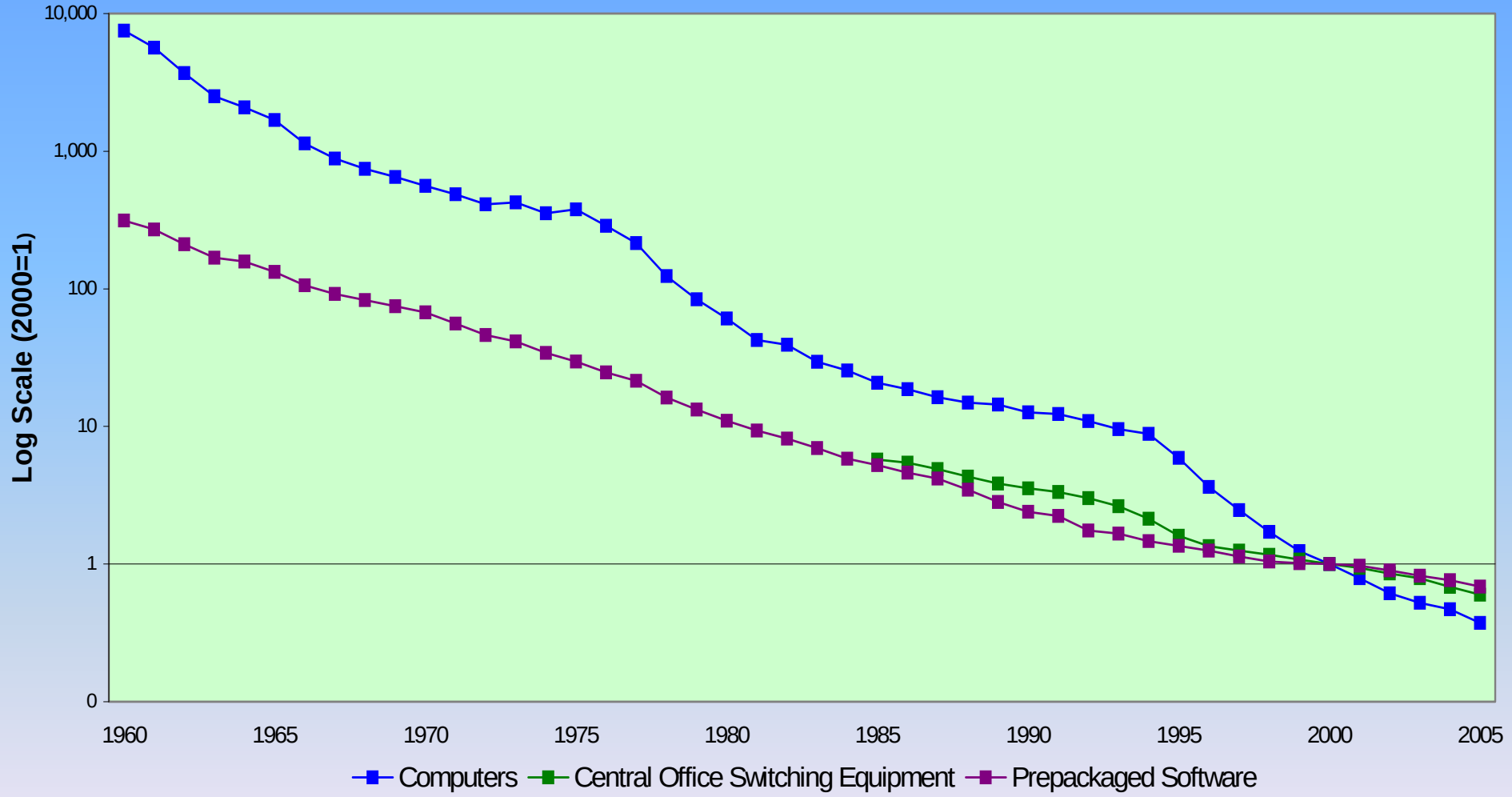
Note: All price indexes are divided by the output prie index.



*Note the 2003 ITRS timing is unchanged from the 2001 ITRS

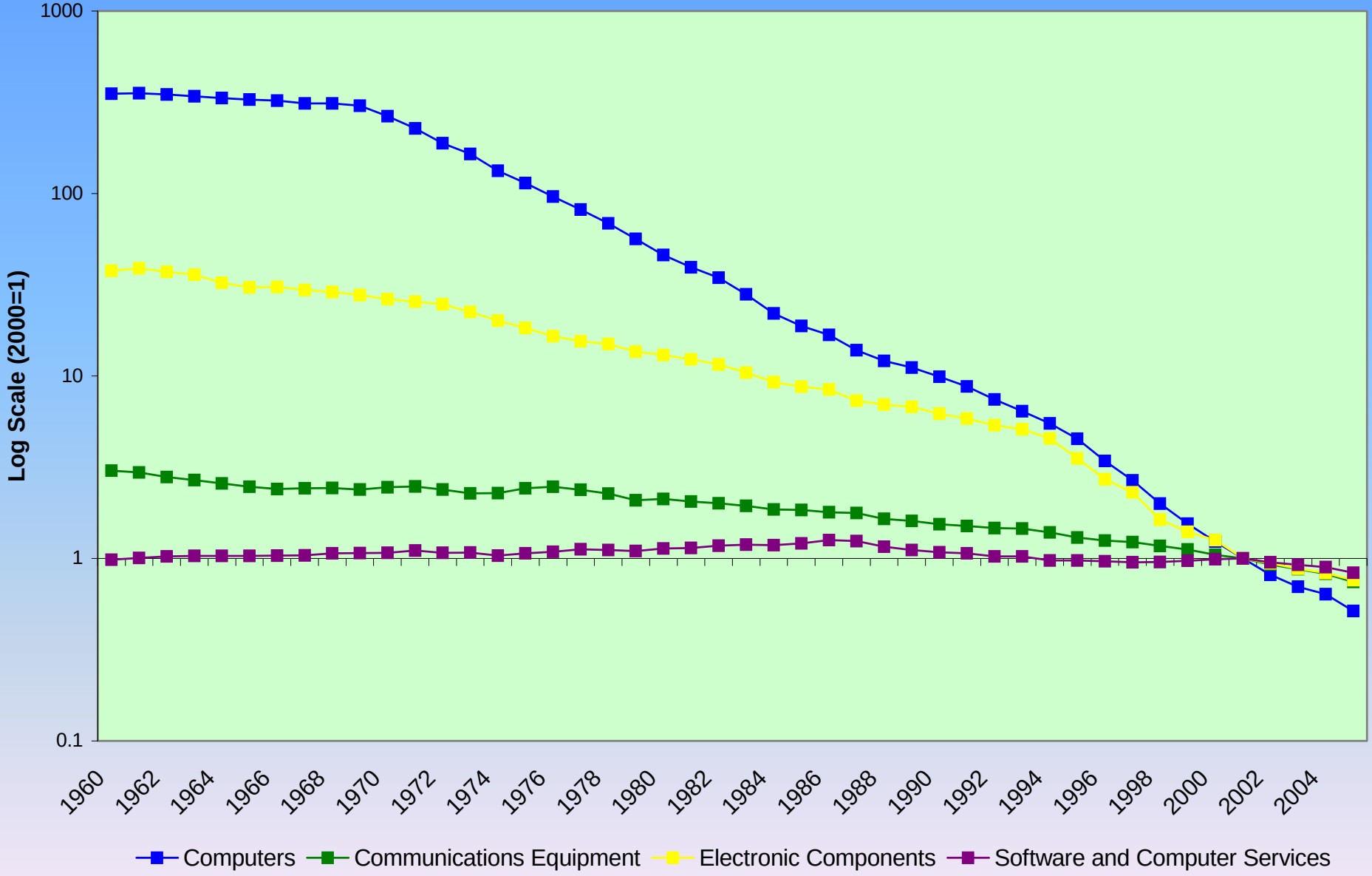
Semiconductor Roadmap Acceleration

Relative Prices of Computers, Central Office Switching Equipment, and Prepackaged Software, 1960-2005



Note: All price indexes are divided by the output price index.

Relative Prices of Computers, Communications, Semiconductors, and Software and Computer Services Industry Output, 1960-2005



ROLE OF INFORMATION TECHNOLOGY: Growth of Output.

OUTPUT SHARES OF IT:

Computers, Communications Equipment, Semiconductors, and Software.

OUTPUT CONTRIBUTION BY TYPE:

