Information Technology and the Japanese Growth Recovery

By

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Economic Growth in the Information Age

The Information Age:

Faster, Better, Cheaper!

Role of Information Technology:

IT Prices and the Cost of Capital

Japanese Growth Recovery:

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."

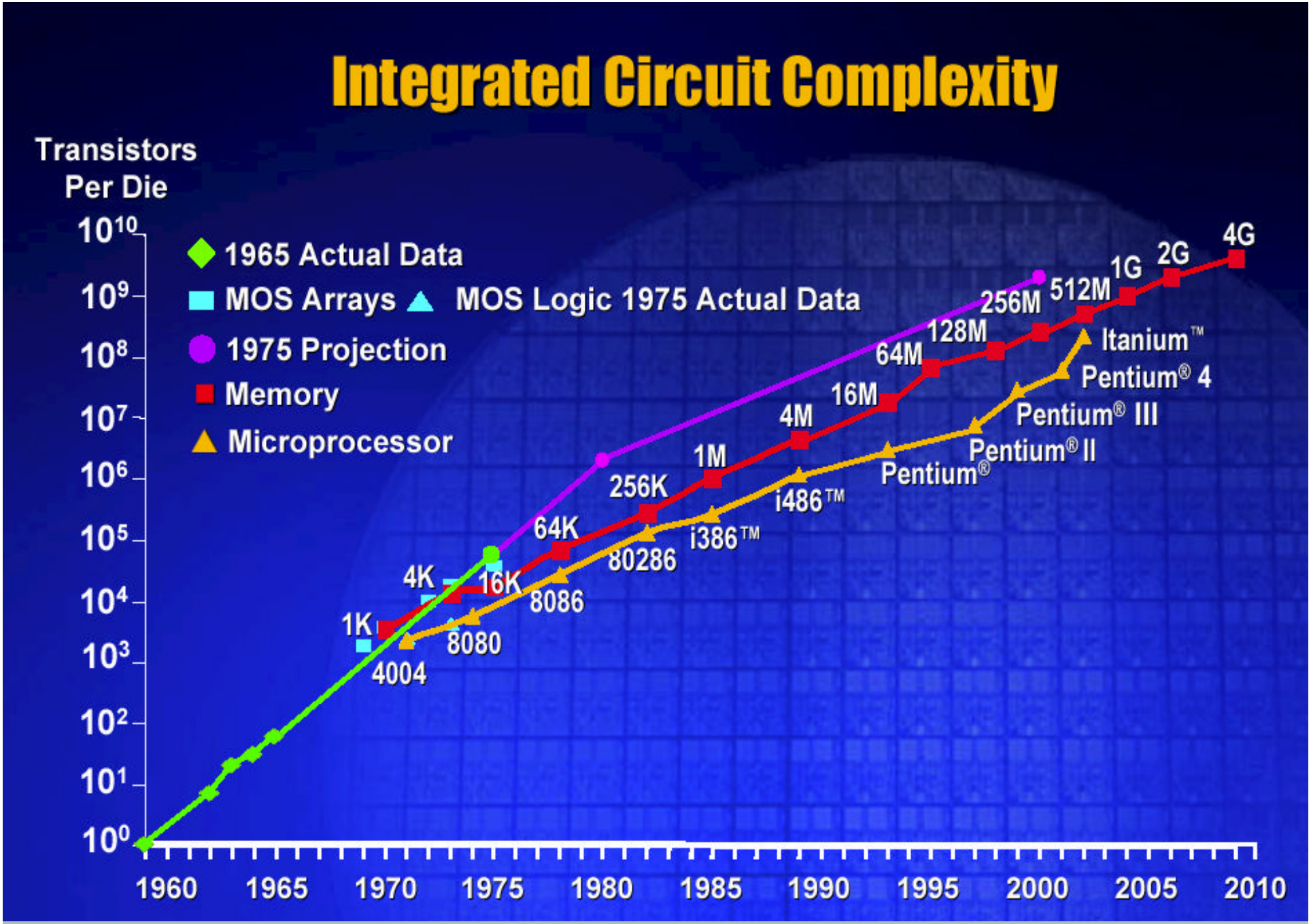
Invention of the Transistor:

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:

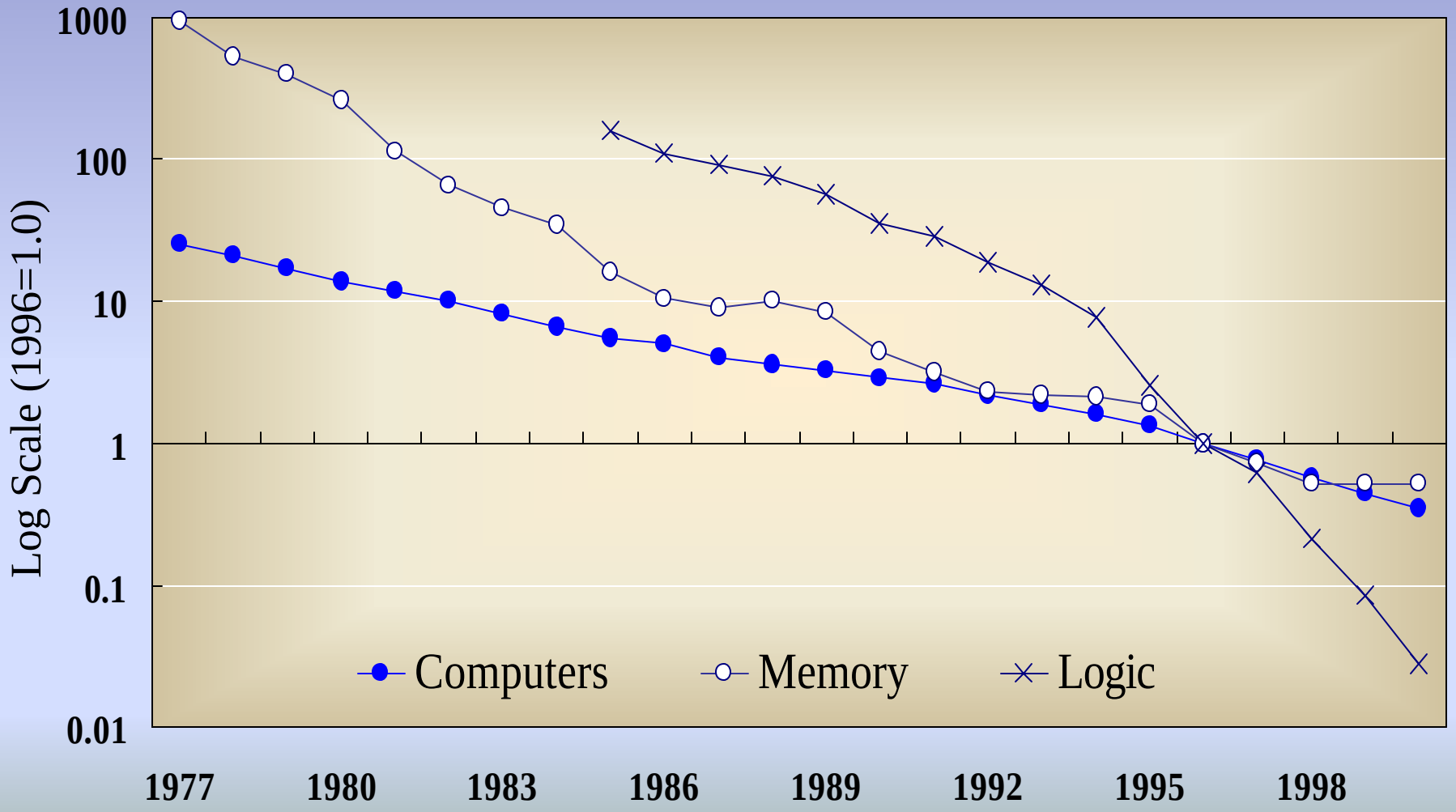
Terminal, Switching, and Transmission.

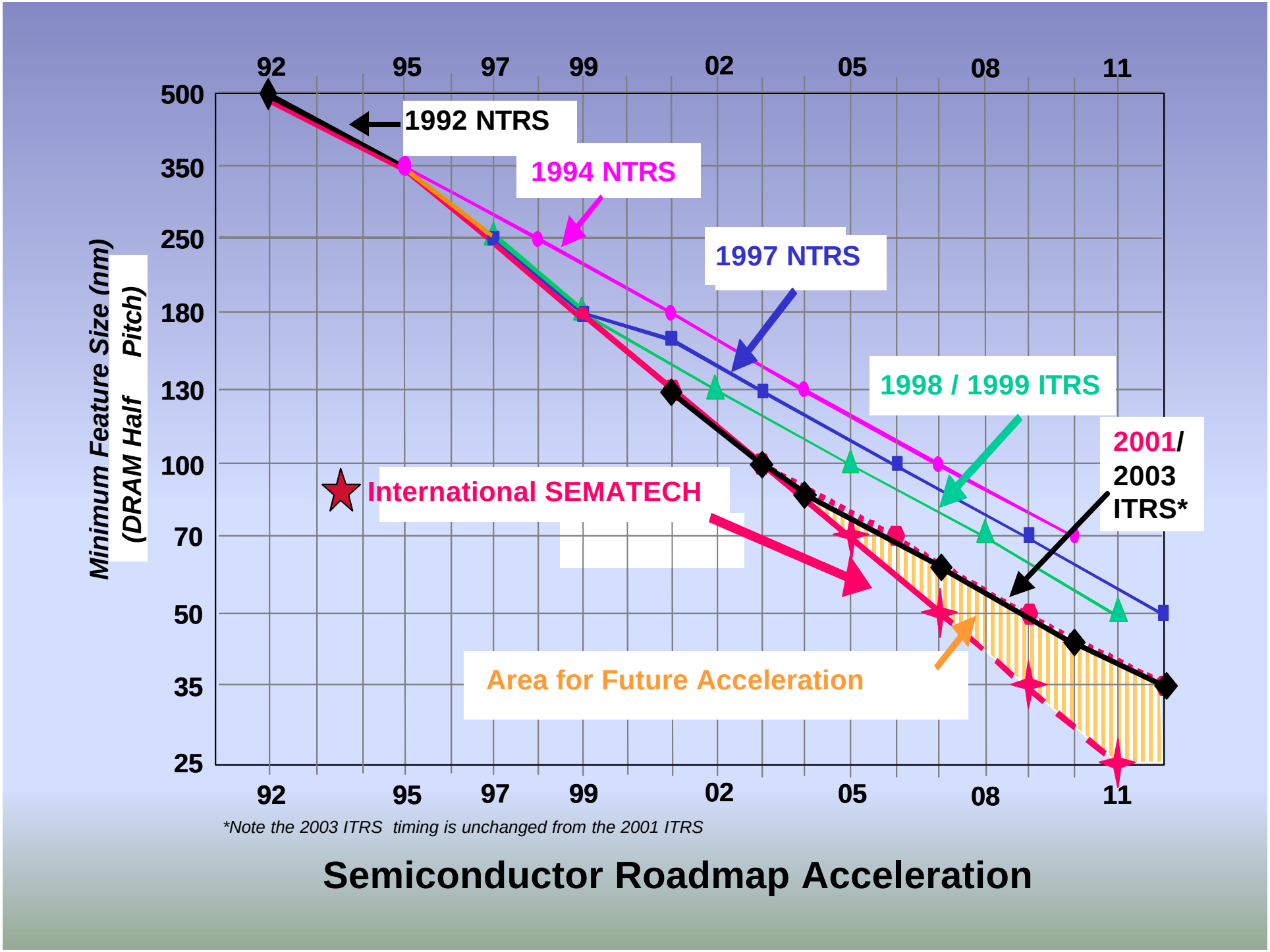
Software:

Prepackaged, Custom, and Own-Account.

Relative Prices of Computers and Semiconductors, 1977-2000

All price indexes are divided by the output price index.

