

Information Technology and the World Economy

By

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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.

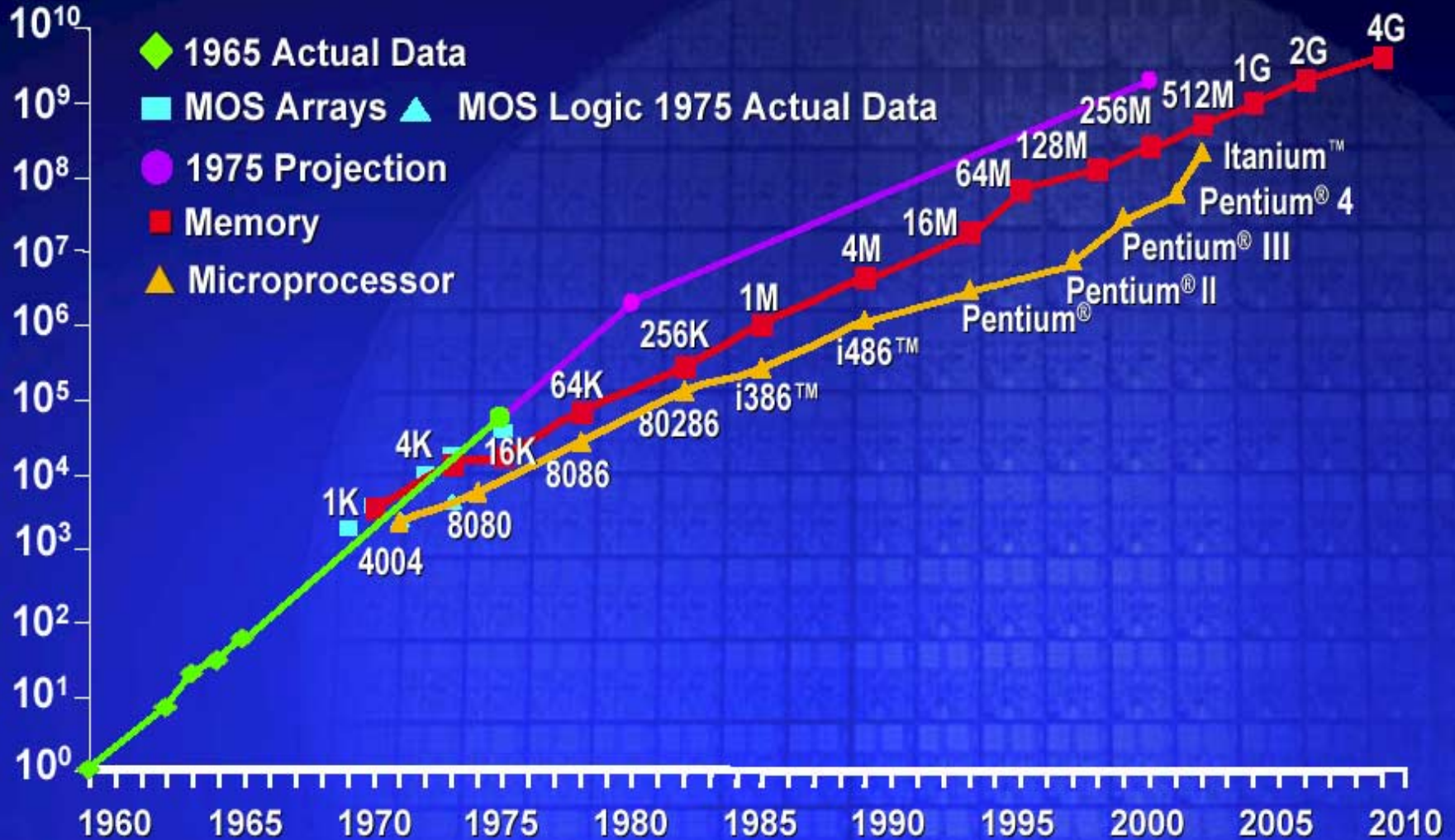
THE INTEGRATED CIRCUIT:

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).

Integrated Circuit Complexity

Transistors
Per Die



HOLDING QUALITY CONSTANT

Matched Models and Hedonics

SEMICONDUCTOR PRICE INDEXES:

Memory and Logic Chips.

COMPUTER PRICE INDEXES:

The BEA-IBM Collaboration.

COMMUNICATIONS EQUIPMENT:

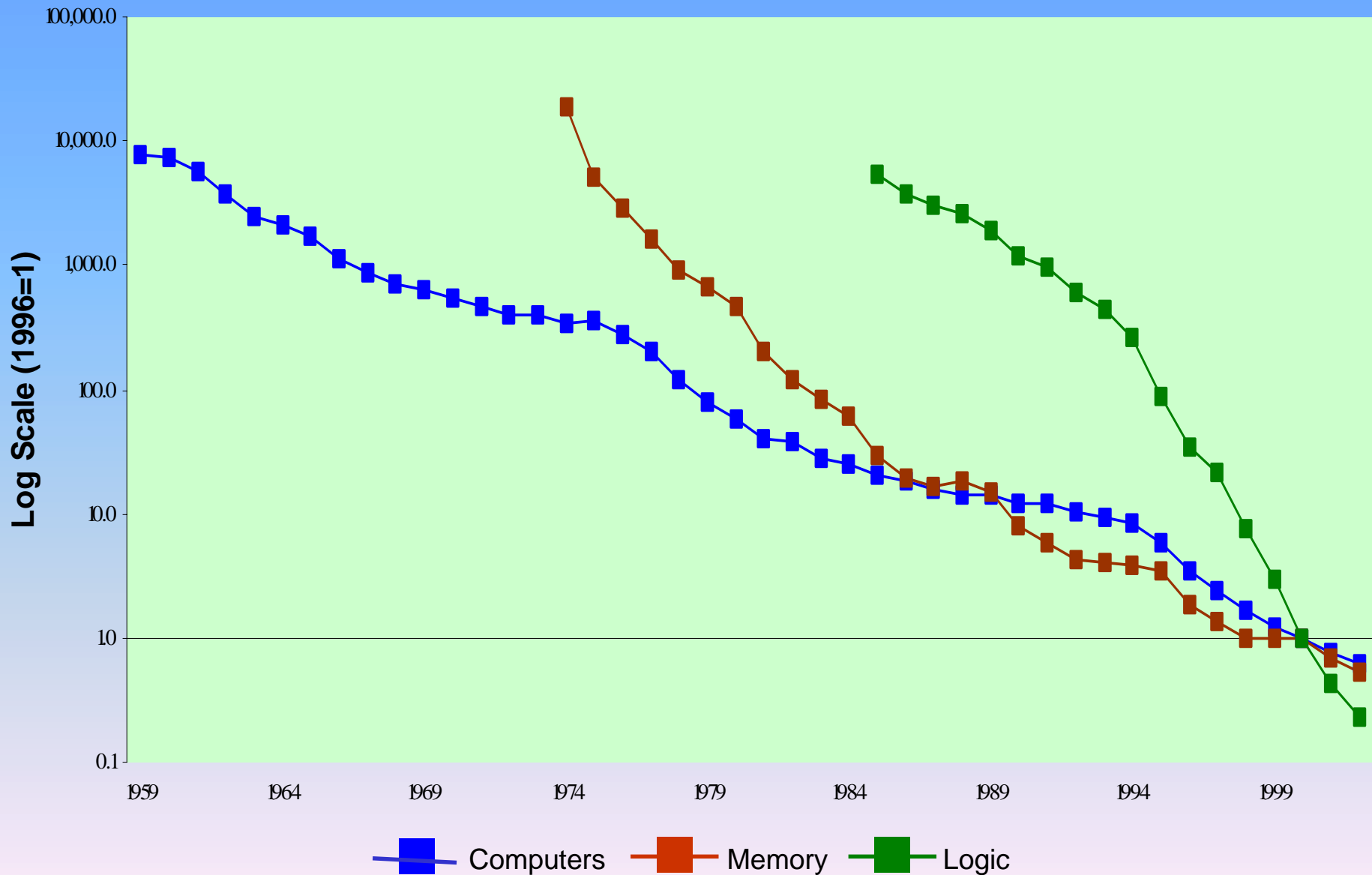
Terminal, Switching, and Transmission.

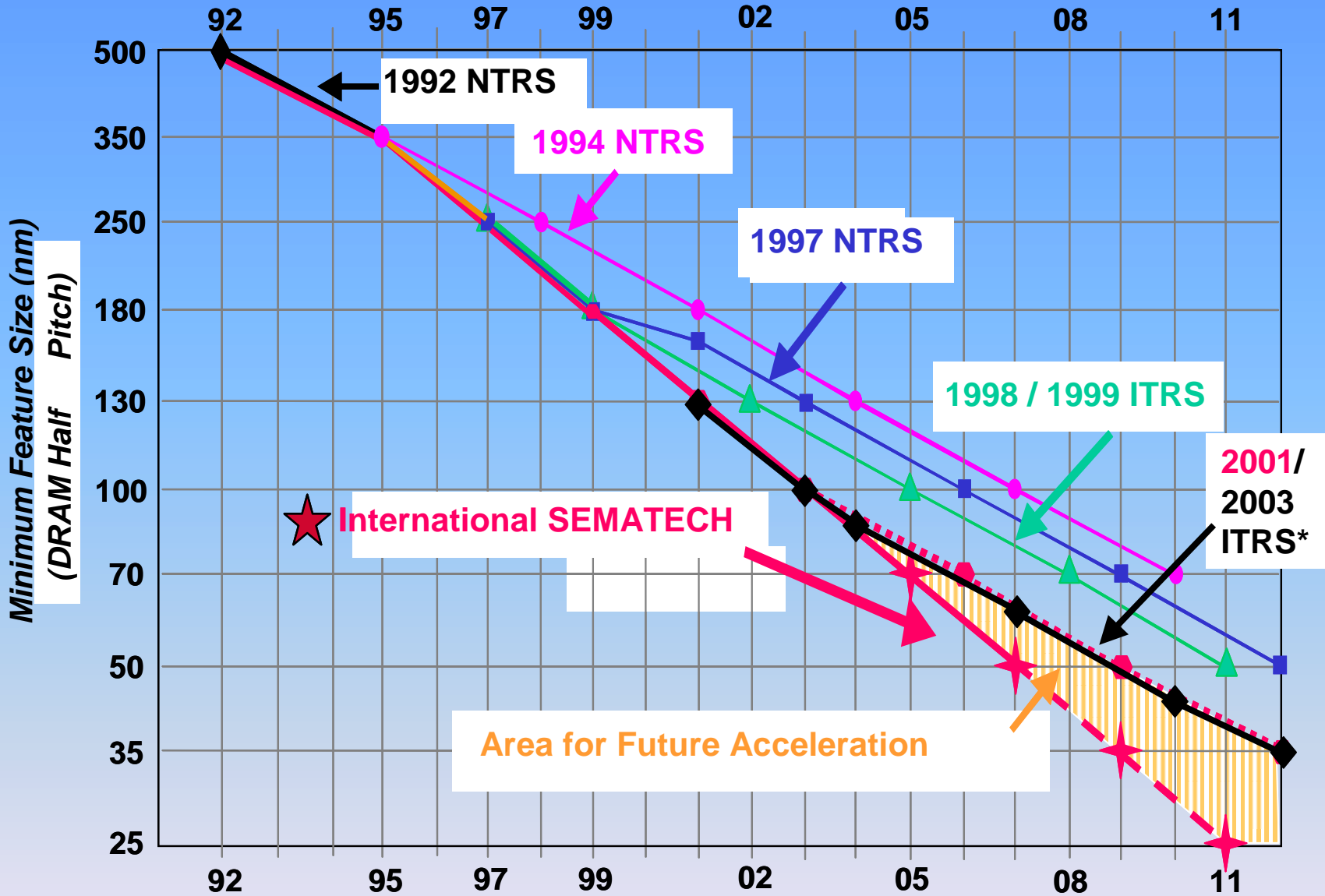
SOFTWARE:

Prepackaged, Custom, and Own-Account.

Relative Prices of Computers and Semiconductors, 1959-2002

All price indexes are divided by the output price index



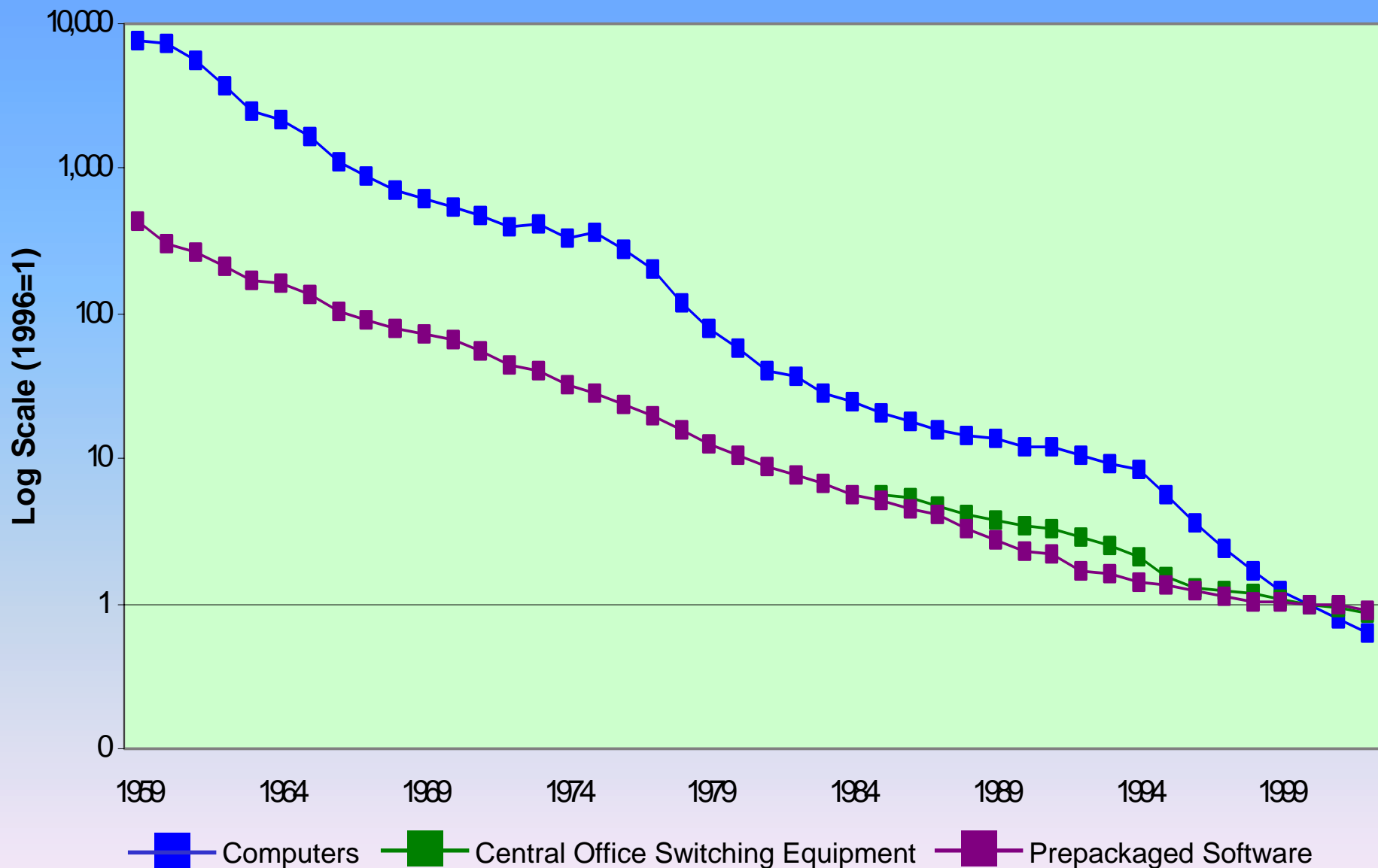


*Note the 2003 ITRS timing is unchanged from the 2001 ITRS

Semiconductor Roadmap Acceleration

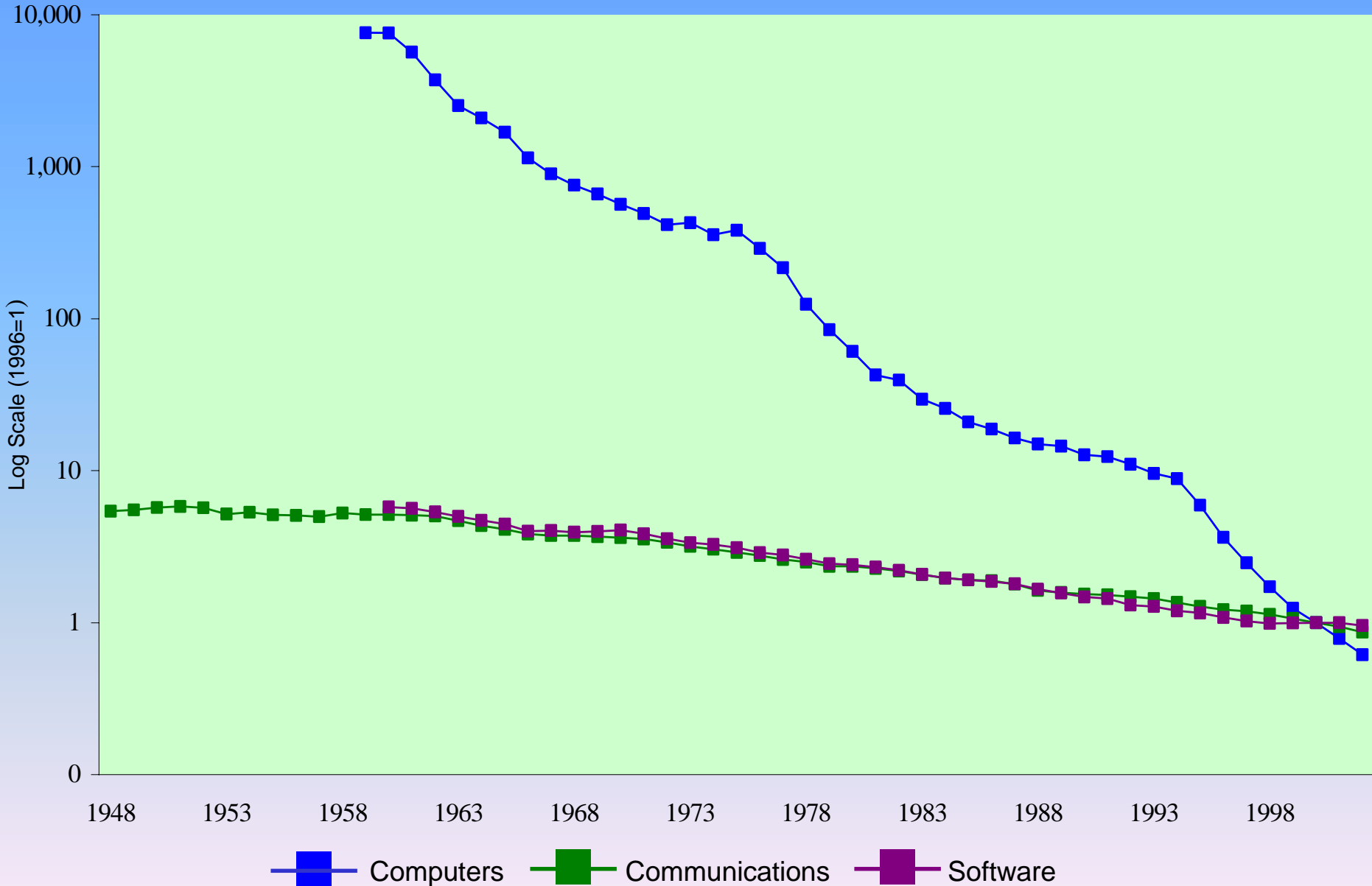
Relative Prices of Computers, Communications and Software, 1959-2002

All price indexes are divided by the output price index



Relative Prices of Computers, Communications and Software, 1948-2002

All price indexes are divided by the output price index



ROLE OF INFORMATION TECHNOLOGY: IT Prices and the Growth of Output.

OUTPUT SHARES OF IT:

Computers, Communications Equipment, and Software.