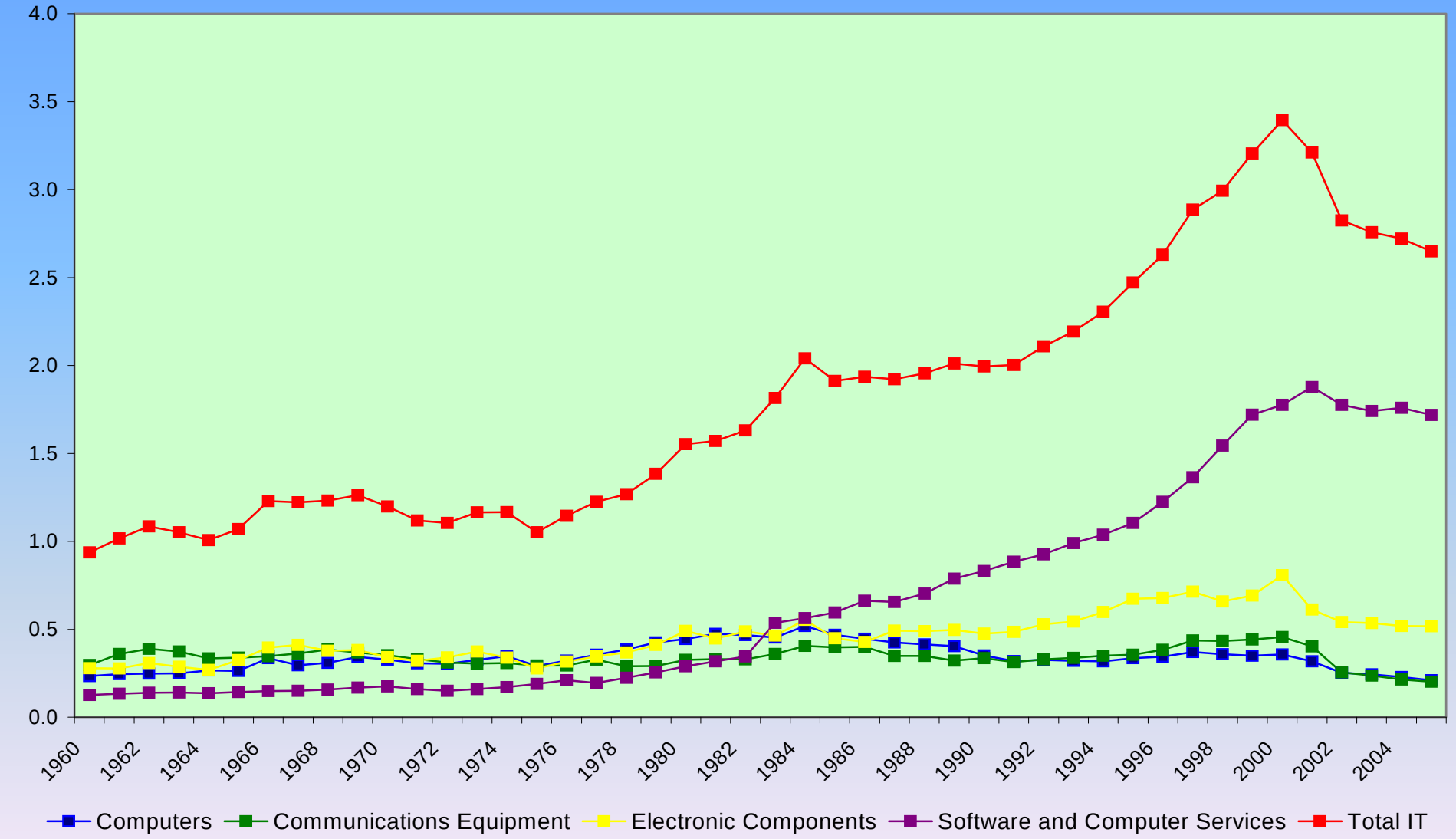
Computers, Communications Equipment, Semiconductors, and Software.

OUTPUT CONTRIBUTION OF IT:

IT-Producing, IT-Using, and Non-IT Value Added.

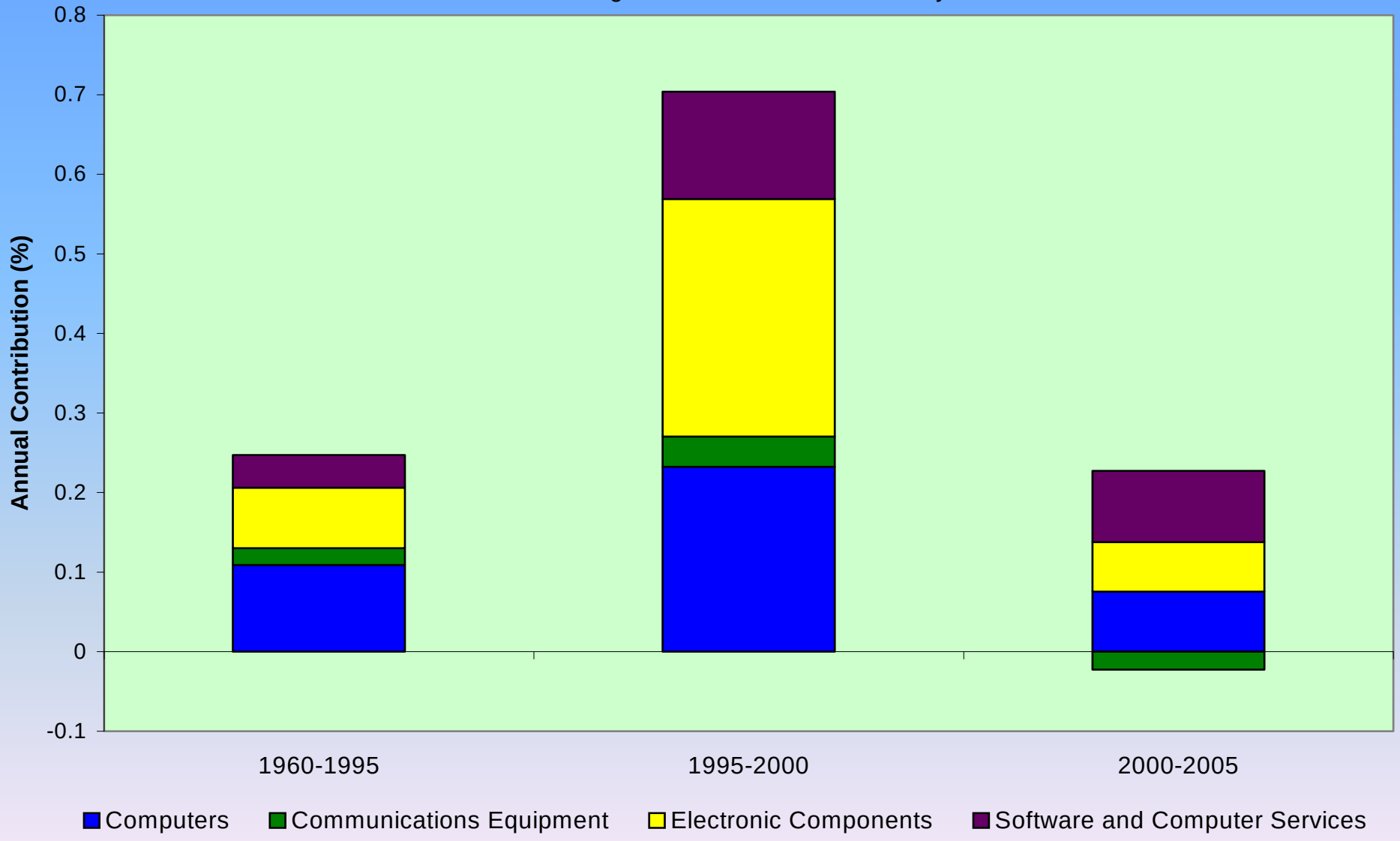
Value Added Shares of Information Technology by Type, 1960-2005

Share of Current Dollar GDP.



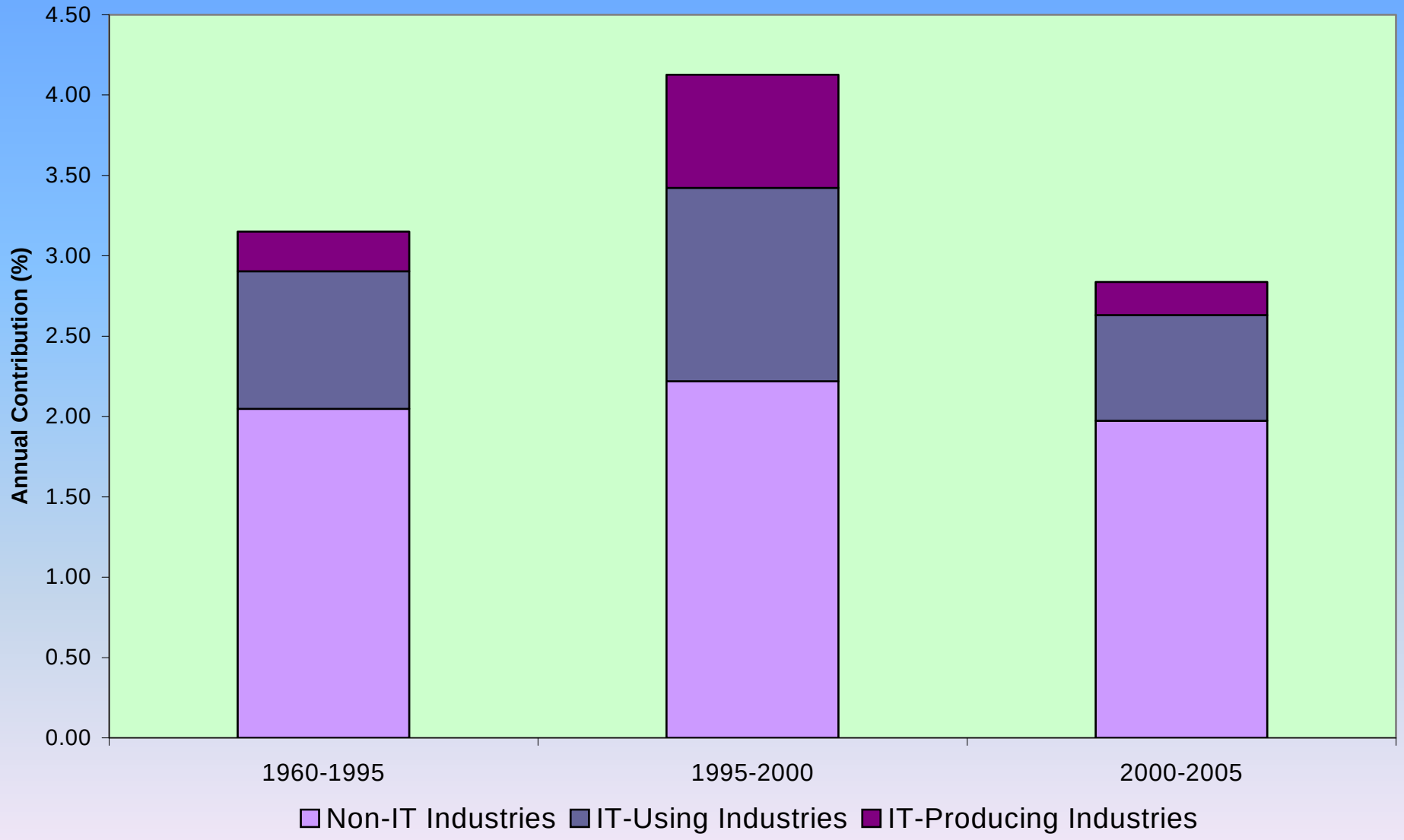
Industry Contributions to Value Added

Value added weighted contributions of industry value added.