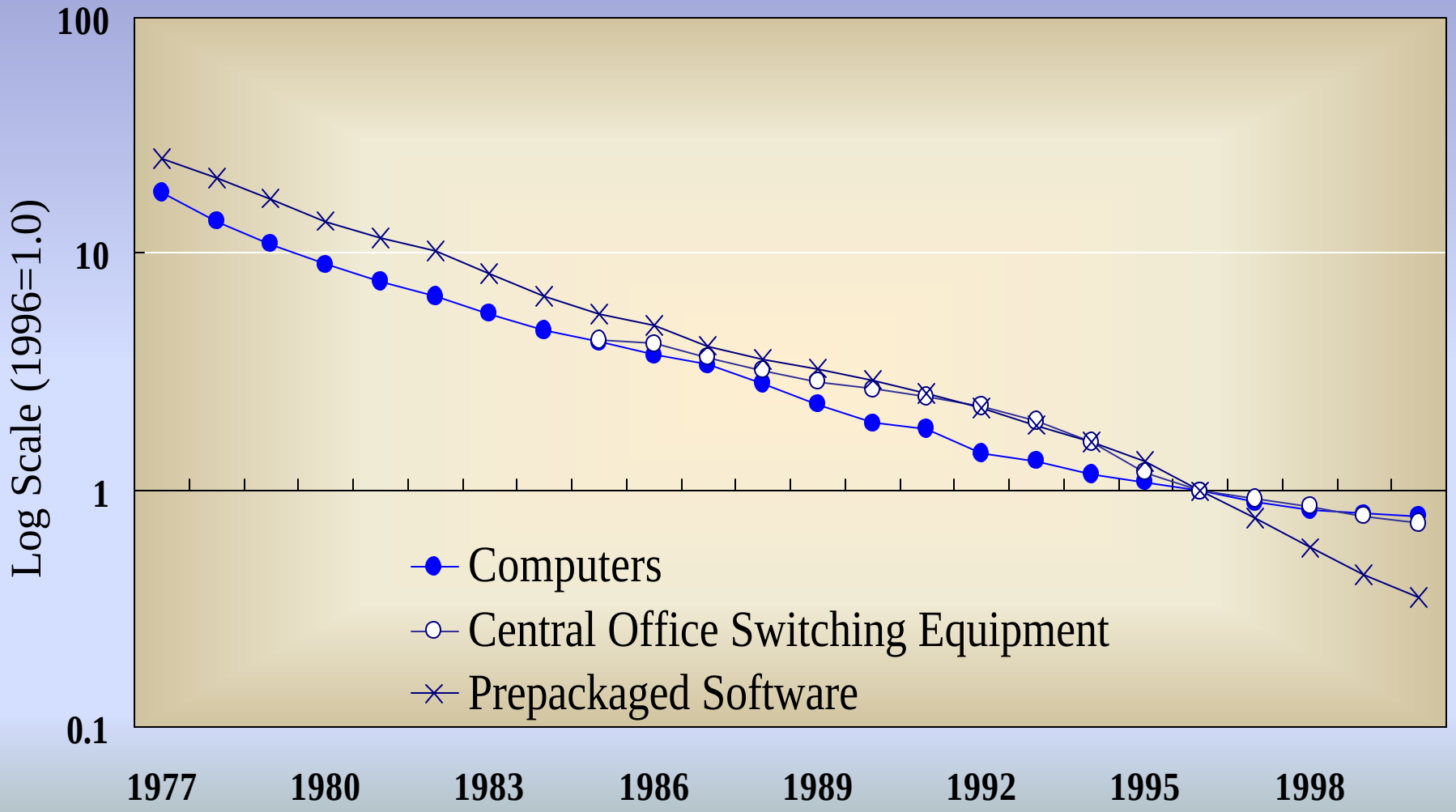




Semiconductor Roadmap Acceleration

Relative Prices of Computers, Communication Equipment, and Software, 1977-2000

All price indexes are divided by the output price index.



Role of Information Technology: IT Prices, Investment, and Productivity

Input Shares of IT:

Computers, Communications Equipment, and Software.

Capital Contribution:

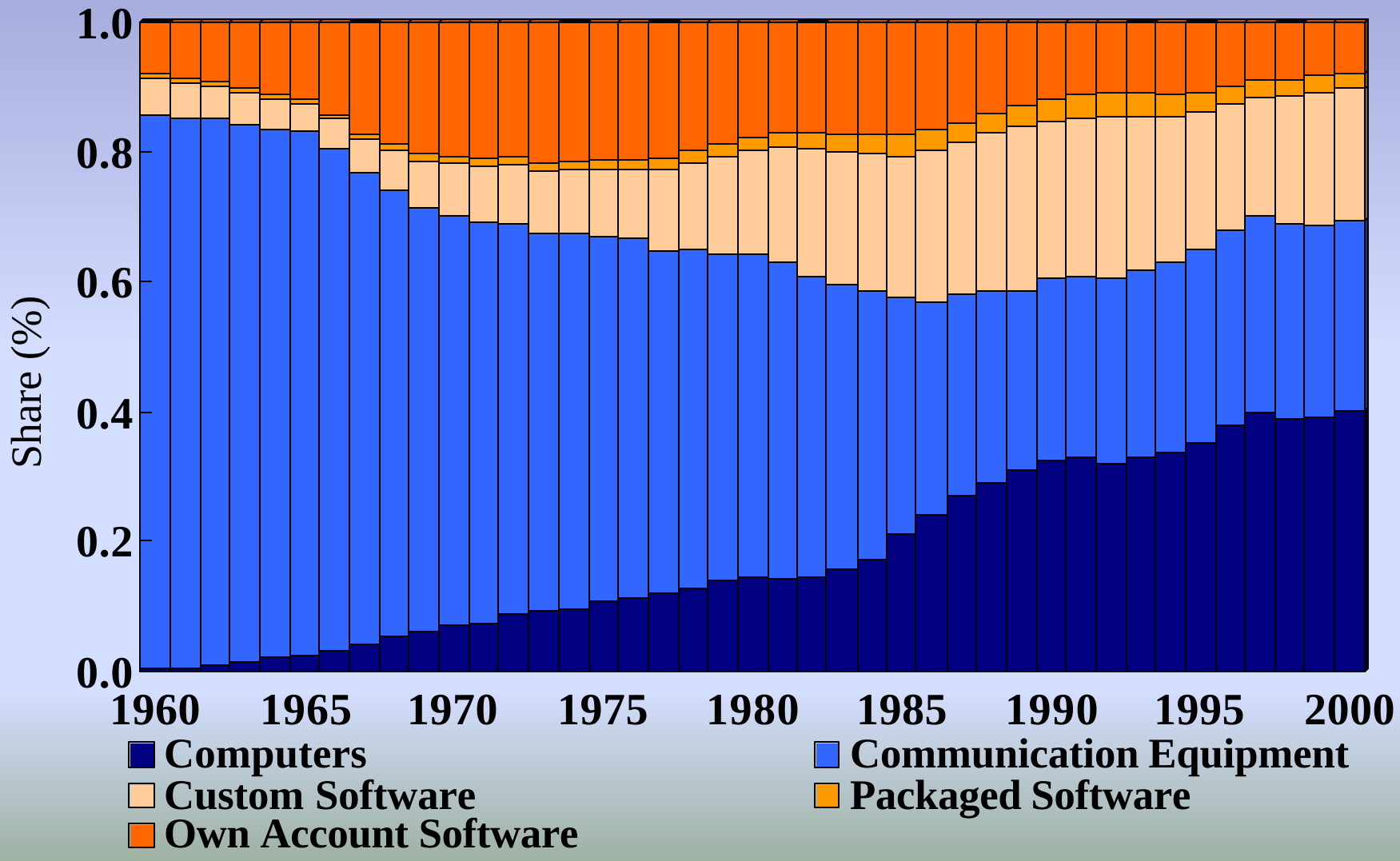
IT versus Non-IT Capital Services.

Capital Contribution by Type:

Computers, Communications Equipment, and Software.

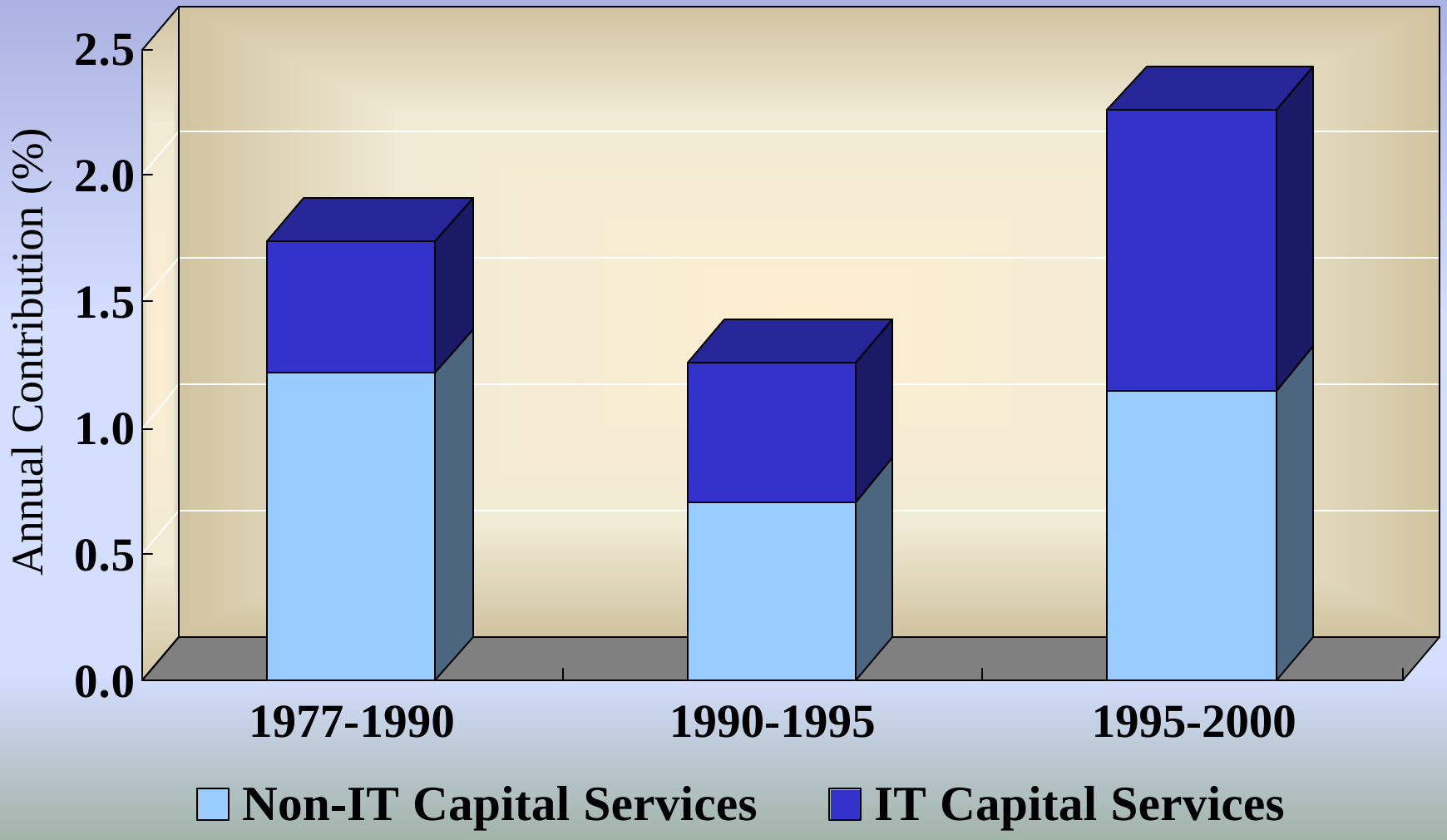
IT Capital Stock in Japan

Real composition of total IT capital stock (1995 price).



Capital Input Contribution of Information Technology in the U.S.

Average annual percentage growth rates, weighted by income shares.