OUTPUT CONTRIBUTION OF IT:

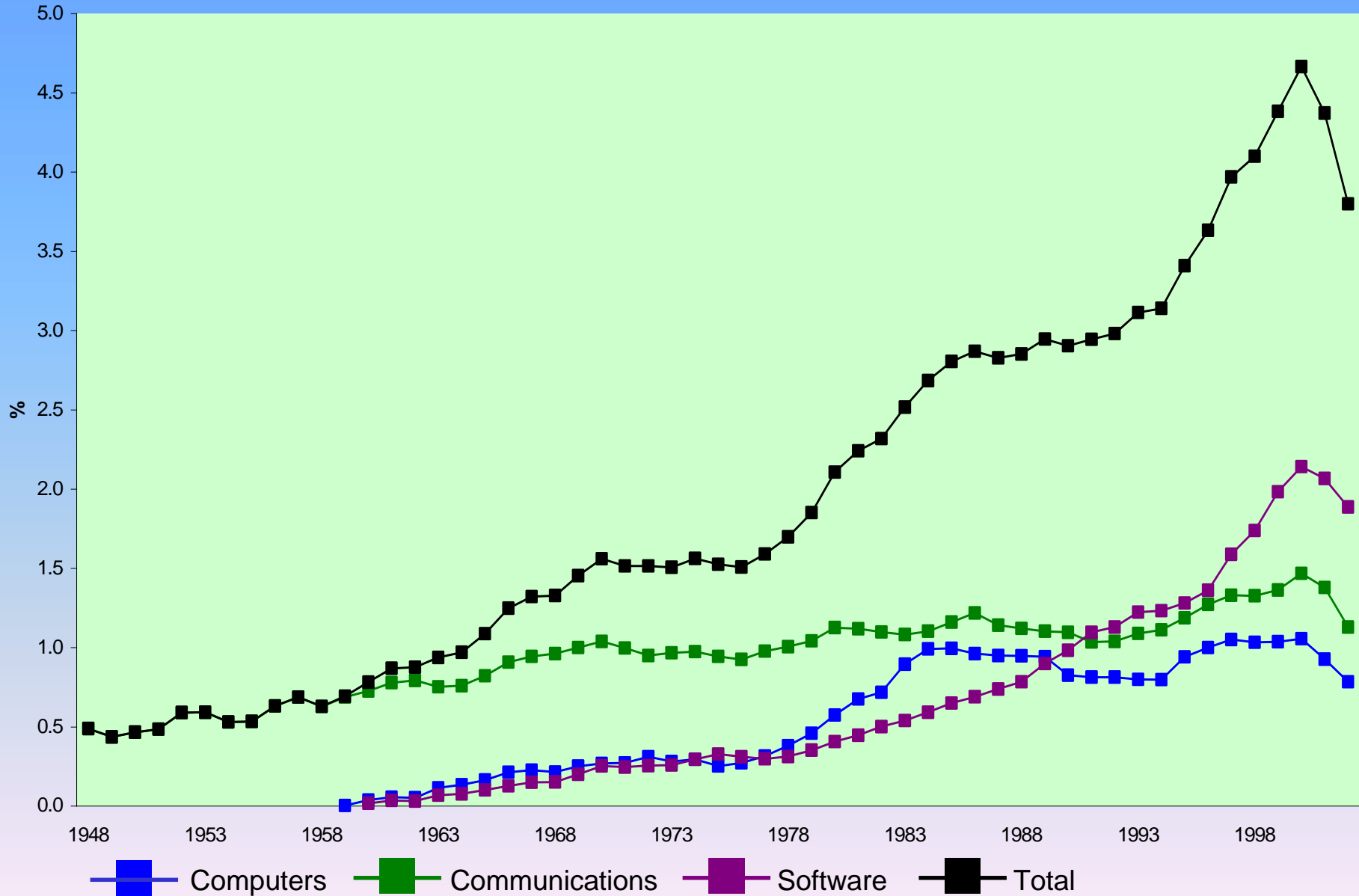
IT versus Non-IT Value Added.

OUTPUT CONTRIBUTION BY TYPE:

Computers, Communications Equipment, and Software.

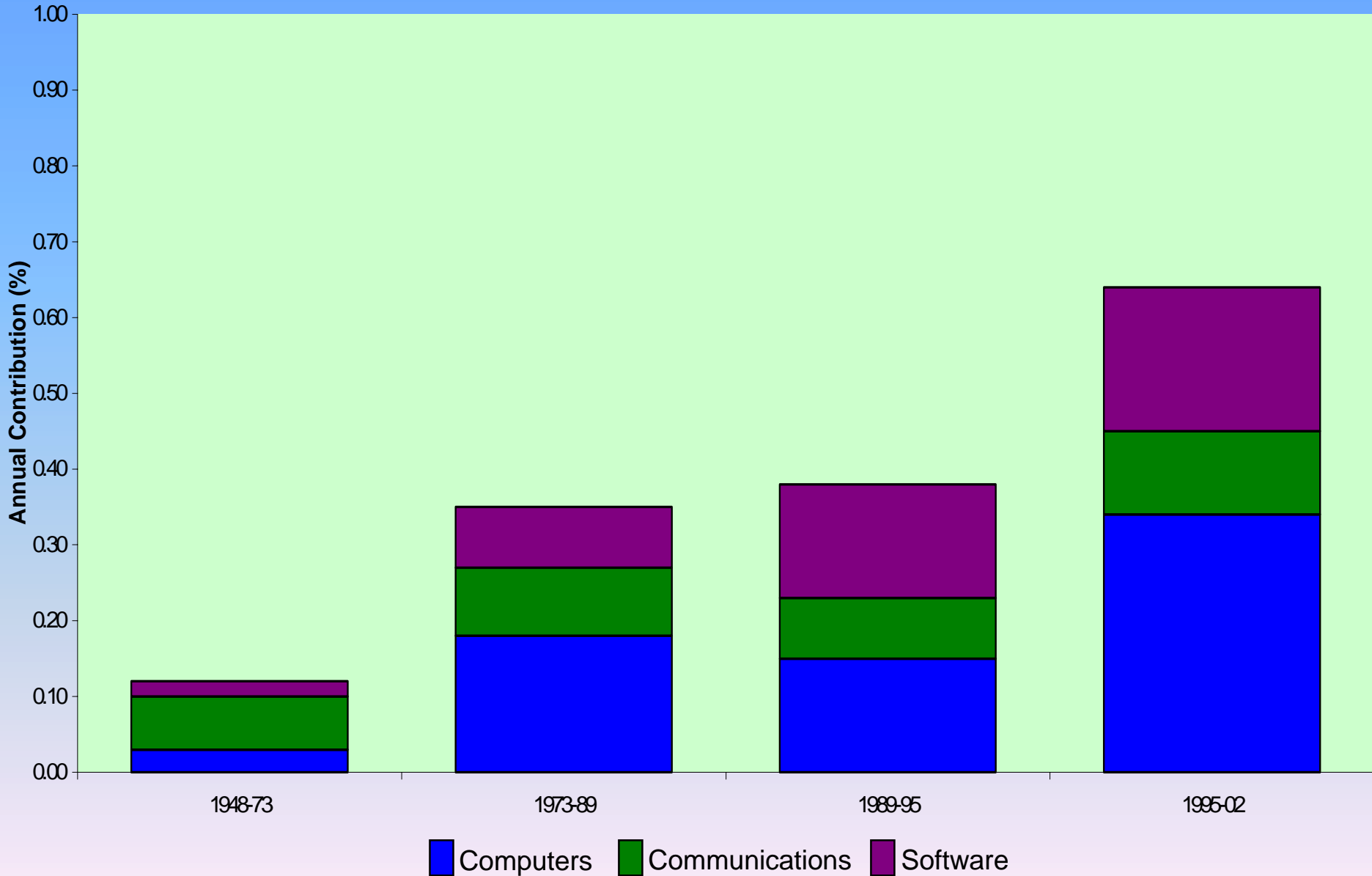
Output Shares of Information Technology by Type, 1948-2002

Share of current dollar gross domestic product.



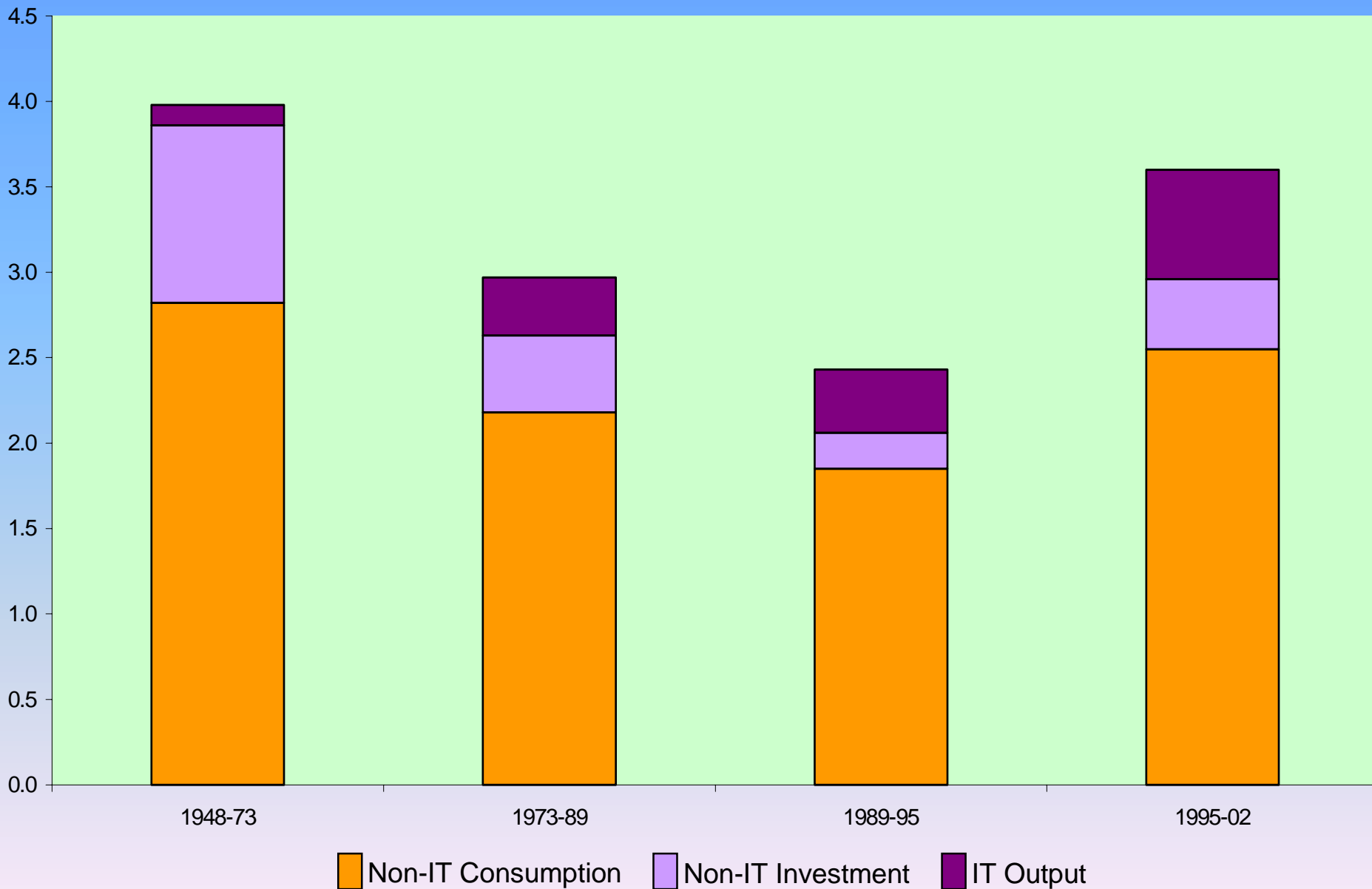
Output Contribution of Information Technology by Type

Output contributions are the average annual growth rates, weighted by the output shares.