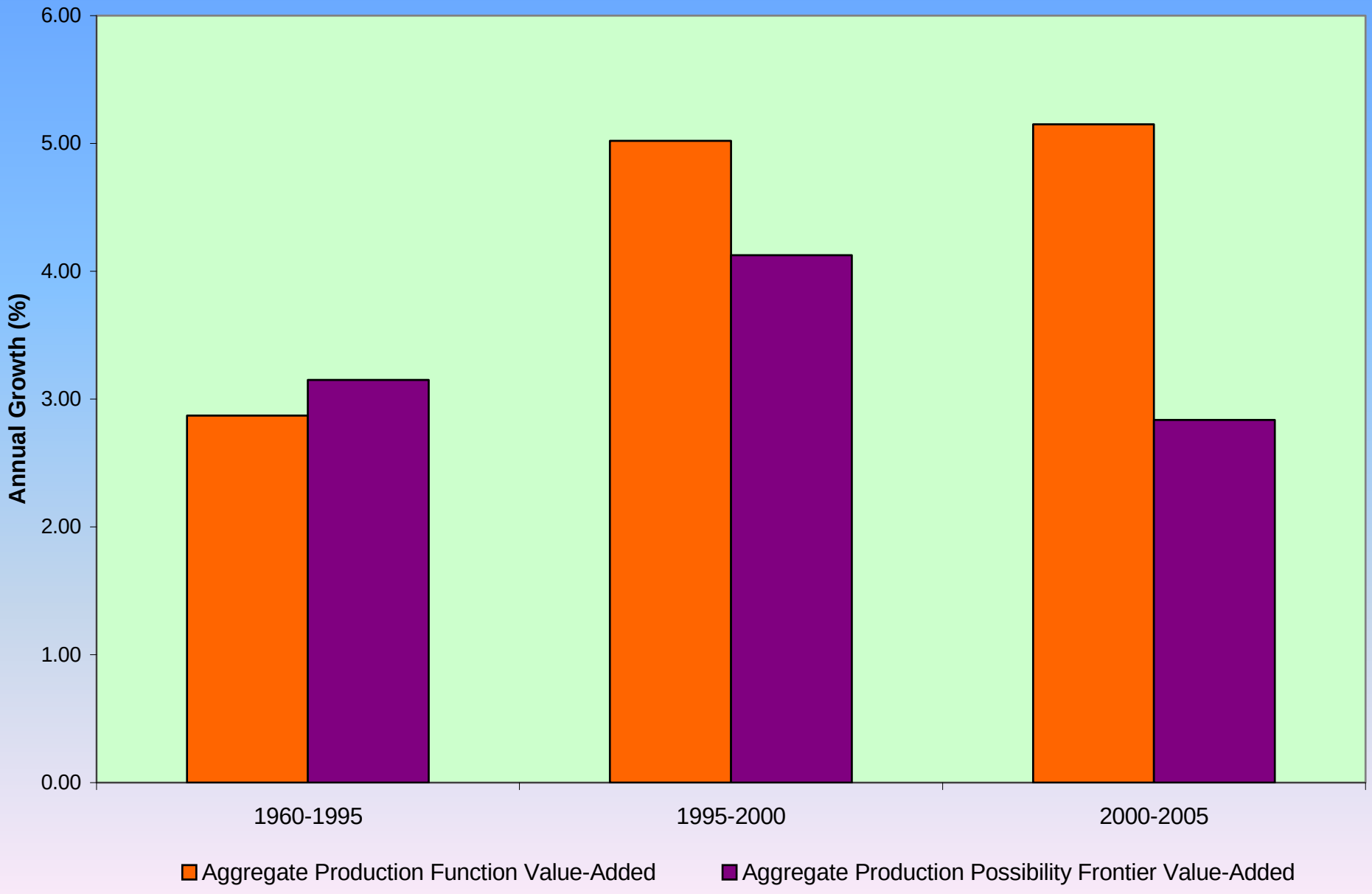


Industry Contributions to Value Added Growth

Value added weighted contributions of industry value added.



Comparison of Production Possibility Frontier and Aggregate Production Function



ROLE OF INFORMATION TECHNOLOGY: Contribution of Capital Input.

INPUT SHARES OF IT:

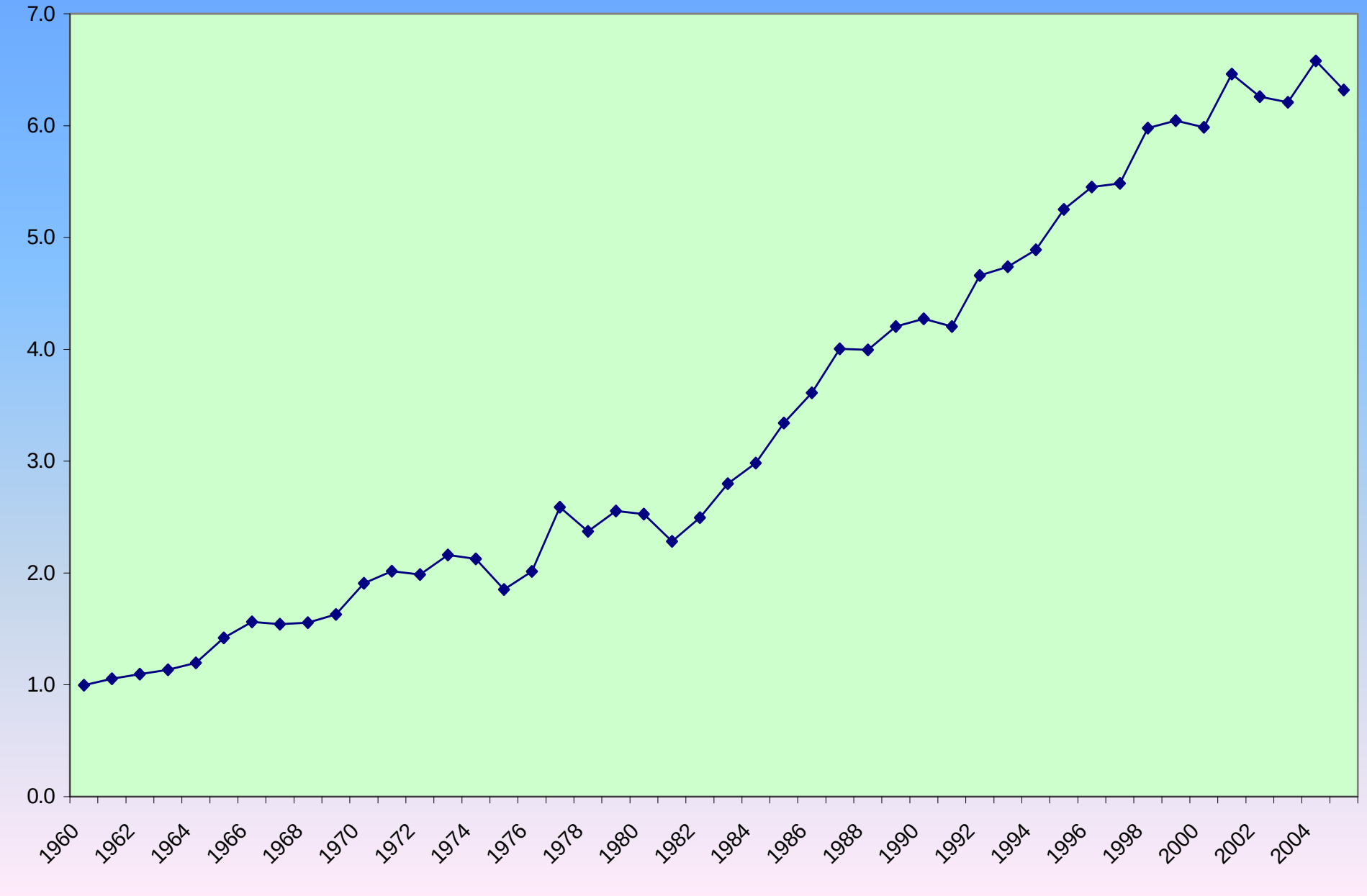
Computers, Communications Equipment, and Software.