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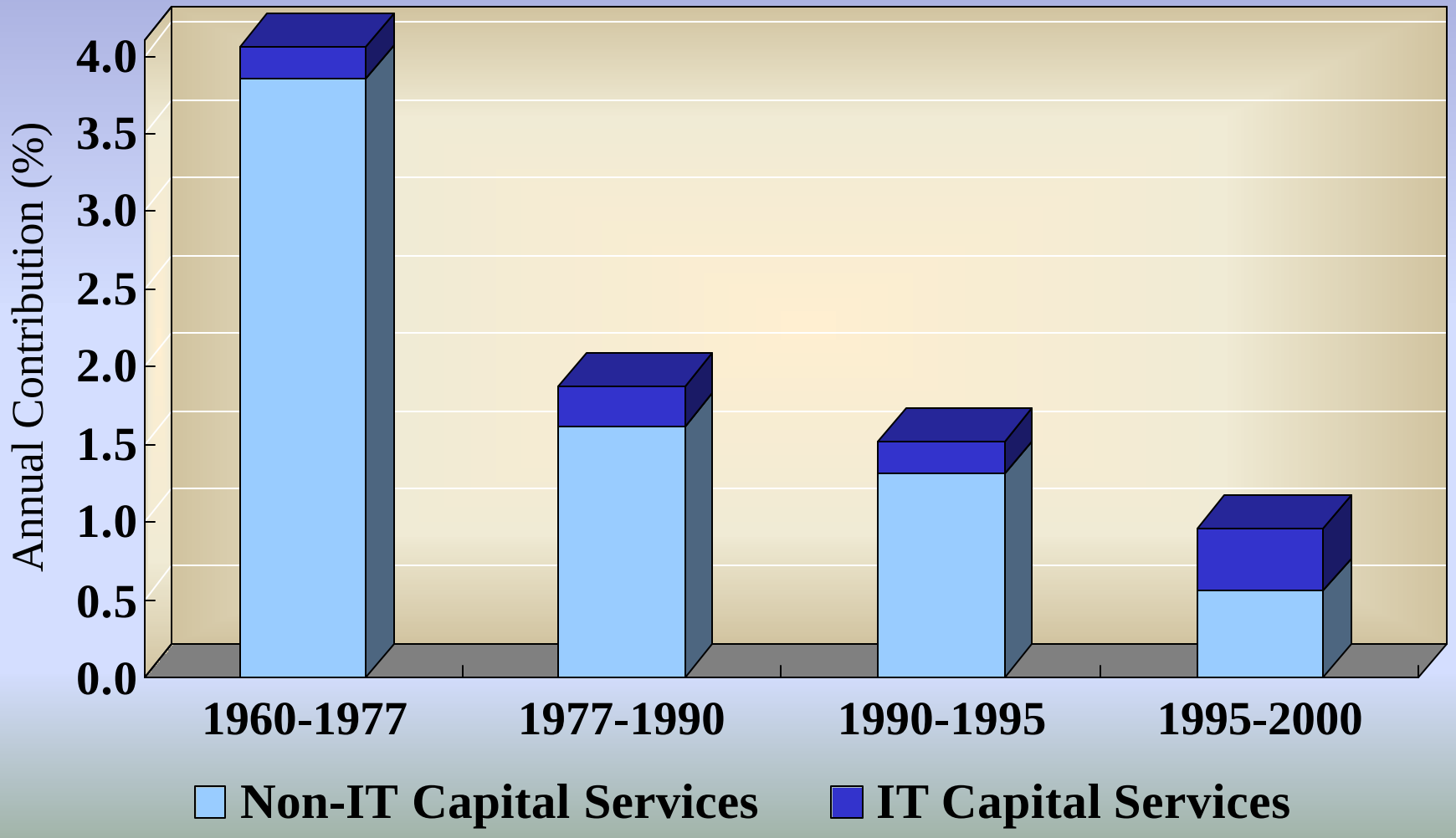
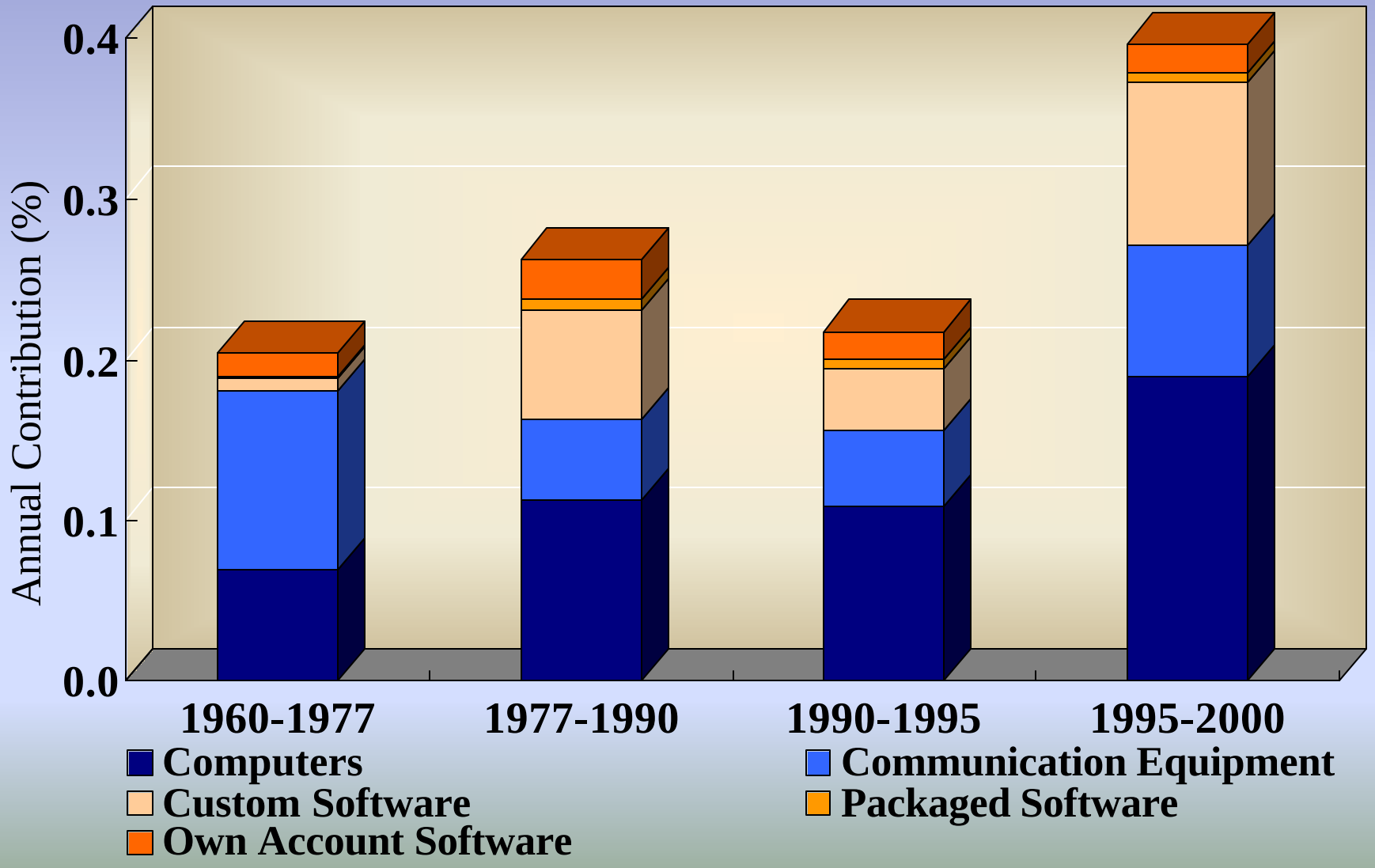
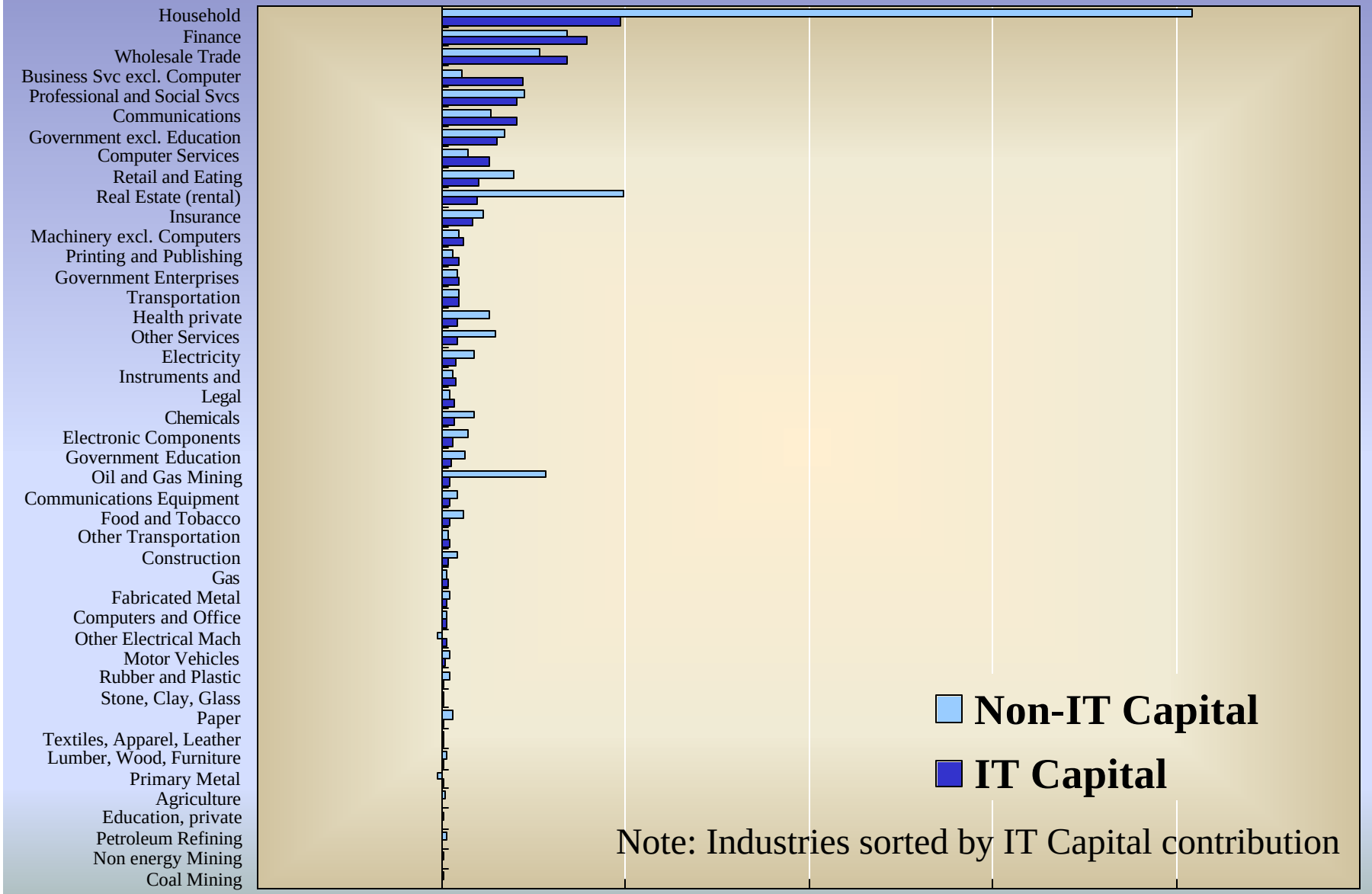


IT Capital Input Contribution to Growth in Japan

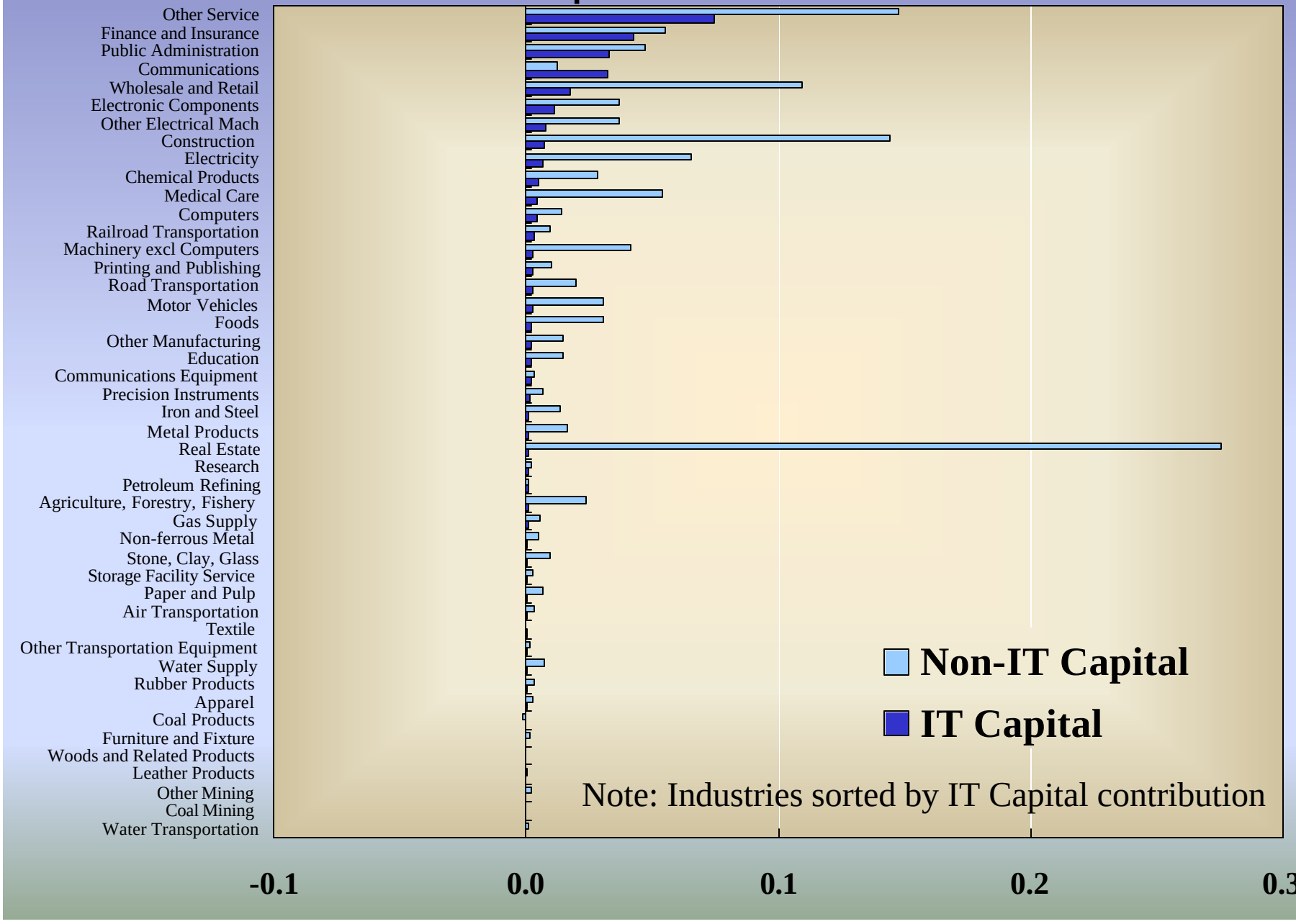
Average annual percentage growth rates, weighted by income shares.