Output Contribution of Information Technology

Output contributions are the average annual growth rates, weighted by the output shares.



ROLE OF INFORMATION TECHNOLOGY: IT Prices, Investment, and Productivity.

INPUT SHARES OF IT:

Computers, Communications Equipment, and Software.

CAPITAL CONTRIBUTION:

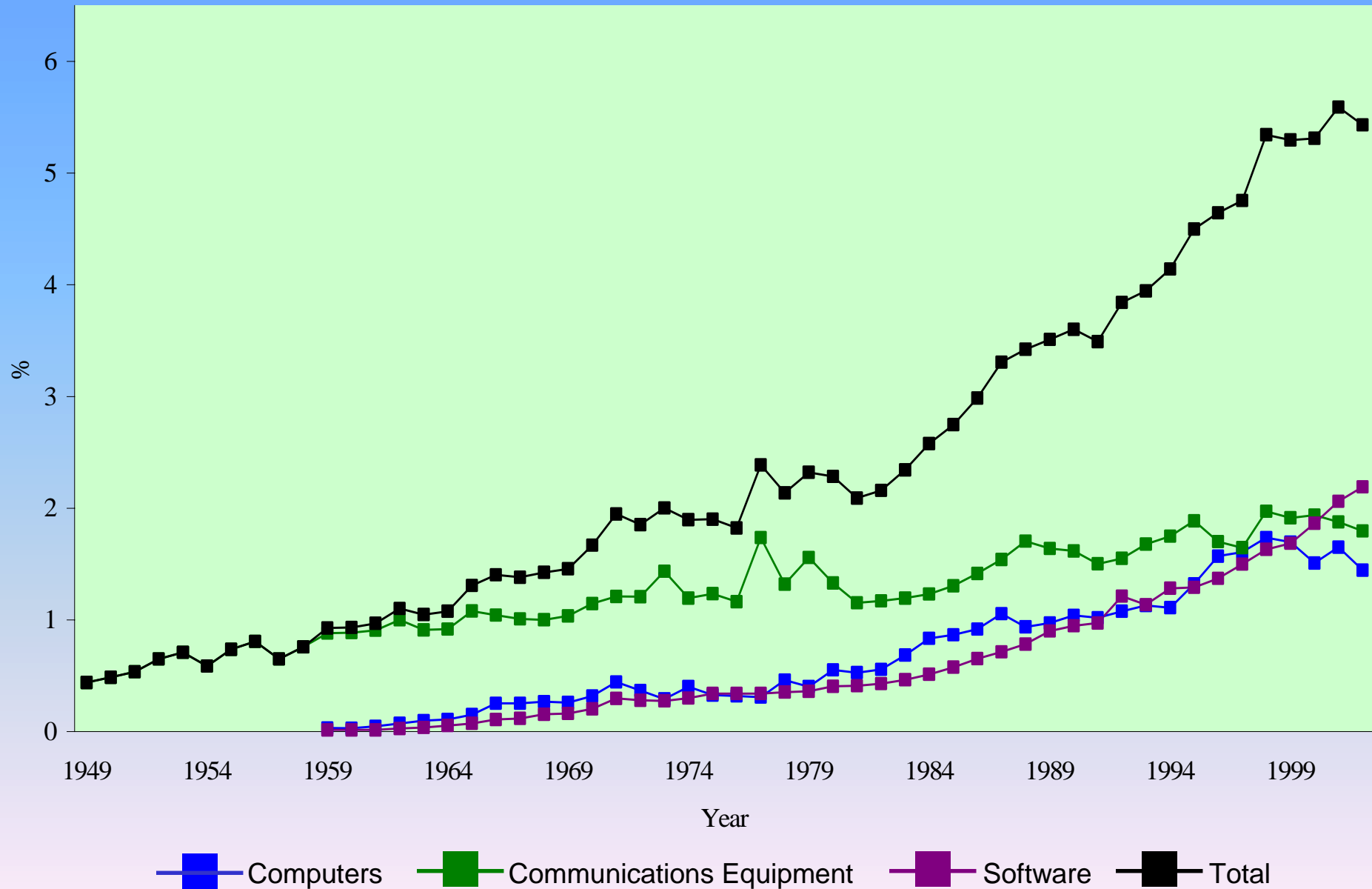
IT versus Non-IT Capital Services.

CAPITAL CONTRIBUTION BY TYPE:

Computers, Communications Equipment, and Software.

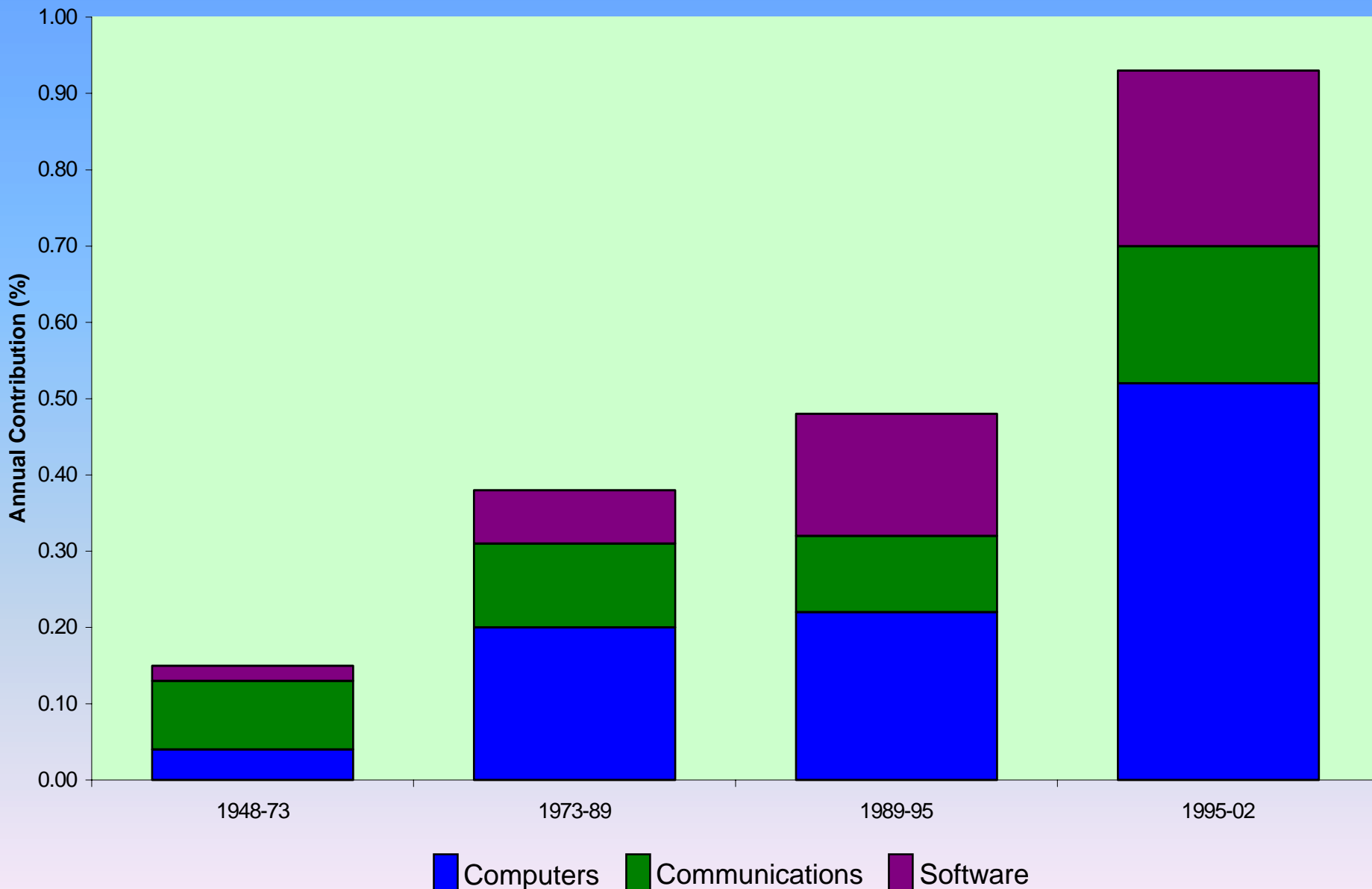
Input Shares of Information Technology by Type, 1948-2002

Share of current dollar gross domestic income.