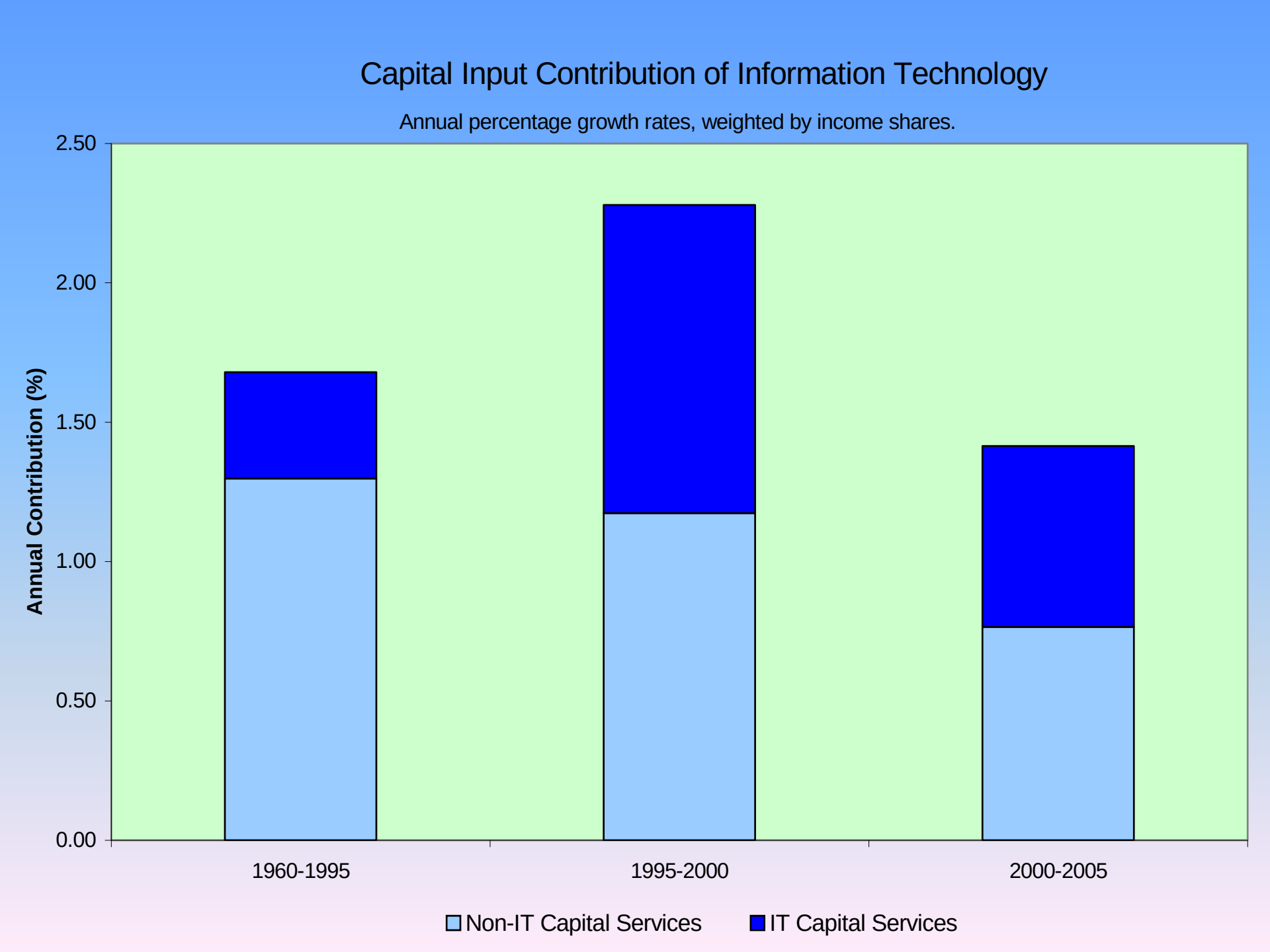
CAPITAL CONTRIBUTION:

IT versus Non-IT Capital Services.

IT Share of Capital Input, 1960-2005

Share of Current Dollar GDP.




Capital Input Contribution of Information Technology
Annual percentage growth rates, weighted by income shares.
Annual Contribution (%)
2.50
2.00
1.50
1.00
0.50
0.00
1960-1995
1995-2000
2000-2005
Non-IT Capital Services
IT Capital Services

GROWTH IN THE NEW MILLENNIUM: IT Investment and Productivity Growth.

TOTAL FACTOR PRODUCTIVITY:

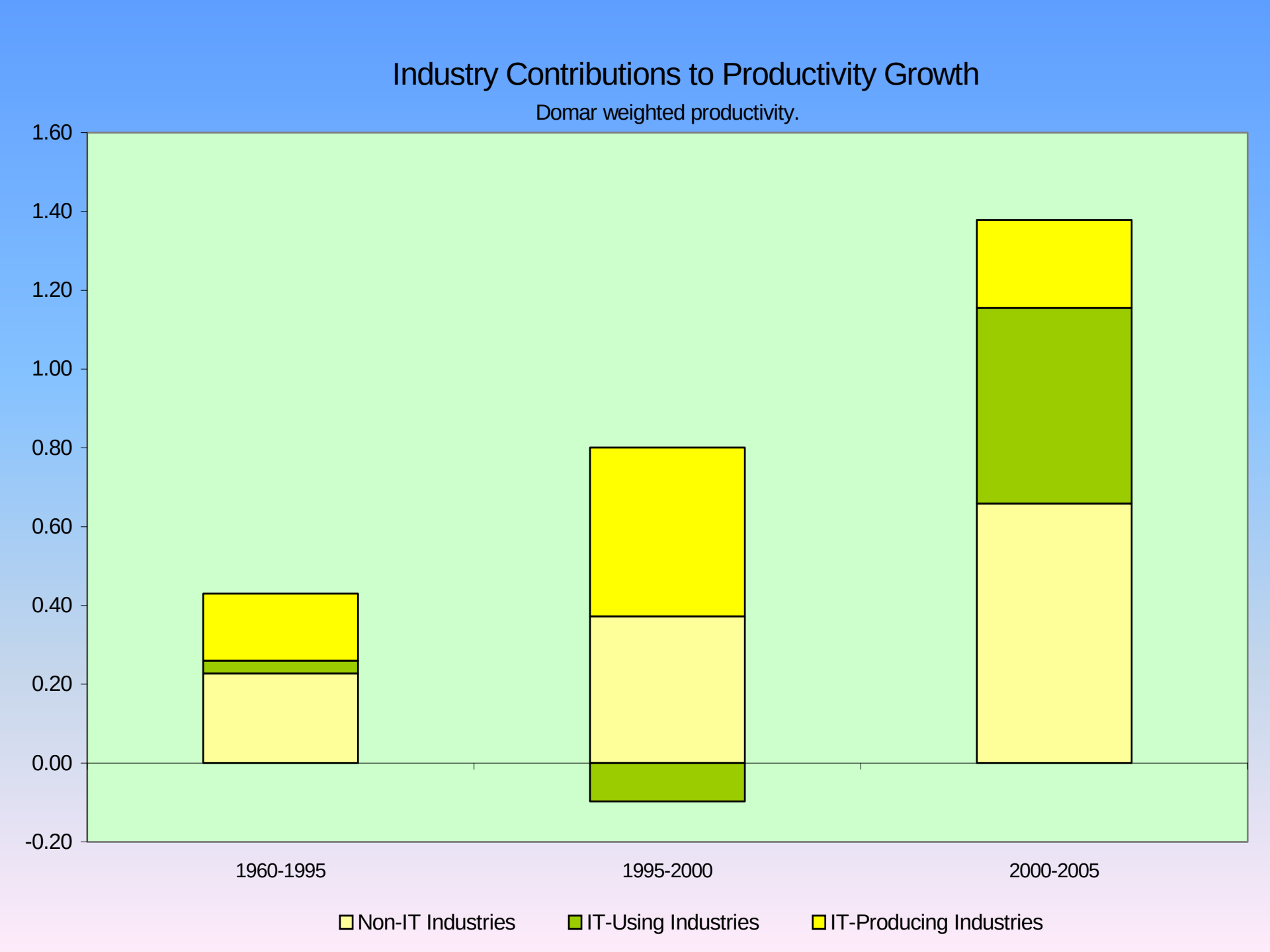
IT-Producing, IT-Using, and Non-IT Production.

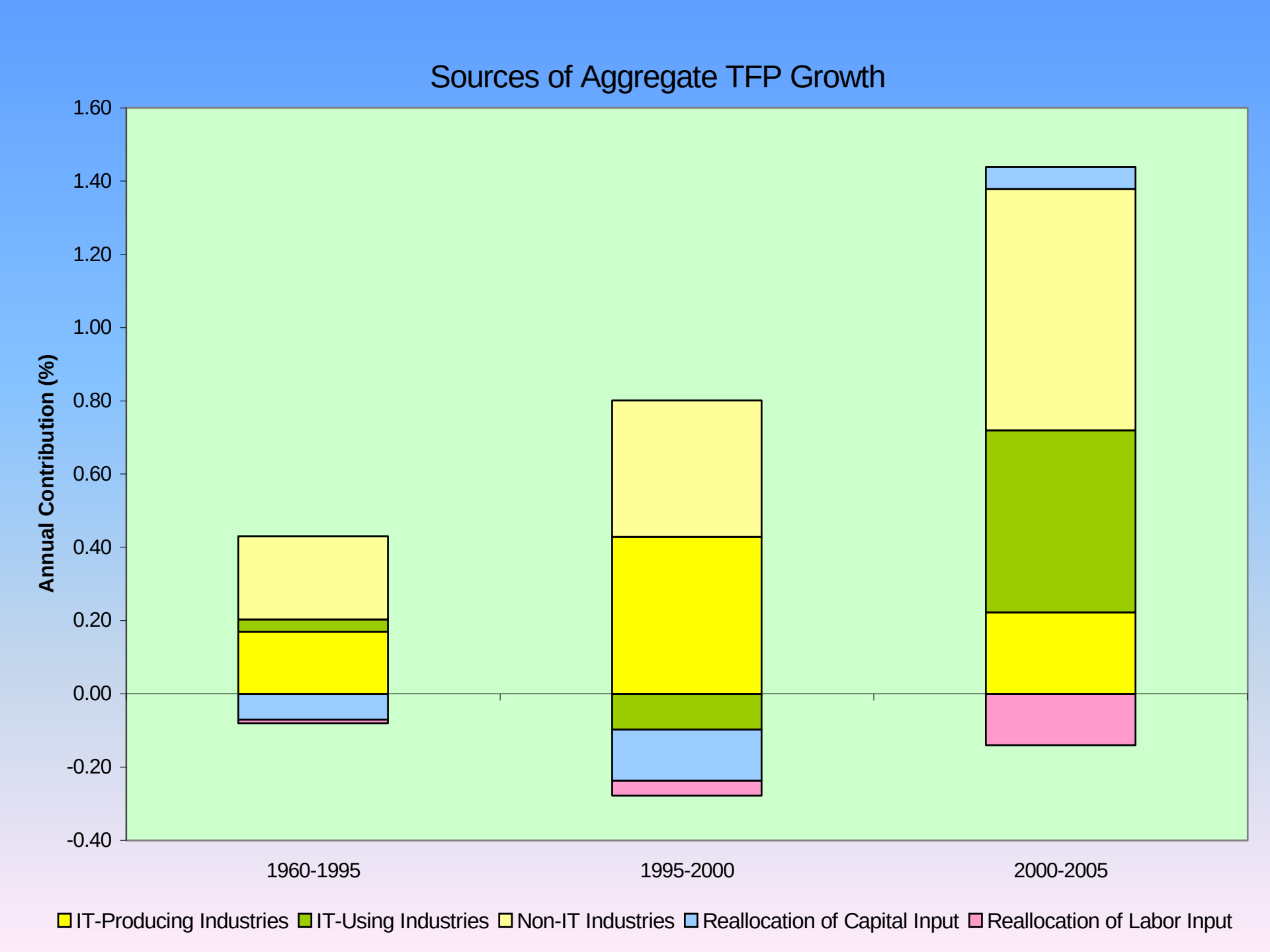
SOURCES OF U.S. ECONOMIC GROWTH:

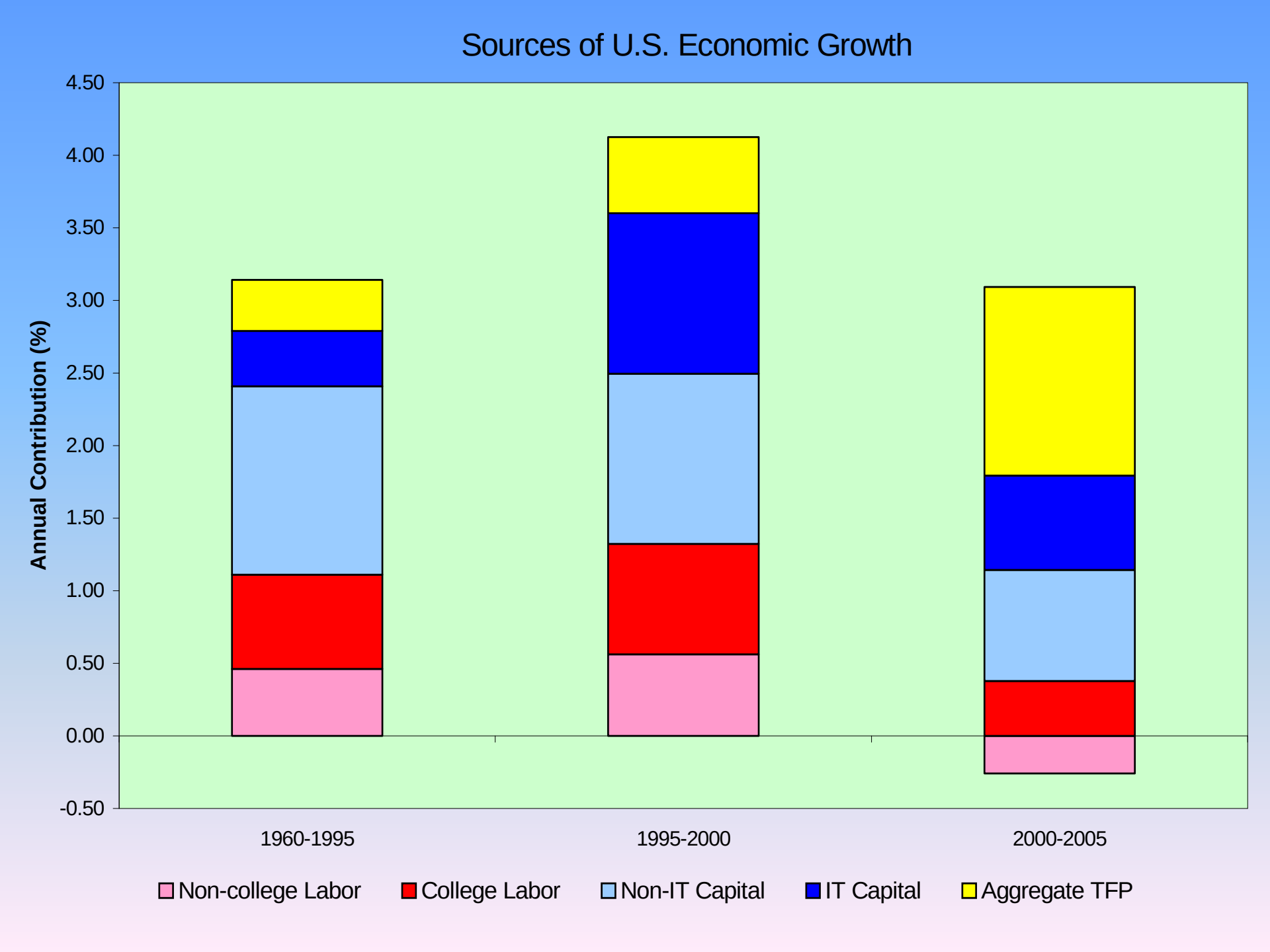
Capital Input, Labor Input, and TFP.

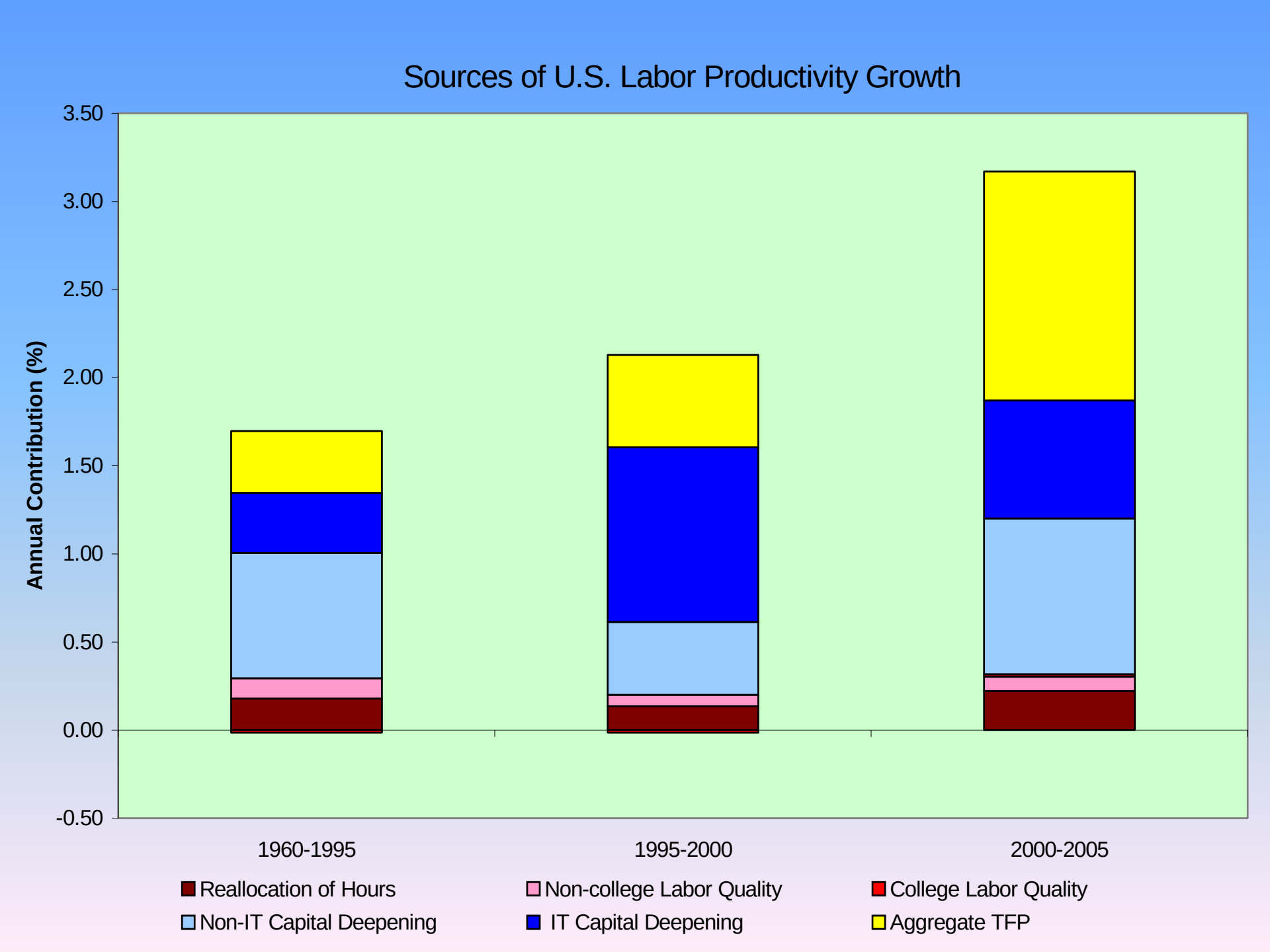
AVERAGE LABOR PRODUCTIVITY GROWTH:

Capital Deepening, Labor Quality, TFP.


Industry Contributions to Productivity Growth
Domar weighted productivity.
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
1960-1995
1995-2000
2000-2005
Non-IT Industries
IT-Using Industries
IT-Producing Industries


Sources of Aggregate TFP Growth
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
Annual Contribution (%)
1960-1995
1995-2000
2000-2005
IT-Producing Industries
IT-Using Industries
Non-IT Industries
Reallocation of Capital Input
Reallocation of Labor Input


Sources of U.S. Economic Growth
Annual Contribution (%)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
1960-1995
1995-2000
2000-2005
Non-college Labor
College Labor
Non-IT Capital
IT Capital
Aggregate TFP


Sources of U.S. Labor Productivity Growth
Annual Contribution (%)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
1960-1995
1995-2000
2000-2005
Reallocation of Hours
Non-college Labor Quality
College Labor Quality
Non-IT Capital Deepening
IT Capital Deepening
Aggregate TFP

ECONOMICS ON INTERNET TIME: The New Research Agenda.