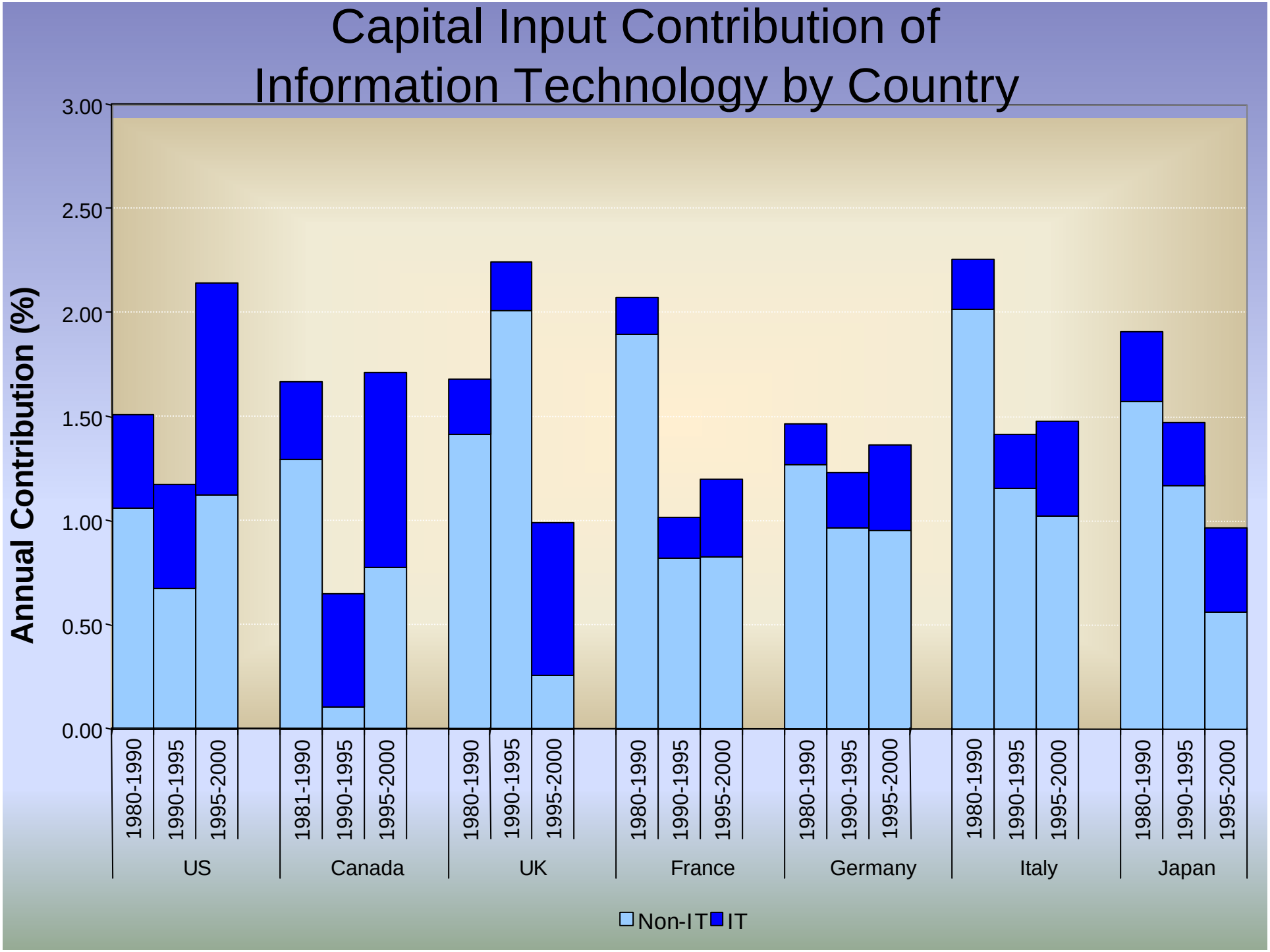
Industry Contributions to Capital Input Growth in the U.S., 1977-2000



Industry Contributions to Capital Input Growth in Japan, 1977-2000



Capital Input Contribution of Information Technology by Country



Japanese Growth Recovery: IT Investment and Productivity Growth.

Total Factor Productivity:

IT-Production versus Non-IT Production.

Sources of Japanese Economic Growth:

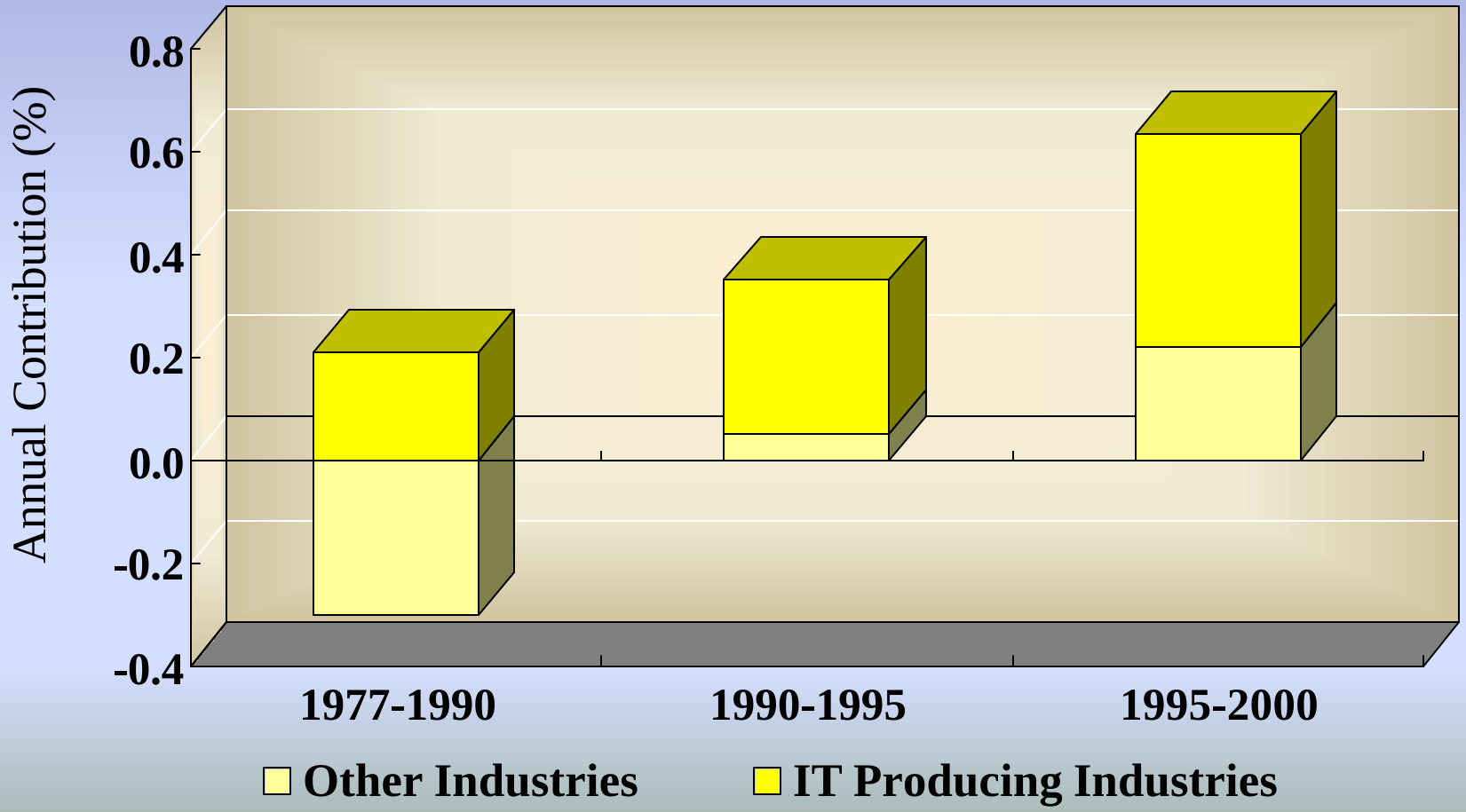
Capital Input, Labor Input, and TFP.

Average Labor Productivity Growth:

Capital Deepening, Labor Quality, TFP.

Productivity Contribution of IT Producing Industries in the U.S.

Average annual percentage growth rates, weighted by Domar weights.