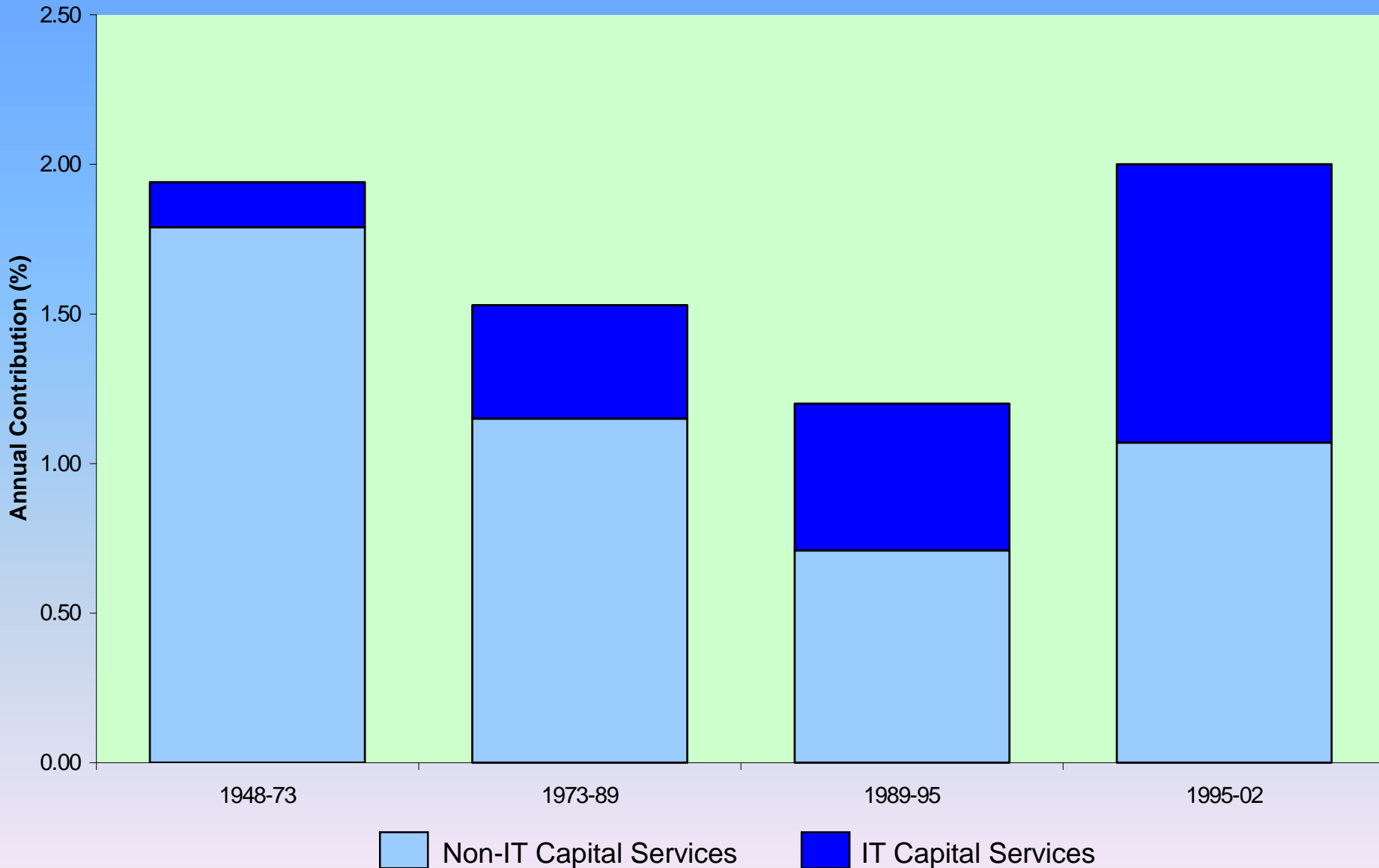
Capital Input Contribution of Information Technology by Type

Input contributions are the average annual growth rates, weighted by the income shares.

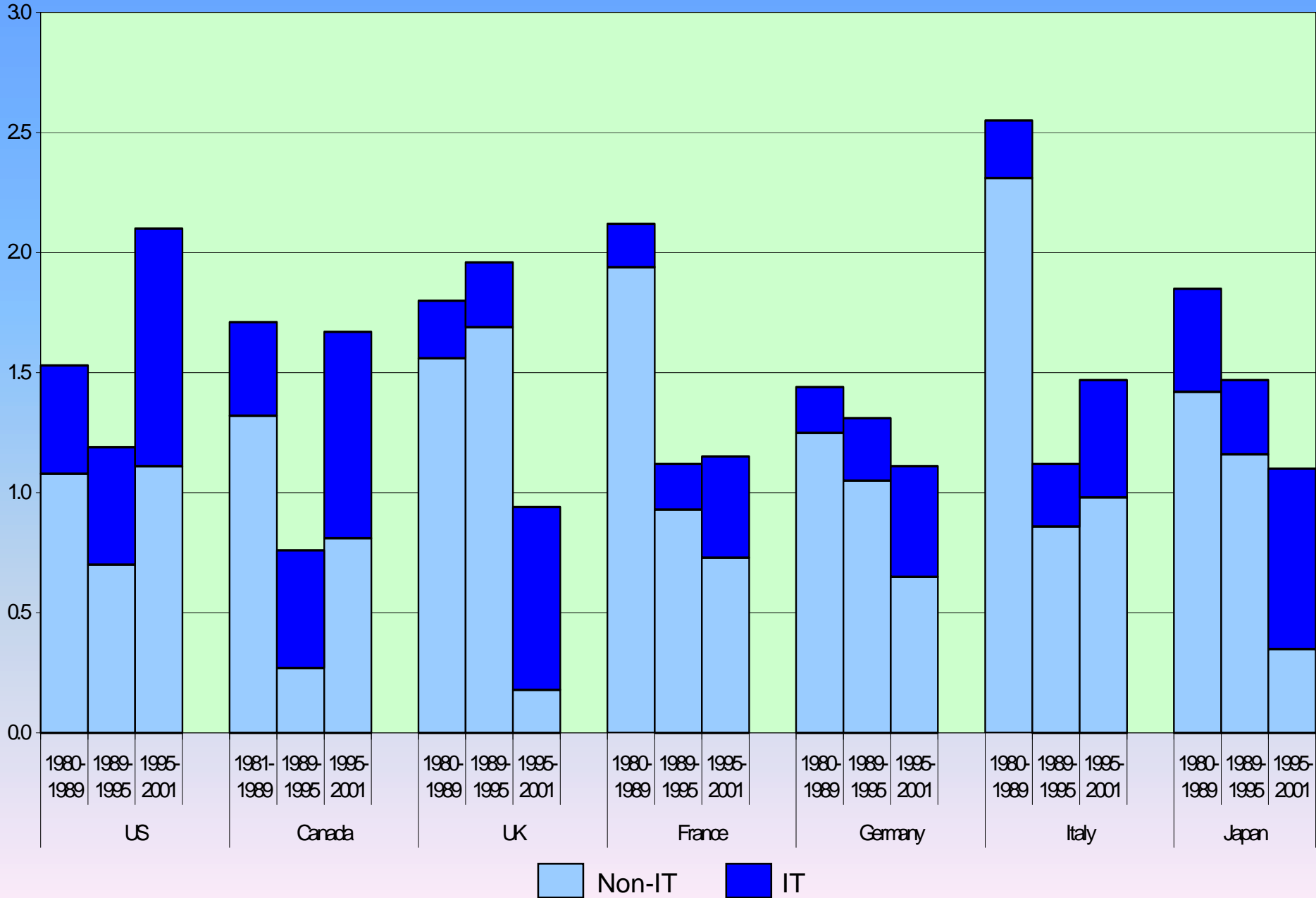


Capital Input Contribution of Information Technology

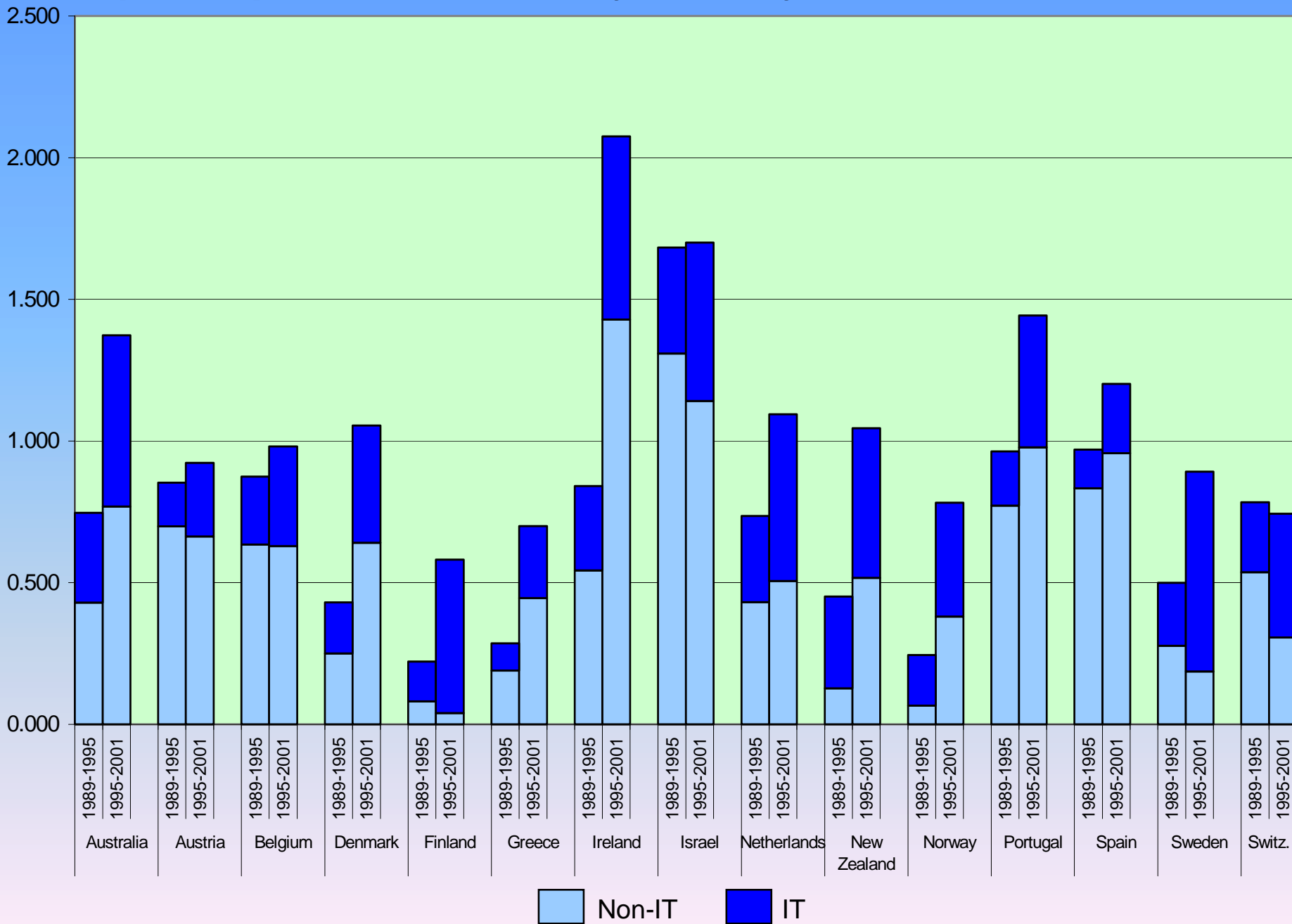
Input contributions are the average annual growth rates, weighted by the income shares.