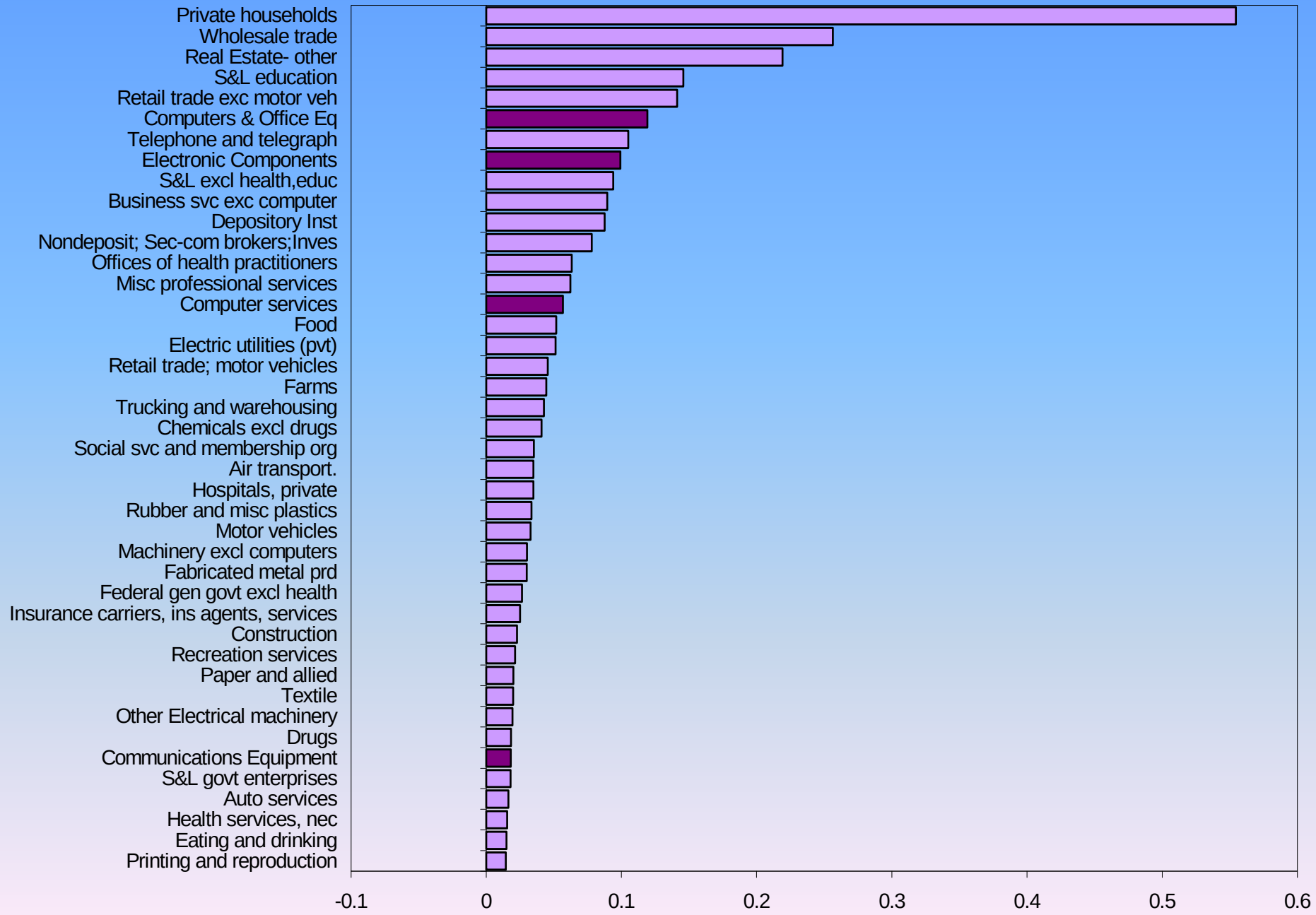
•The Solow Paradox -- we see computers everywhere but in the productivity statistics -- versus the Information Age.

•Equity Valuations and Growth Prospects: accumulation of intangible assets versus irrational exuberance.

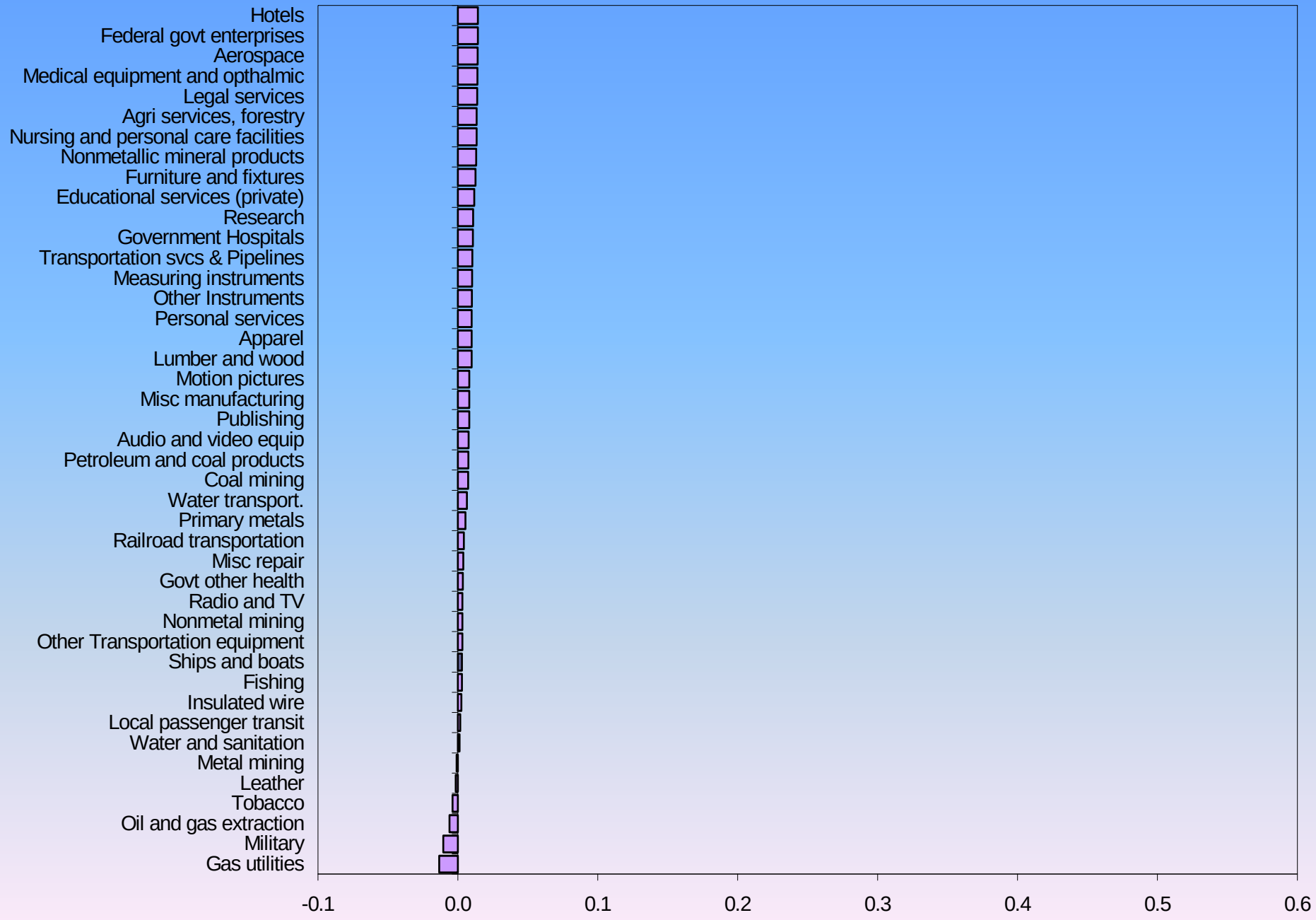
•Widening Wage Inequality:capital-skill complementarity versus skill-biased technical change.

• Modeling IT and the semiconductor industry: permanent versus transitory contributions to economic growth.