Productivity Contribution of IT Producing Industries in Japan

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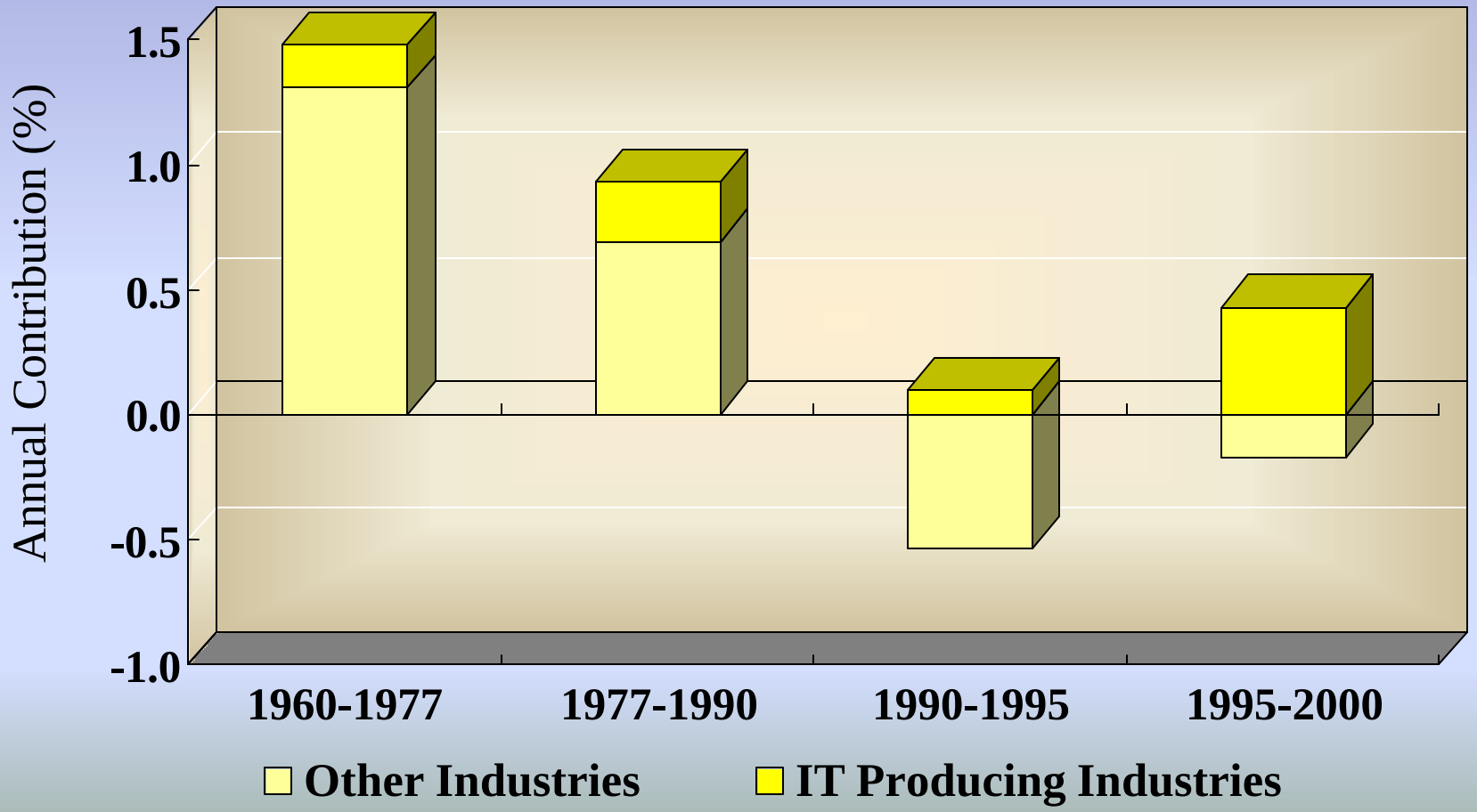
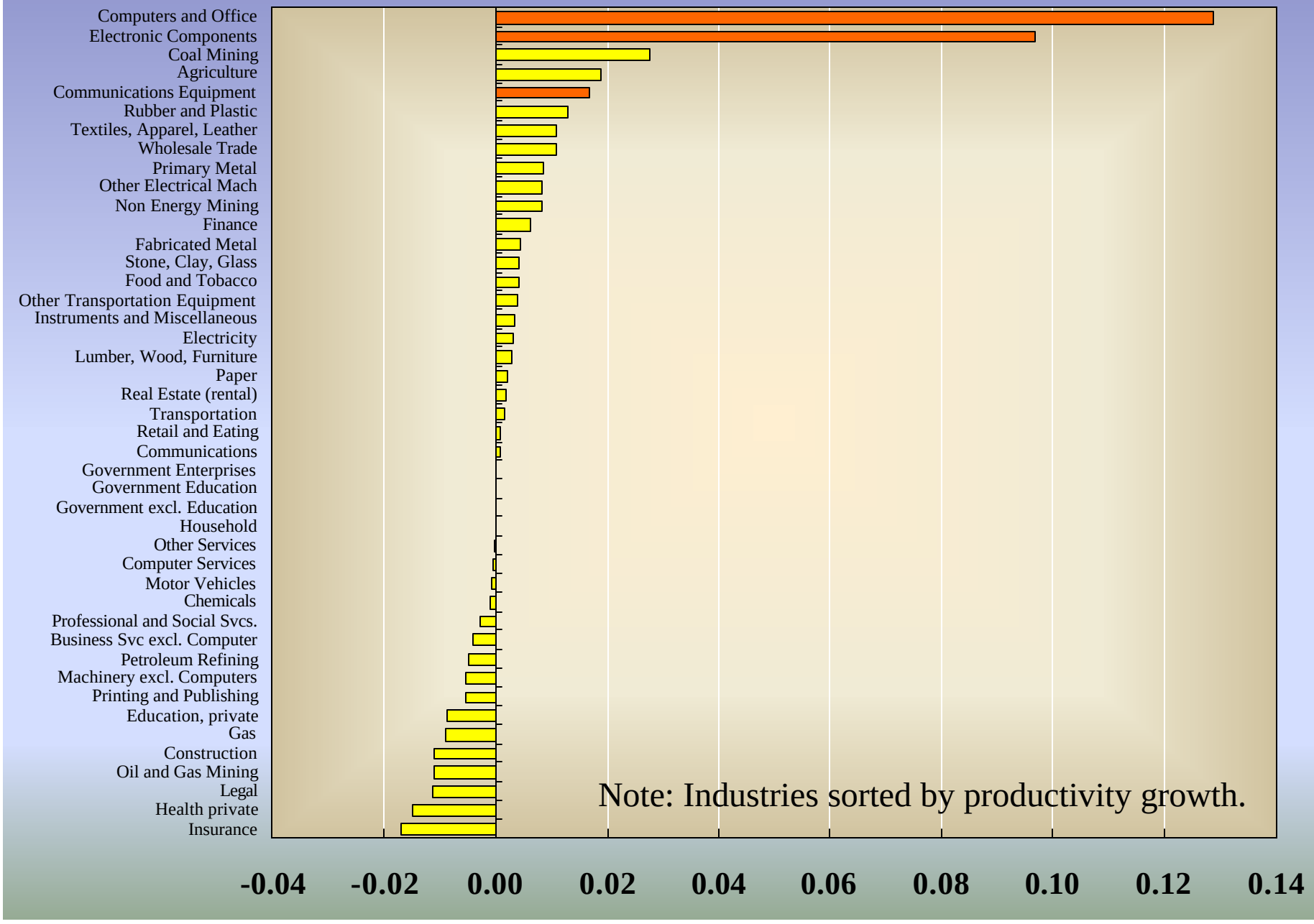
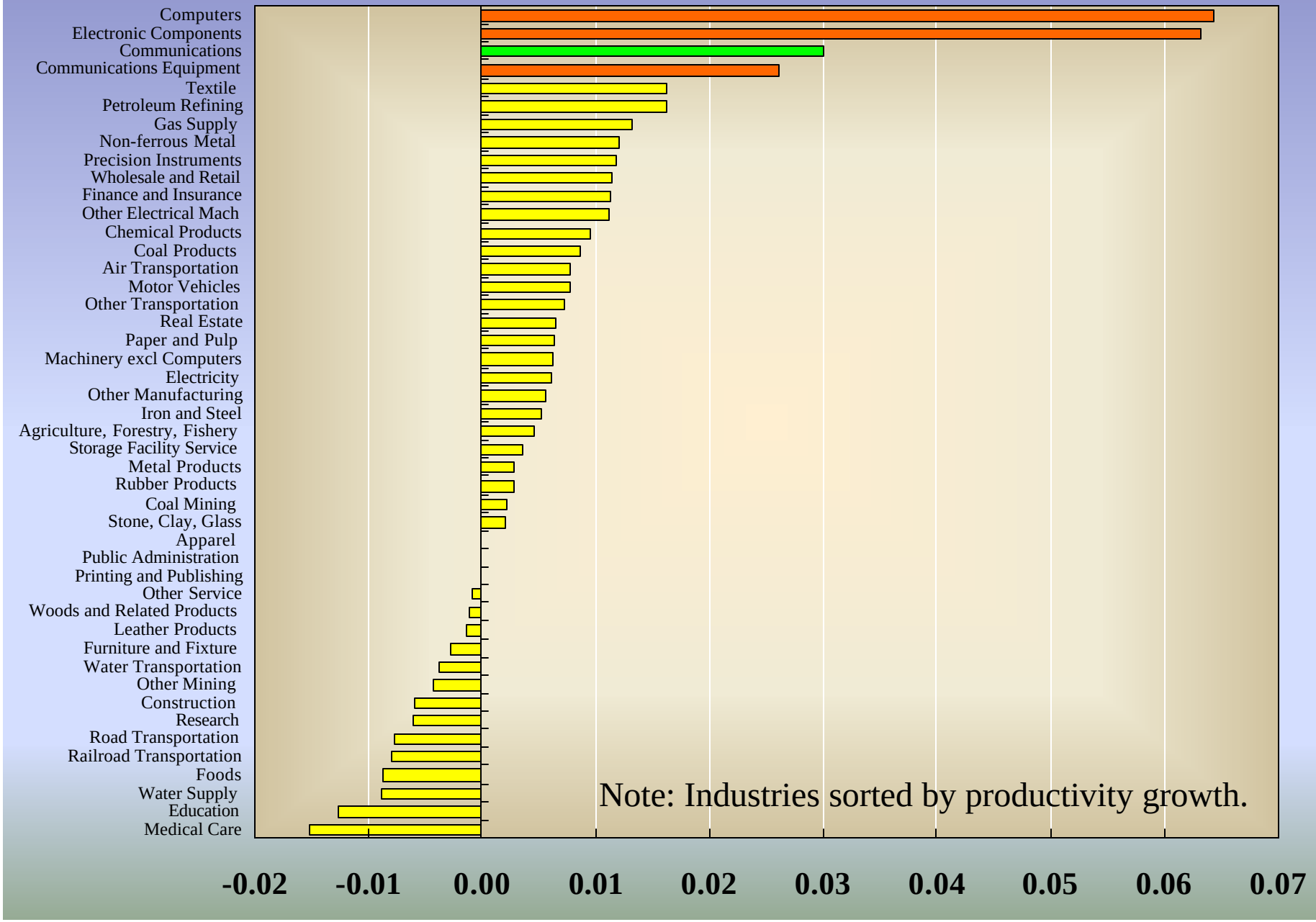


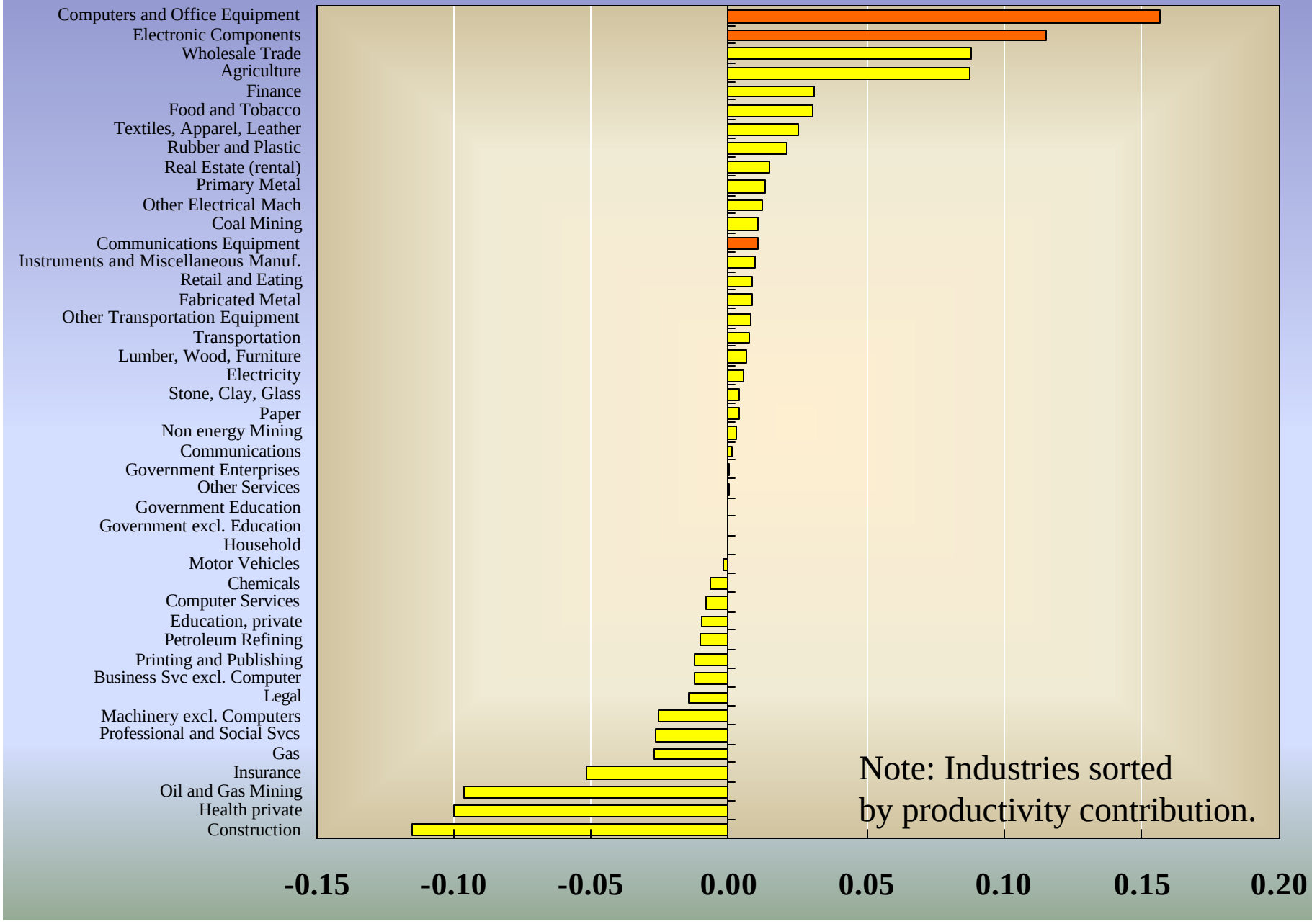
Industry Productivity Growth in the U.S., 1977-2000



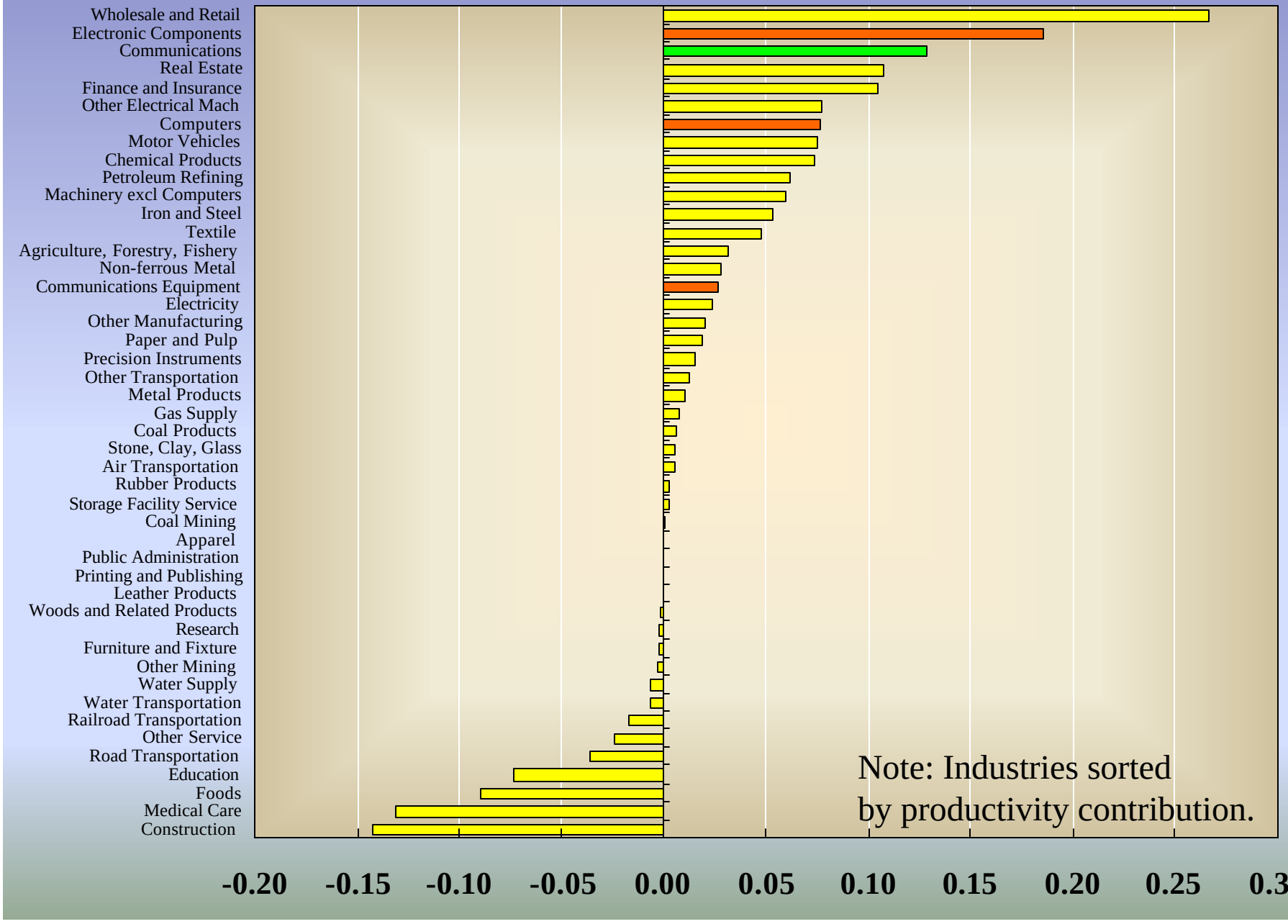
Industry Productivity Growth in Japan, 1977-2000