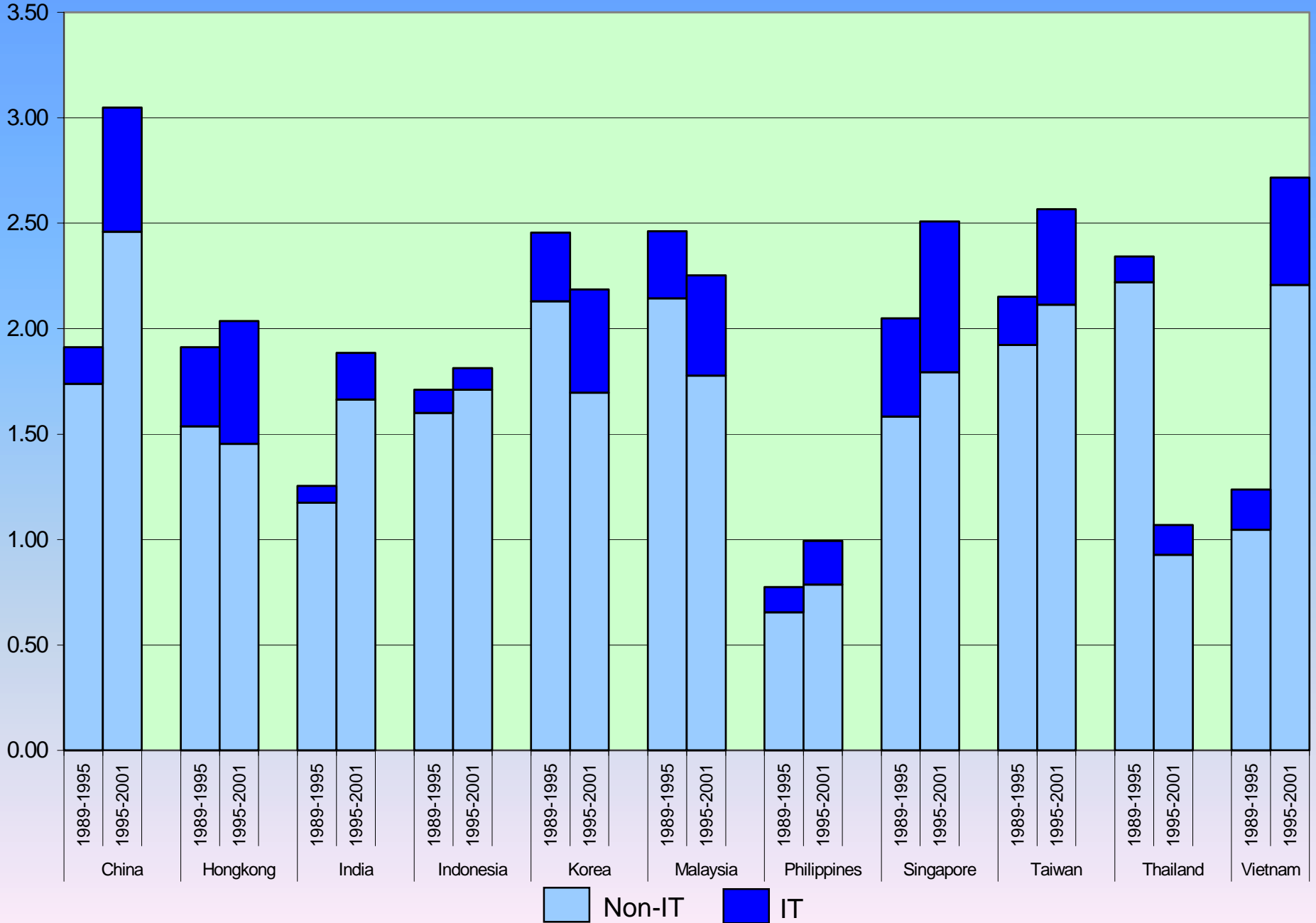
Capital Input Contribution by Country



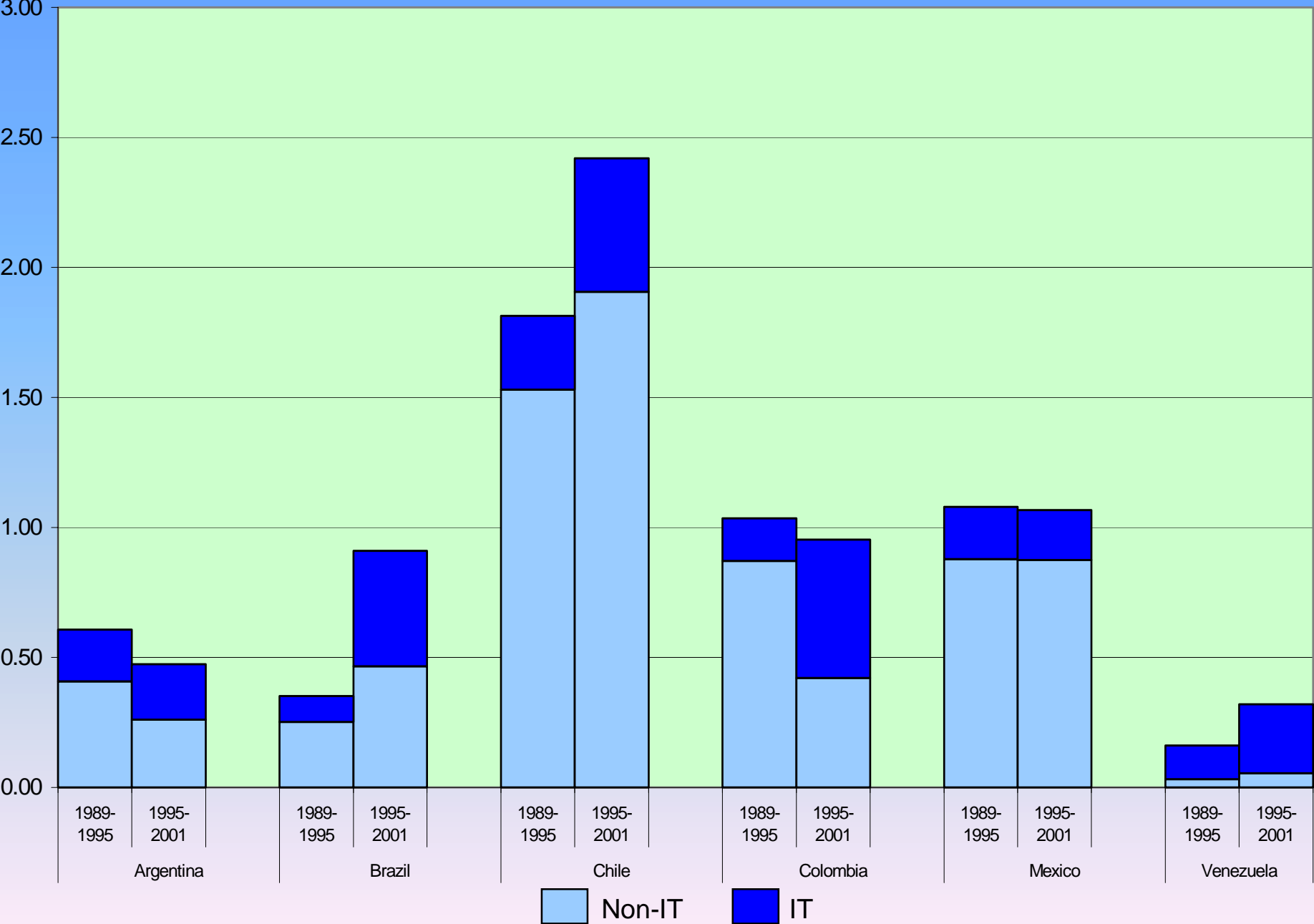
Capital Input Contribution by Country: Non-G7 Industrialized



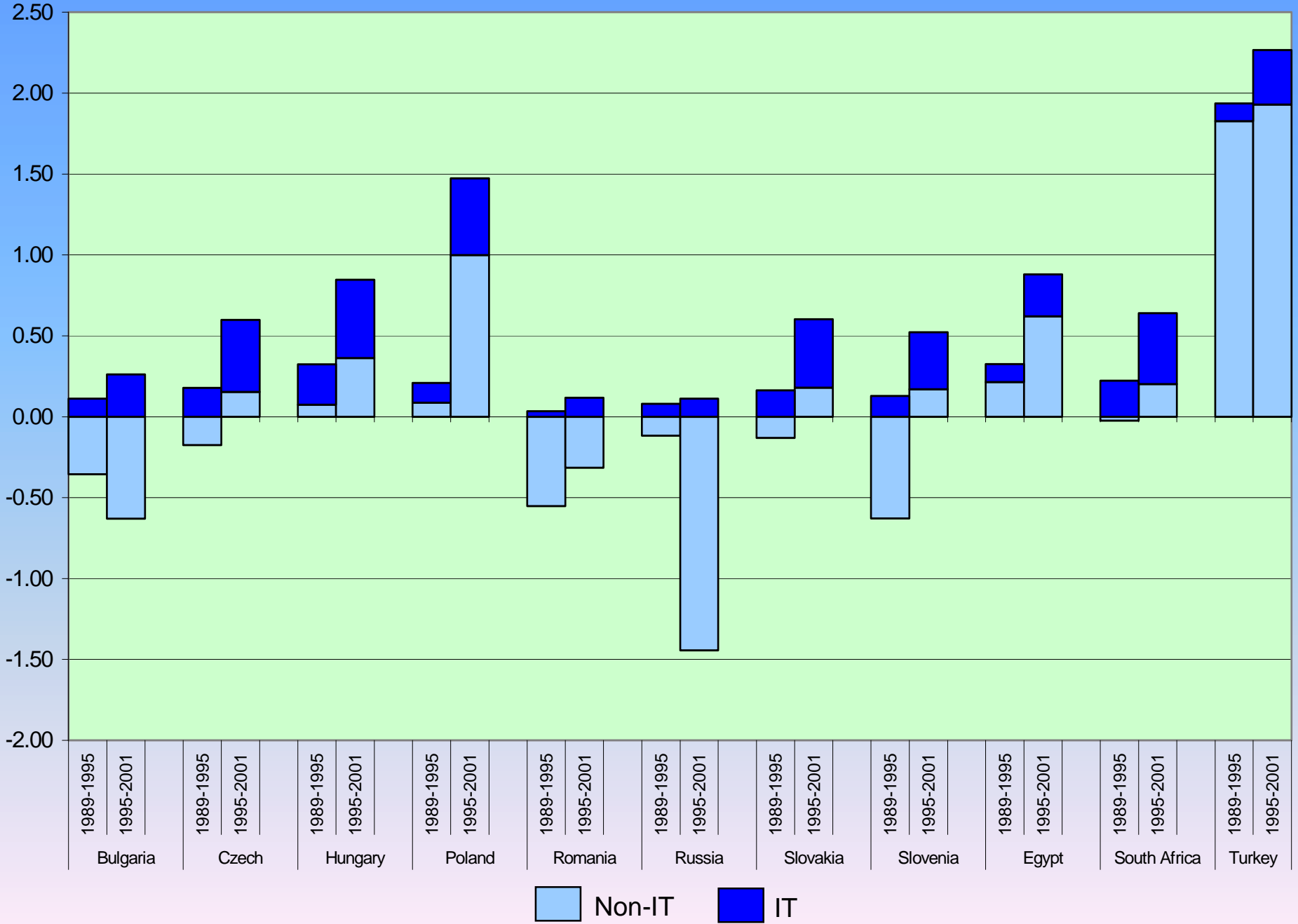
Capital Input Contribution by Country: Developing Asia



Capital Input Contribution by Country: Latin America



Capital Input Contribution by Country: Eastern Europe and Other



AMERICAN GROWTH RESURGENCE: IT Investment and Productivity Growth.