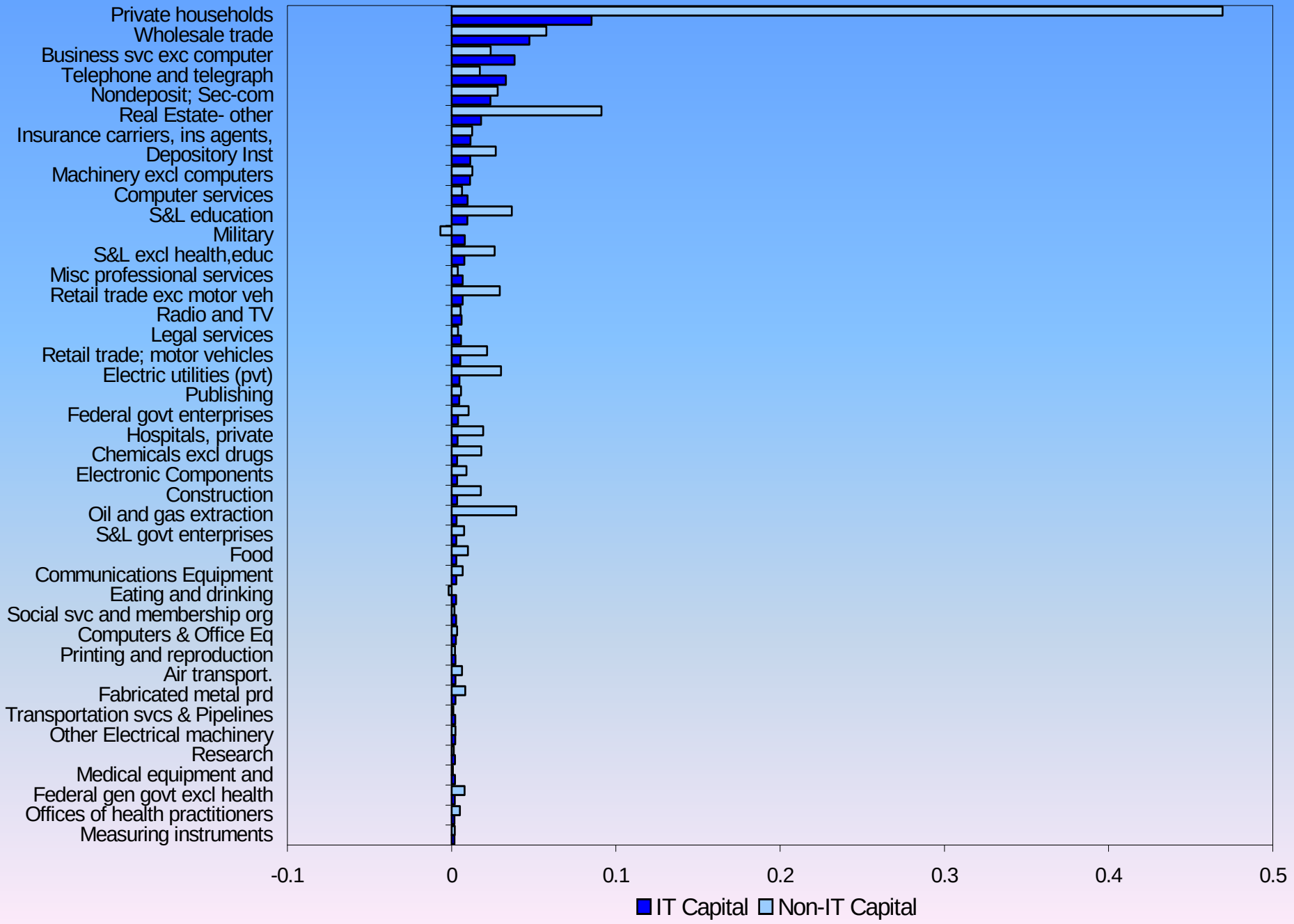
Industry Contributions to Value Added Growth, 1960-2005



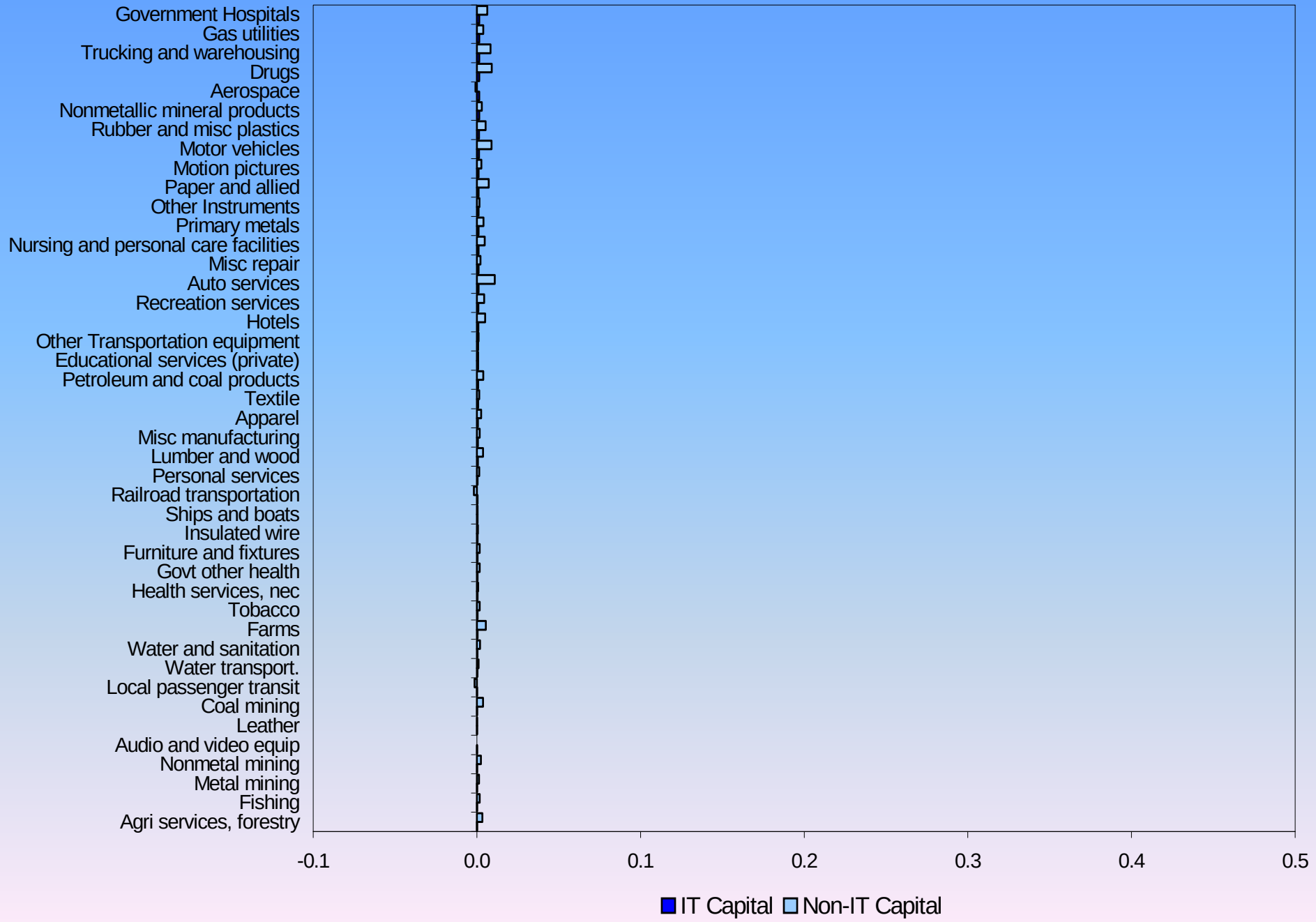
Industry Contributions to Value Added Growth, 1960-2005 (cont.)



Industry Contributions to Capital Input Growth, 1960-2005

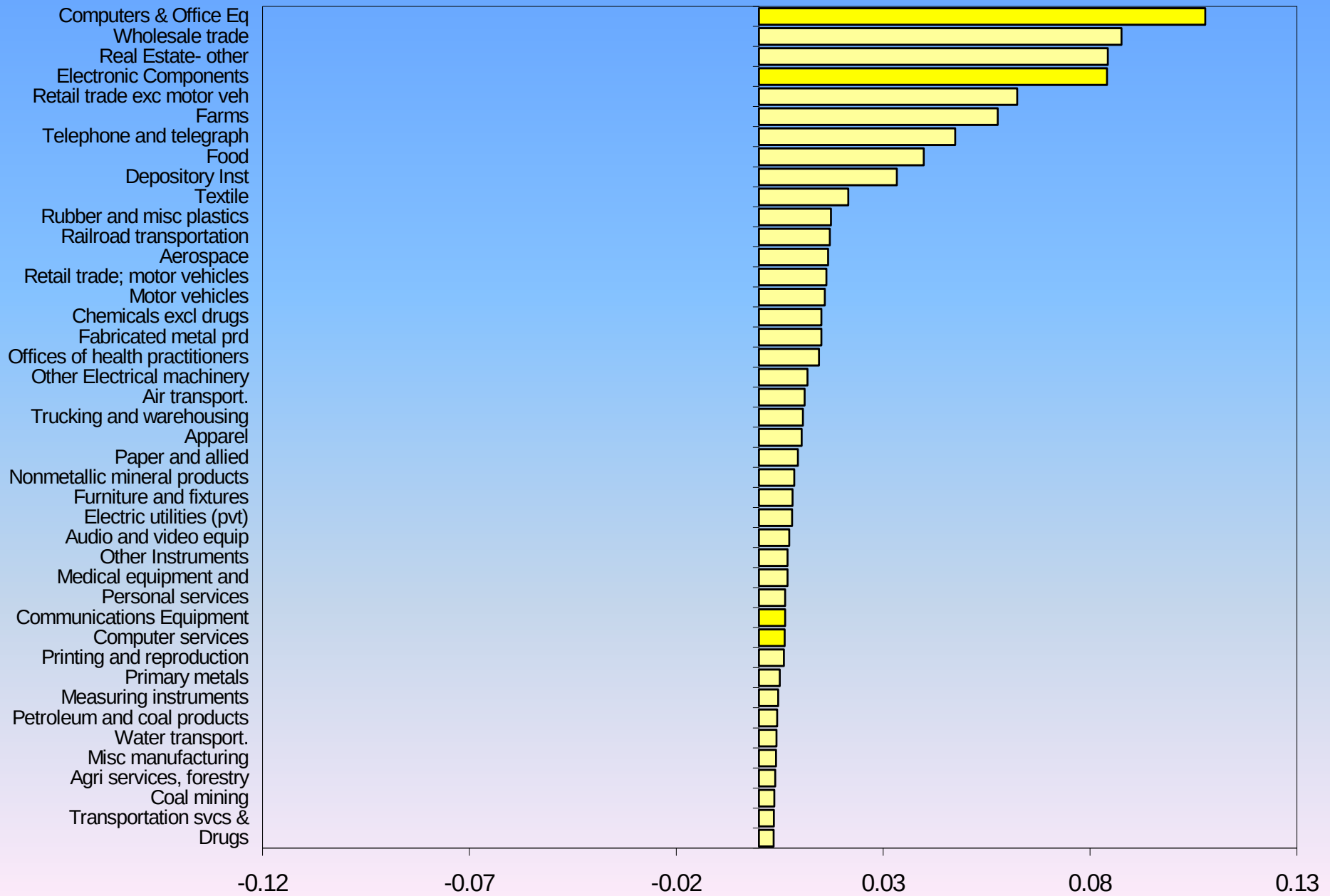


Industry Contributions to Capital Input Growth, 1960-2005 (cont)