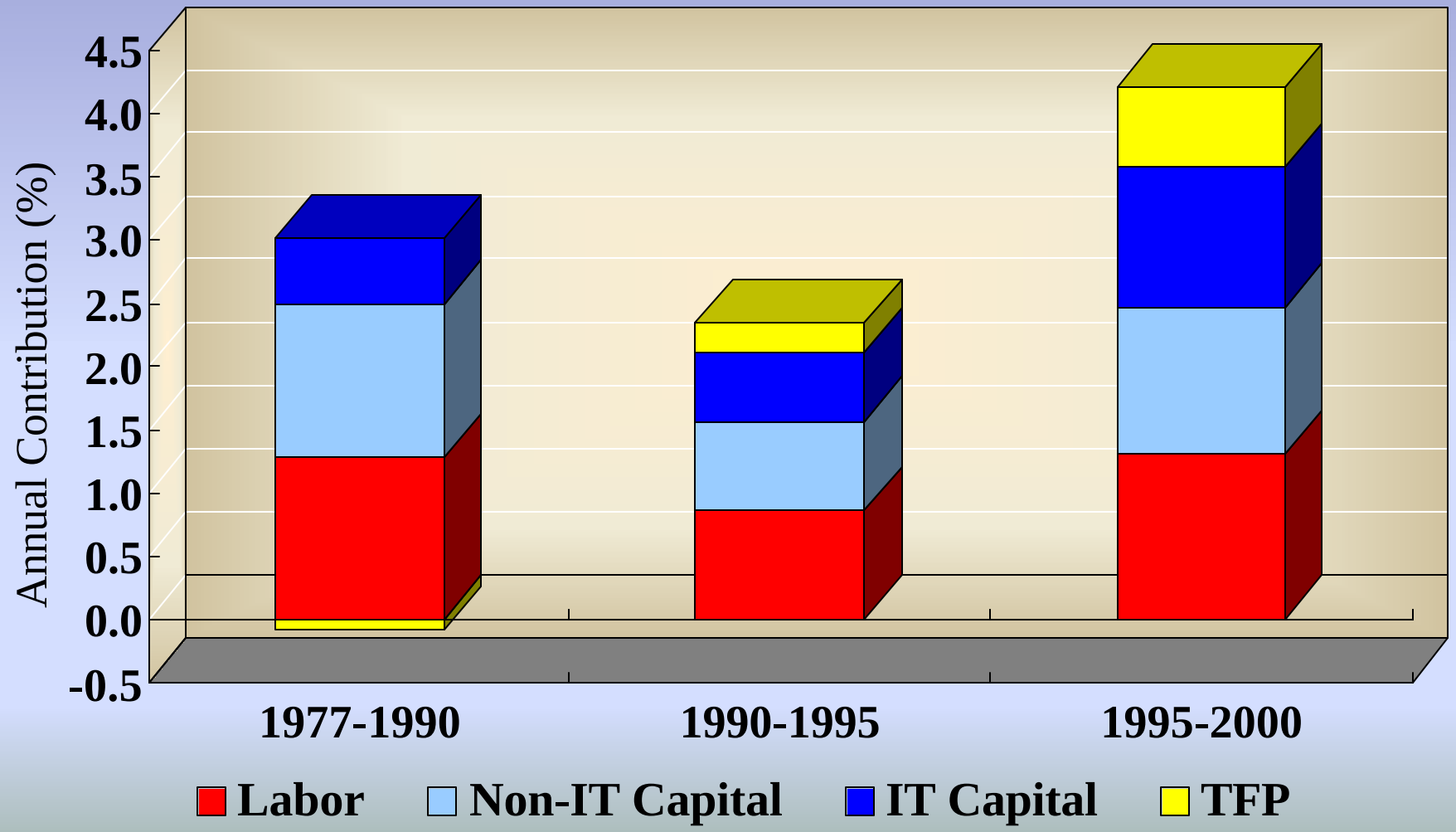
Industry Contributions to Productivity in the U.S., 1977-2000



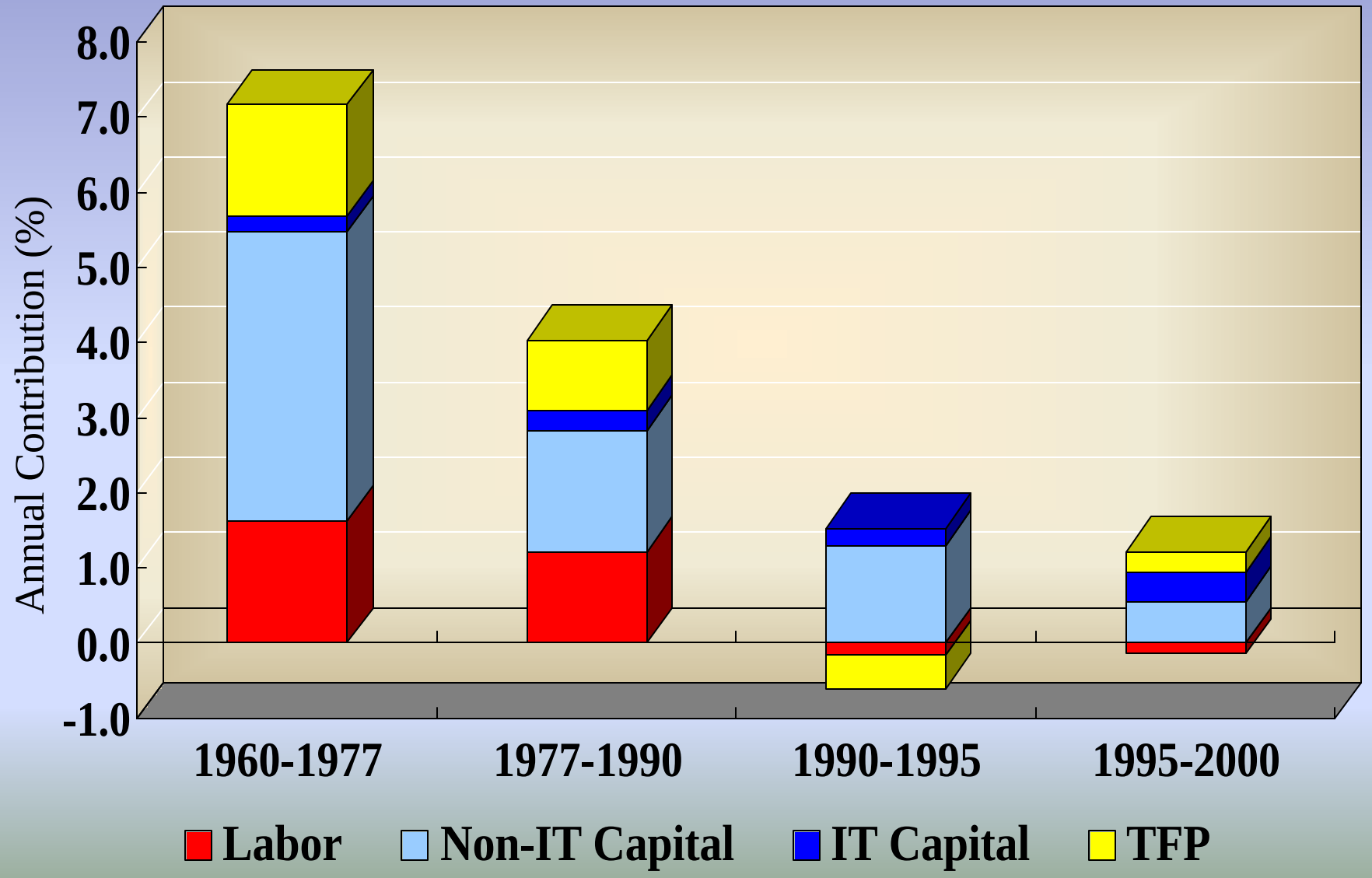
Industry Contributions to Productivity in Japan, 1977-2000



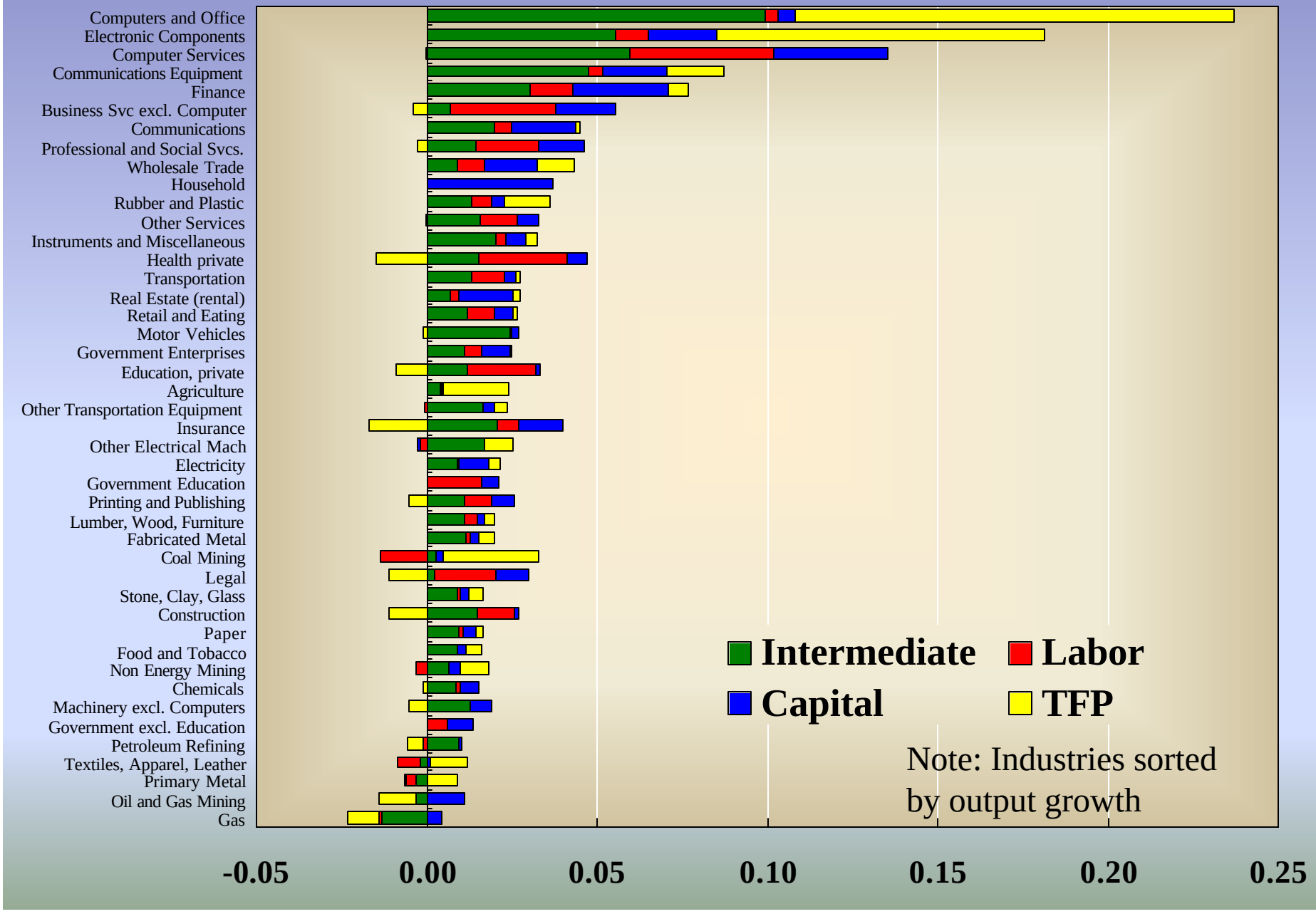
Sources of Economic Growth in the U.S.