TOTAL FACTOR PRODUCTIVITY:

IT-Production versus Non-IT Production.

SOURCES OF U.S. ECONOMIC GROWTH:

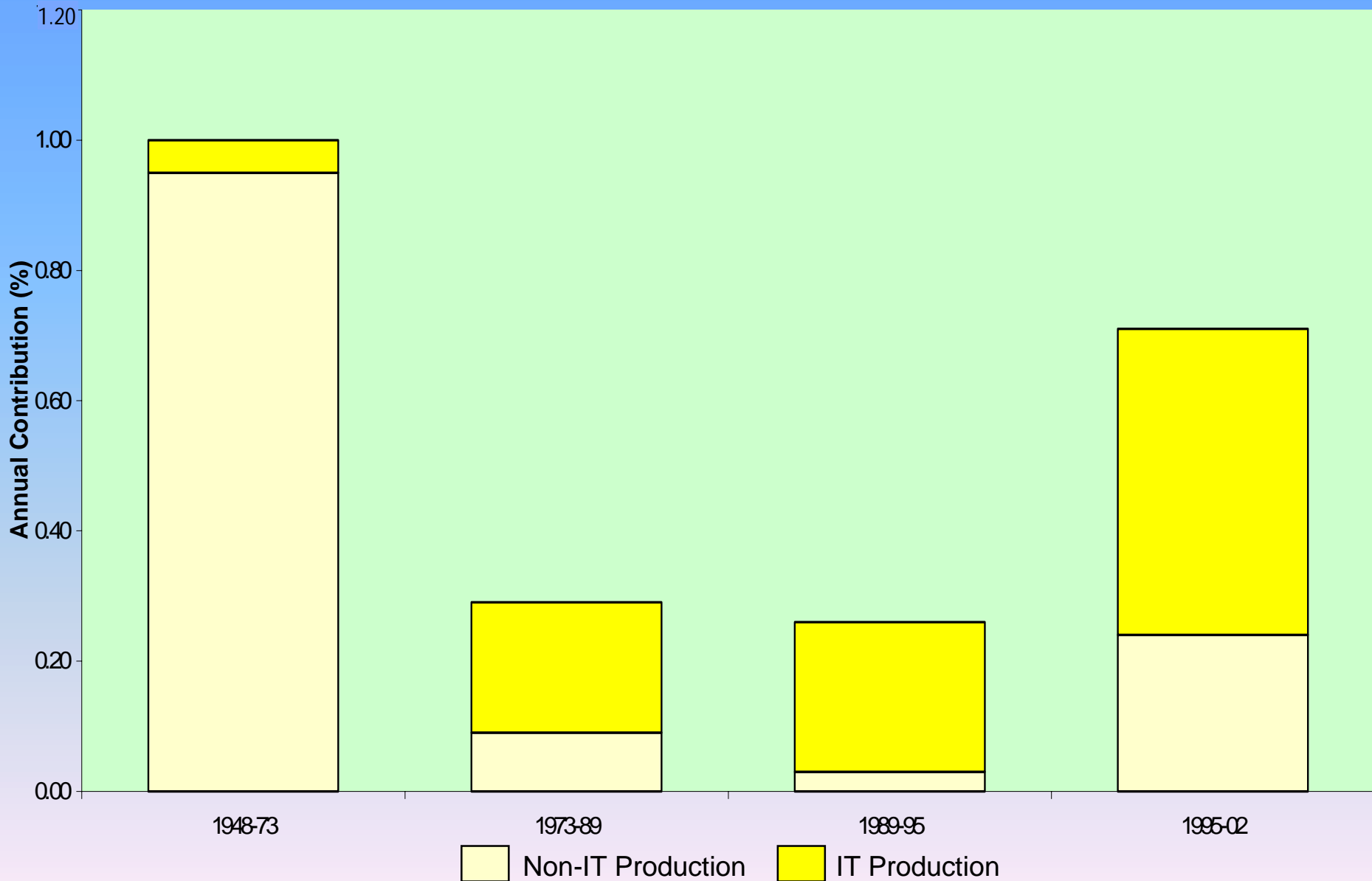
Capital Input, Labor Input, and TFP.

AVERAGE LABOR PRODUCTIVITY GROWTH:

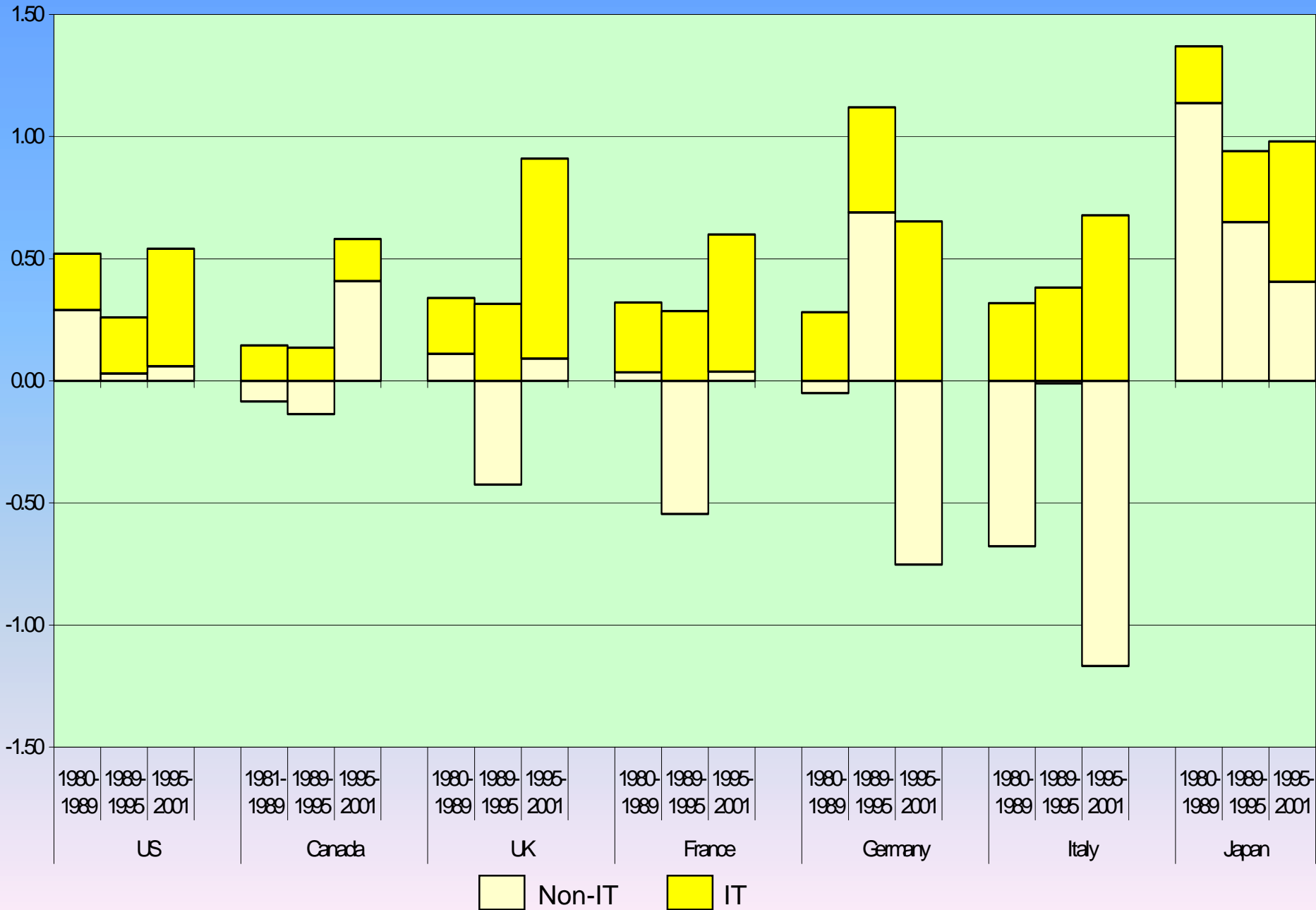
Capital Deepening, Labor Quality, TFP.