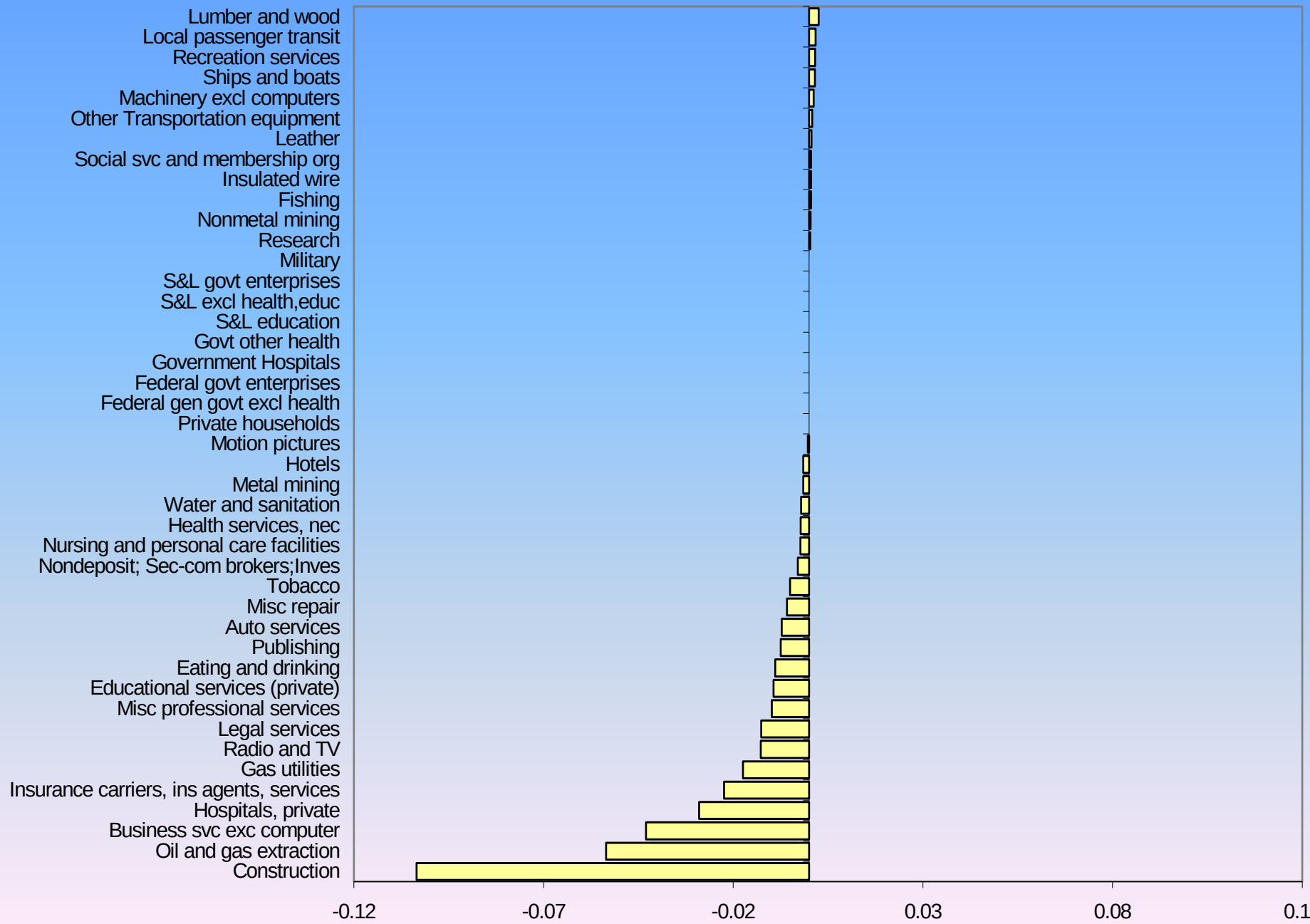
Industry Contributions to Productivity Growth, 1960-2005

Domar weighted contribution.



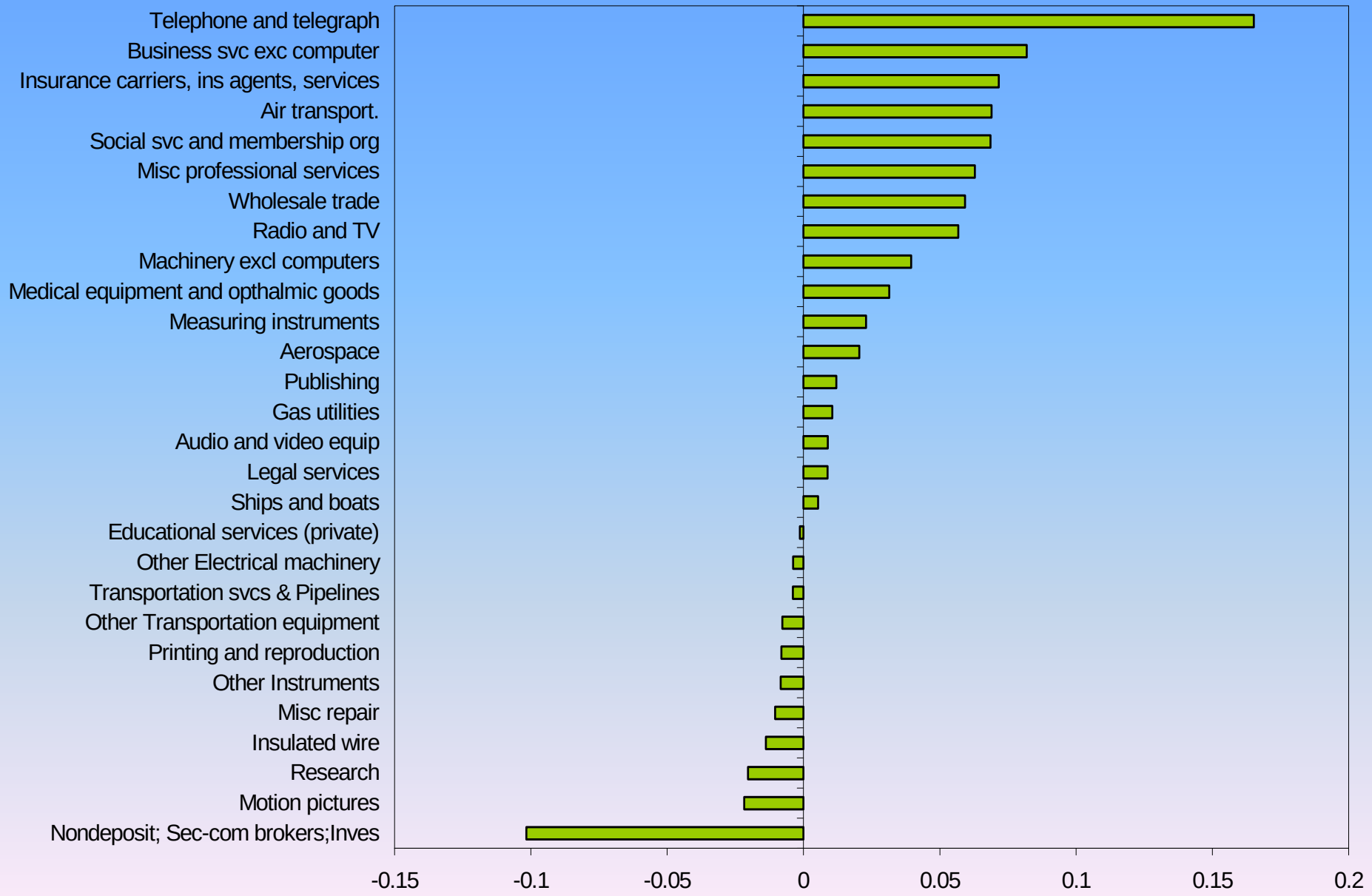
Industry Contributions to Productivity Growth, 1960-2005 (cont.)

Domar weighted contribution.



Change in Contribution to Productivity: 2000-2005 less 1960-1995

IT-Users



IT Producing Industries

Communications Equipment
Computer services
Computers & Office Eq
Electronic Components

IT Using Industries

Audio and video equip
Insulated wire
Other Electrical machinery
Aerospace
Air transport.
Business svc exc computer
Educational services (private)
Gas utilities
Insurance carriers, ins agents, services
Legal services
Machinery excl computers
Measuring instruments
Medical equipment and opthalmic goods
Misc professional services
Misc repair
Motion pictures
Nondeposit; Sec-com brokers;Inves
Other Instruments
Other Transportation equipment
Printing and reproduction
Publishing
Radio and TV
Research
Ships and boats
Social svc and membership org
Telephone and telegraph
Transportation svcs & Pipelines
Wholesale trade

* Industries with an IT Capital Share of 15% or greater in 1995.

Non-IT Industries

Agri services, forestry
Apparel
Auto services
Chemicals excl drugs
Coal mining
Construction
Depository Inst
Drugs
Eating and drinking
Electric utilities (pvt)
Fabricated metal prd
Farms
Fishing
Food
Furniture and fixtures
Government
Health services, nec
Hospitals, private
Hotels
Leather
Local passenger transit
Lumber and wood
Metal mining
Misc manufacturing
Motor vehicles
Nonmetal mining
Nonmetallic mineral products
Nursing and personal care facilities
Offices of health practitioners
Oil and gas extraction
Paper and allied
Personal services
Petroleum and coal products
Primary metals
Railroad transportation
Real Estate- other
Recreation services
Retail trade exc motor veh
Retail trade; motor vehicles
Rubber and misc plastics
Textile
Tobacco
Trucking and warehousing
Water and sanitation
Water transport.