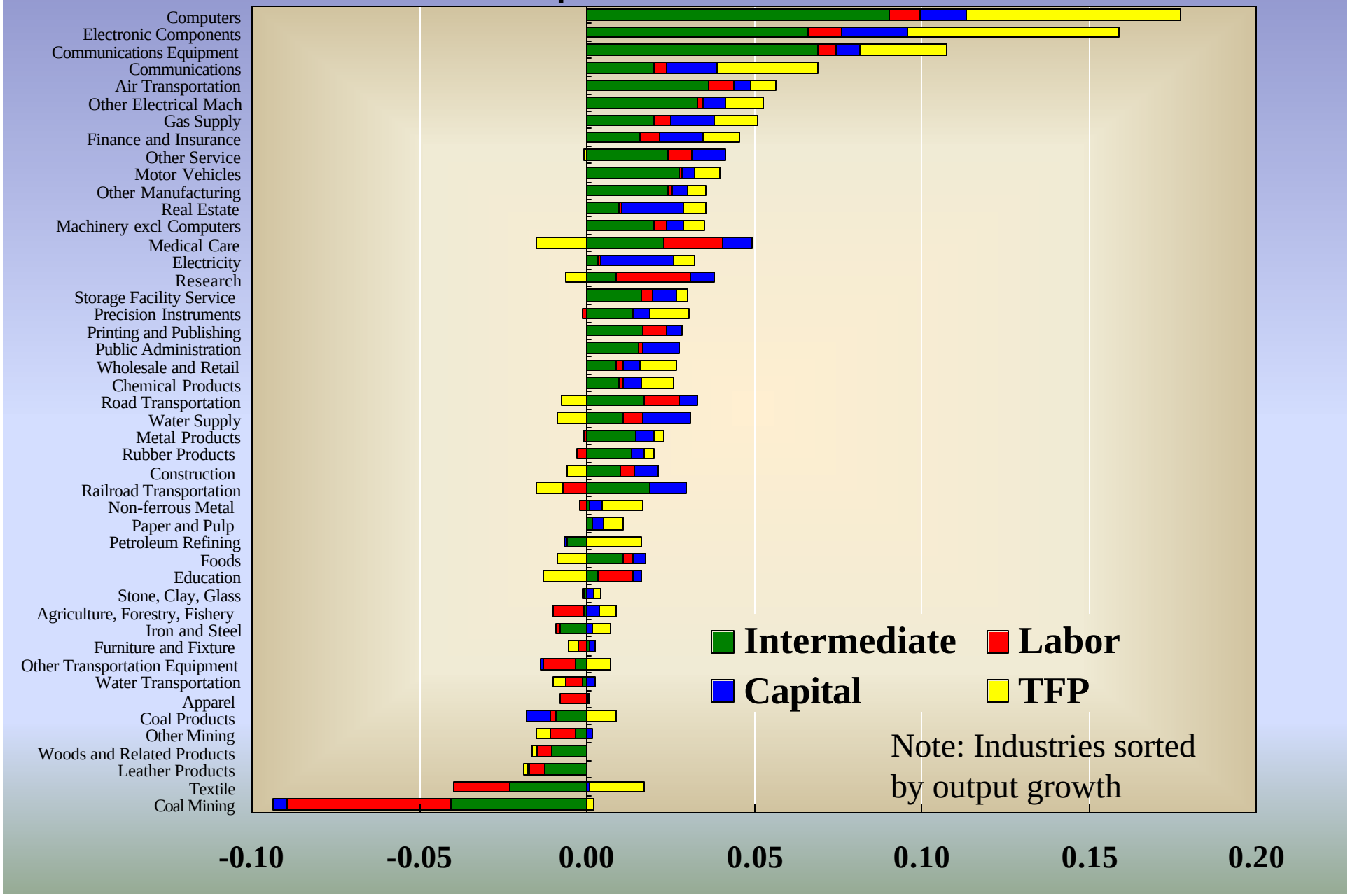
Sources of Economic Growth in Japan



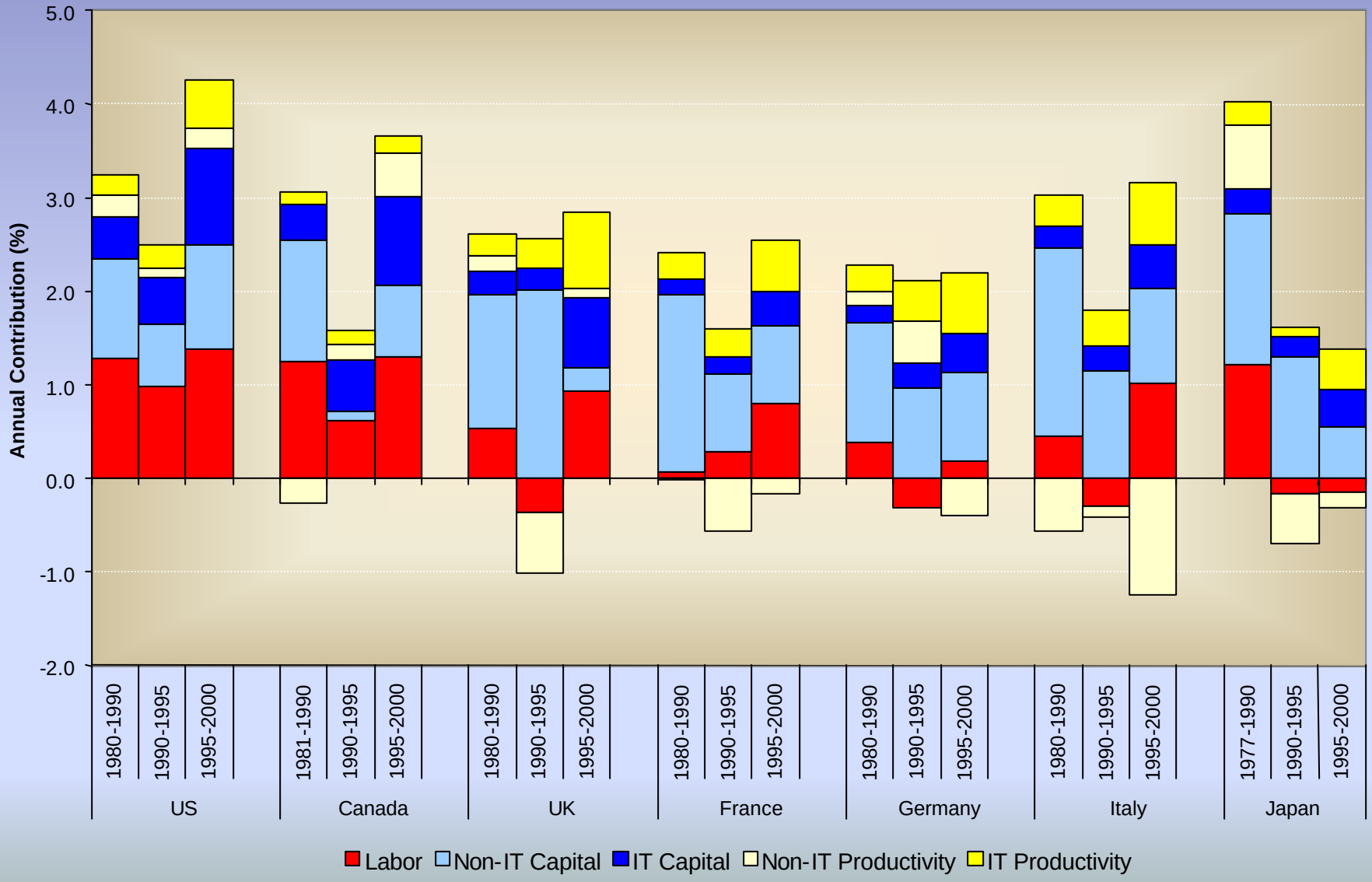
Sources of Growth in Industry Output in the U.S., 1977-2000



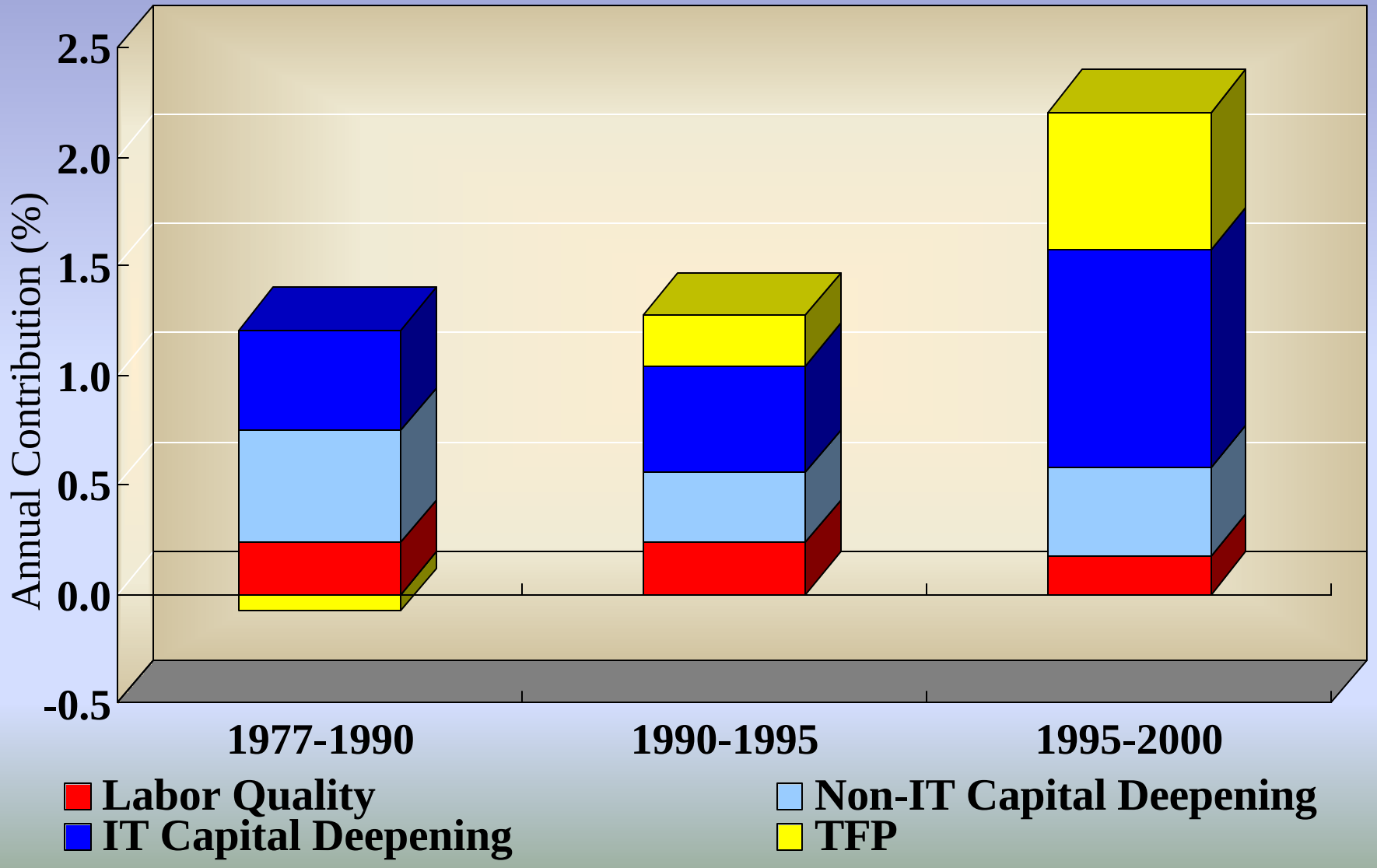
Sources of Growth in Industry Output in Japan, 1977-2000



Sources of Economic Growth by Country



Sources of Labor Productivity Growth in the U.S.



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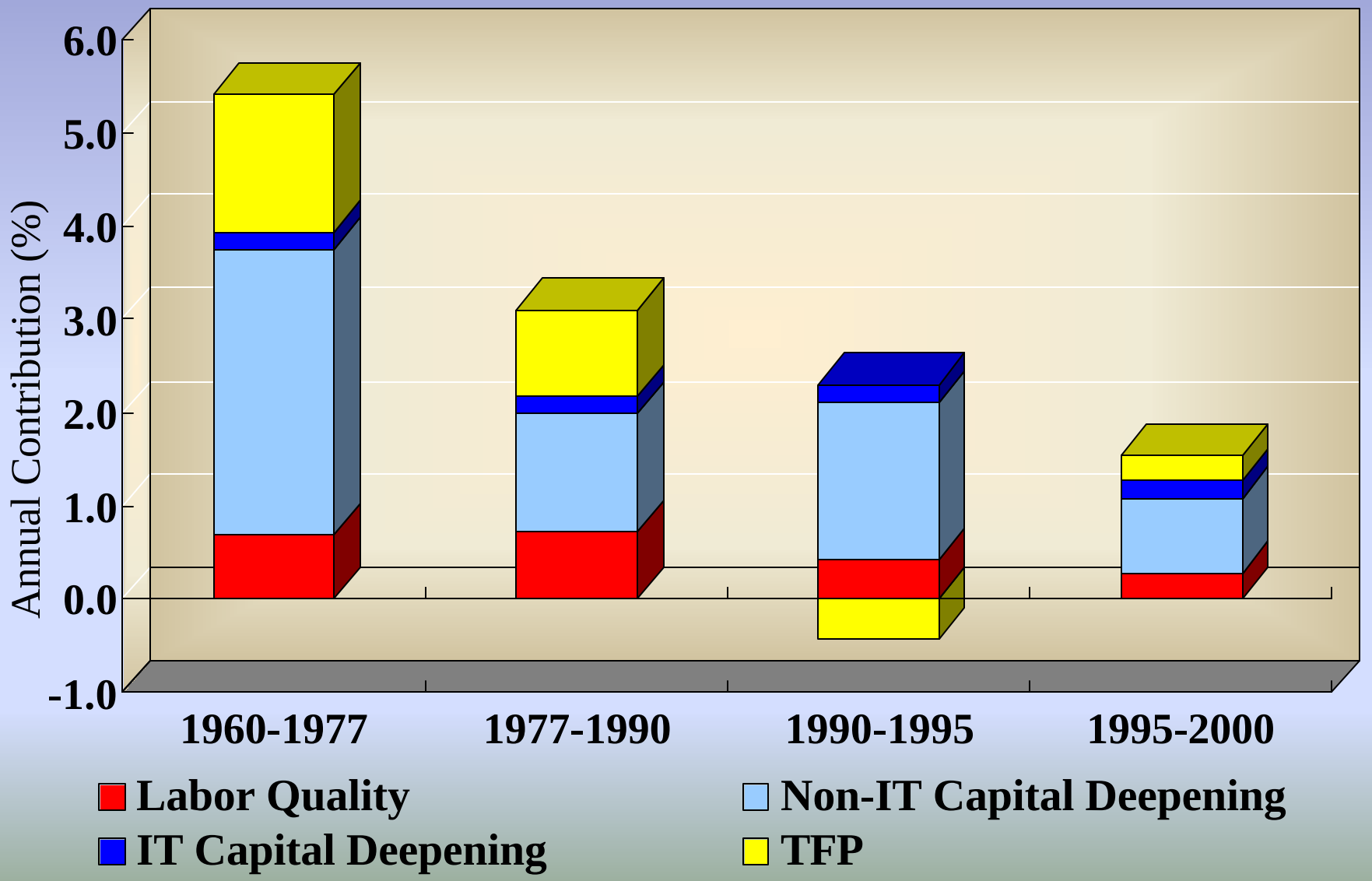
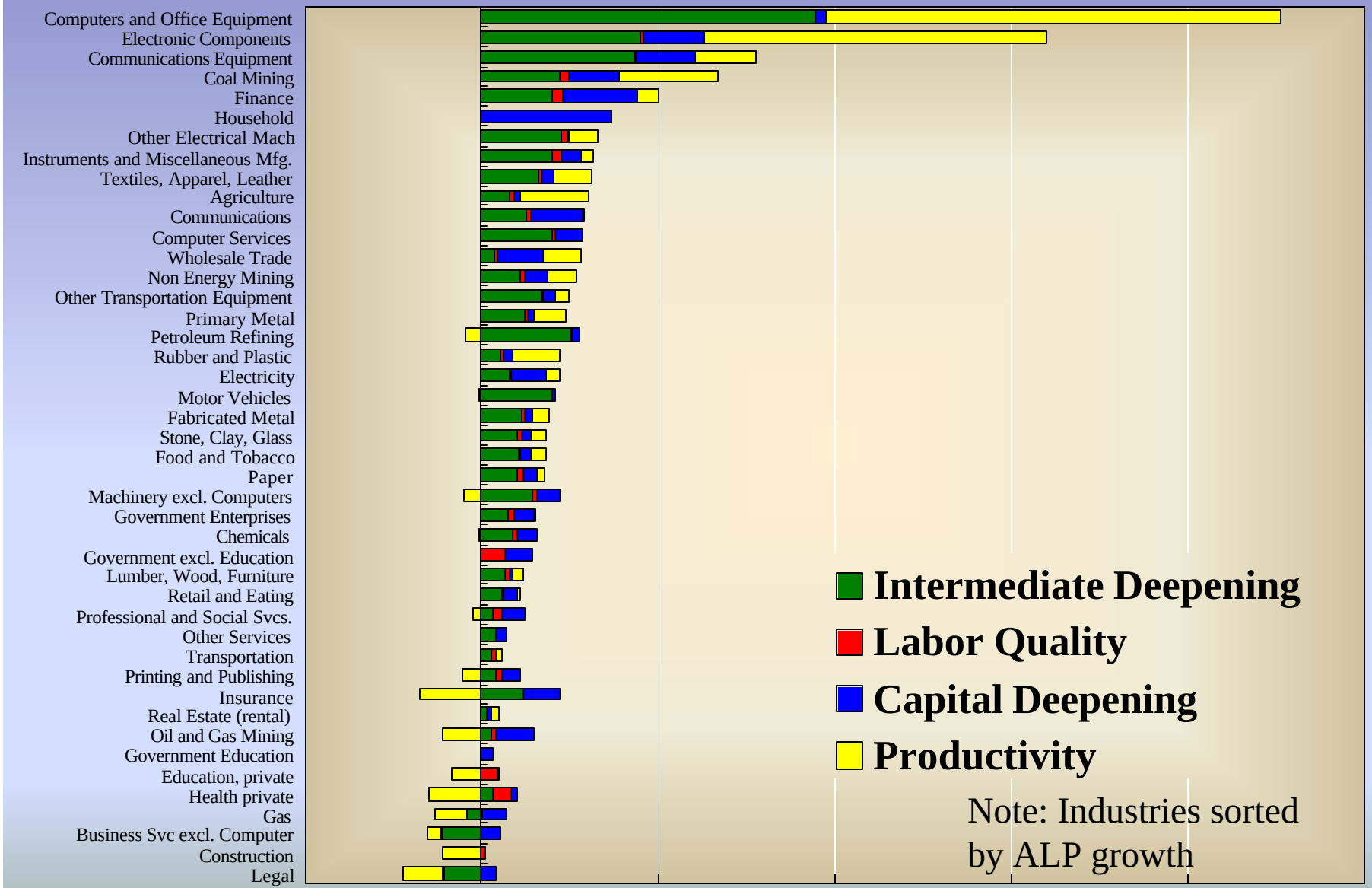
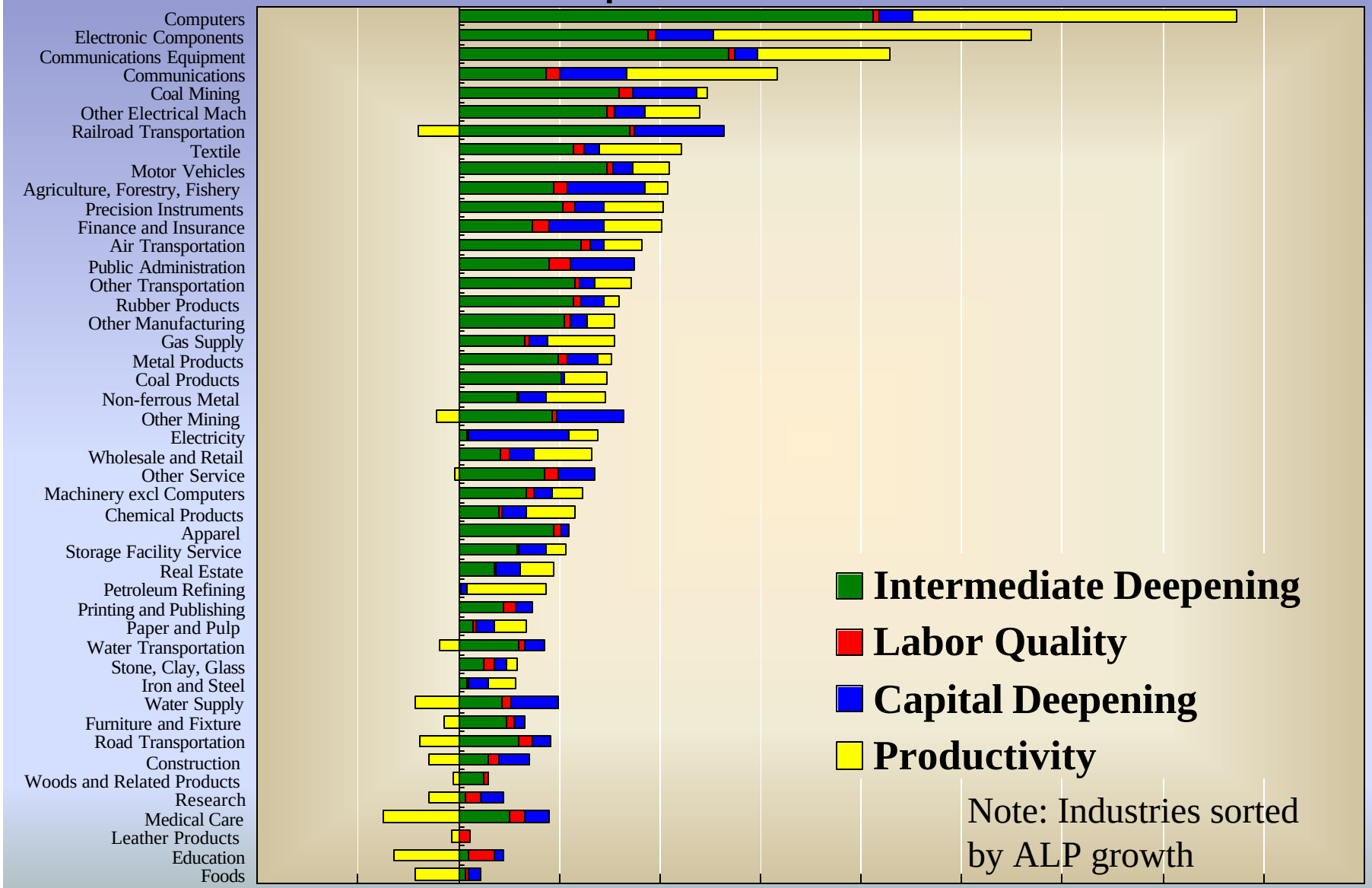


Sources of Industry Labor Productivity Growth in the U.S., 1977-2000



Sources of Industry Labor Productivity Growth in Japan, 1977-2000



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.

Data for Japanese Economy

Periods

- 1960-2000 (1955-2000 for Capital Stock)

Industry Classification

- 46 Industries
  - 3 IT Producers (Computer & Peripherals, Communication Equipment, and Electronic Components)
  - 43 Industries at KEO Database

Asset Classification

- 102 Asset Classification by 46 Industries
  - 90 Tangible Assets
  - 5 Intangible Assets (3 Software, others)
  - 3 Inventories
  - 4 Types of Land Use

International Comparison of Software Professionals

	Year	Share to total employees	ISCO-213	ISCO-312	ISCO-213/ (213+312)
Greece	1998	0.2	7444	7196	50.8
Spain	1998	0.3	44026	34107	56.3
France	1998	0.4	196705	99011	66.5
Netherlands	1998	0.9	100765	82144	55.1
U.S.	2000	1.3	1633280		
Sweden	1999	1.3	75881	24474	75.6
Japan	2000	1.4	753493	363753	67.4

Data: Employee Base, U.S.(Occupational Employment and Wages, BLS), Japan(Population Census, MIC), Others(OECD, Ahmad [2003])
Classification: U.S. SOC-15-1020,30, 50 and JSCO-06 correspond to ISCO-213

Software Professionals in Japan

	Employment			Employee		
	Total	Male	Female	Total	Male	Female
1970	0.09	0.13	0.02	0.13	0.18	0.04
1975	0.15	0.22	0.04	0.22	0.29	0.06
1980	0.23	0.34	0.05	0.32	0.44	0.08
1985	0.55	0.77	0.20	0.72	0.96	0.29
1990	0.91	1.26	0.37	1.13	1.52	0.48
1995	0.94	1.35	0.32	1.13	1.59	0.40
2000	1.23	1.80	0.41	1.43	2.07	0.49

Data: Population Census, MIC, Japan
(Koji Nomura[2004]:Capitalizing Own-Account Software in Japan)