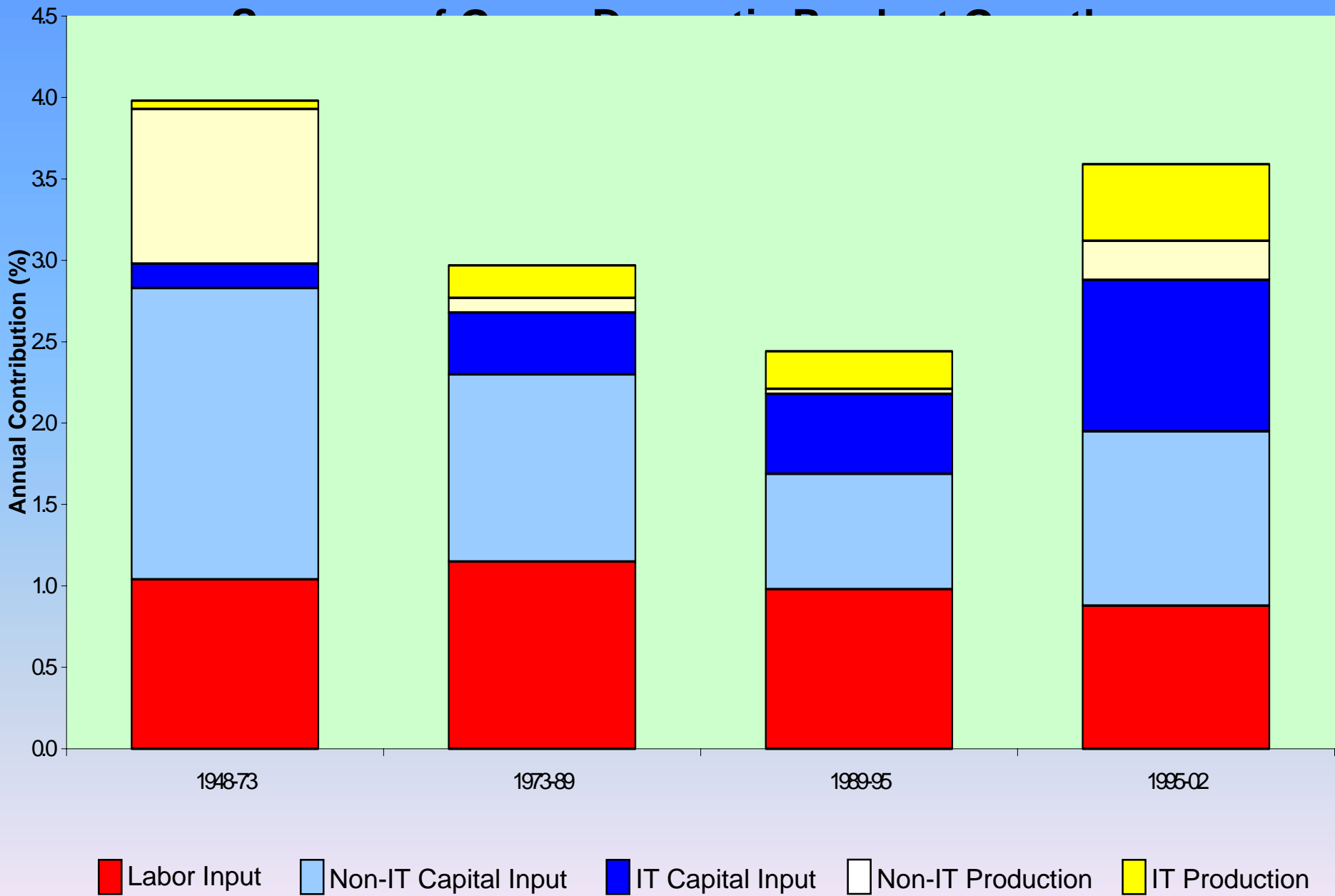
Contributions of Information Technology to Total Factor Productivity Growth

Contributions are average annual relative price changes, weighted by average nominal output shares.

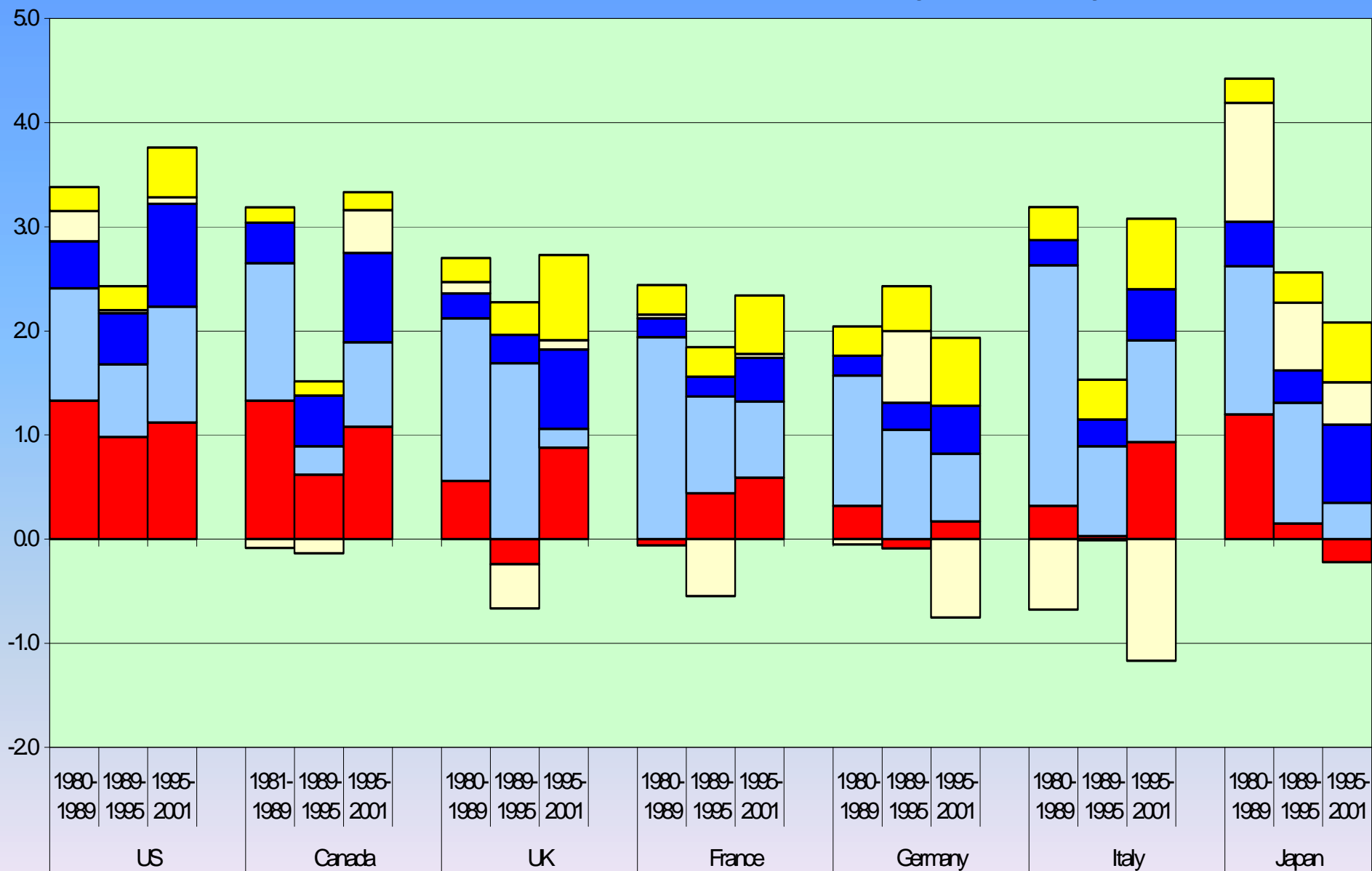


Sources of Total Factor Productivity Growth by Country



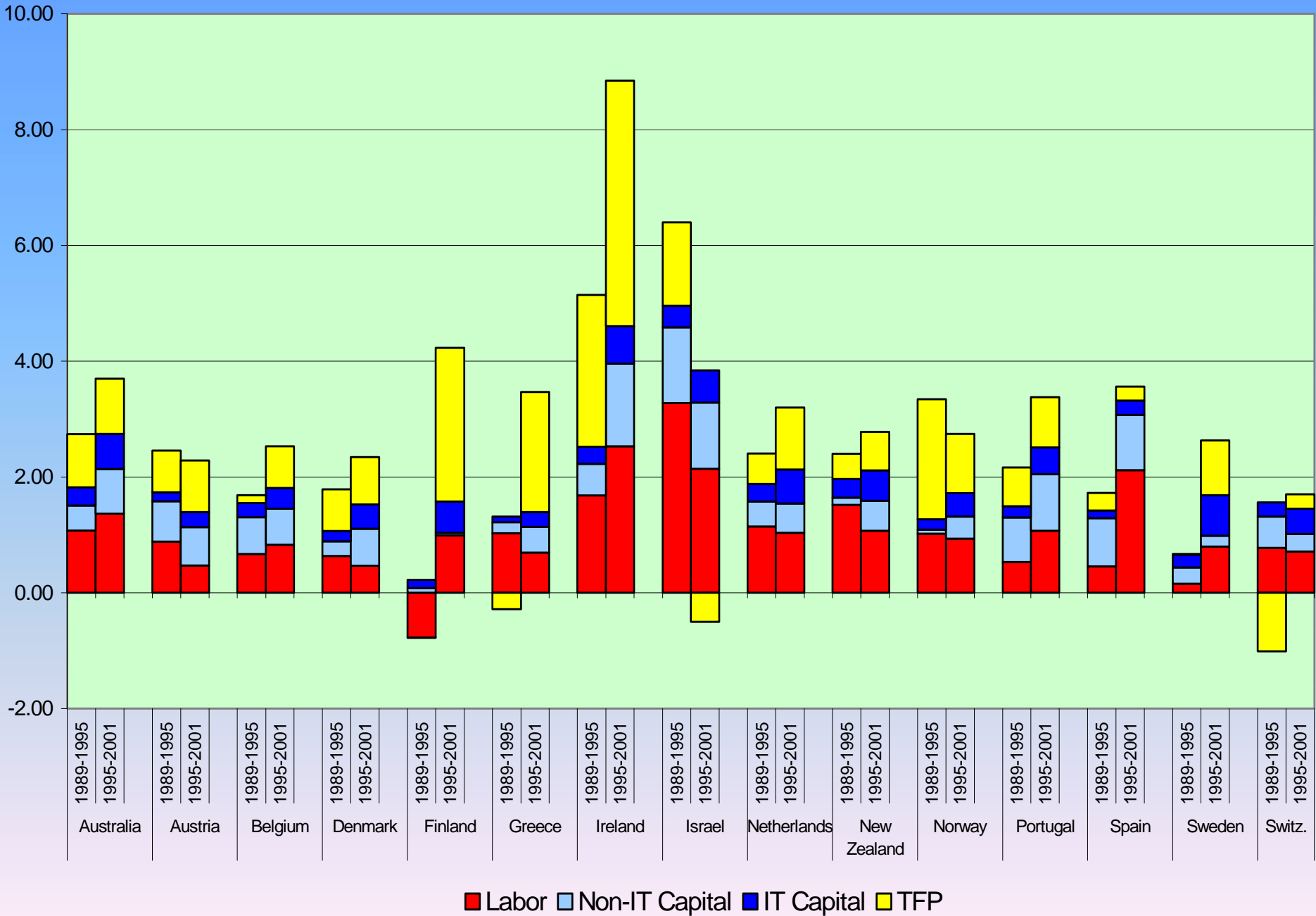


Sources of Economic Growth by Country



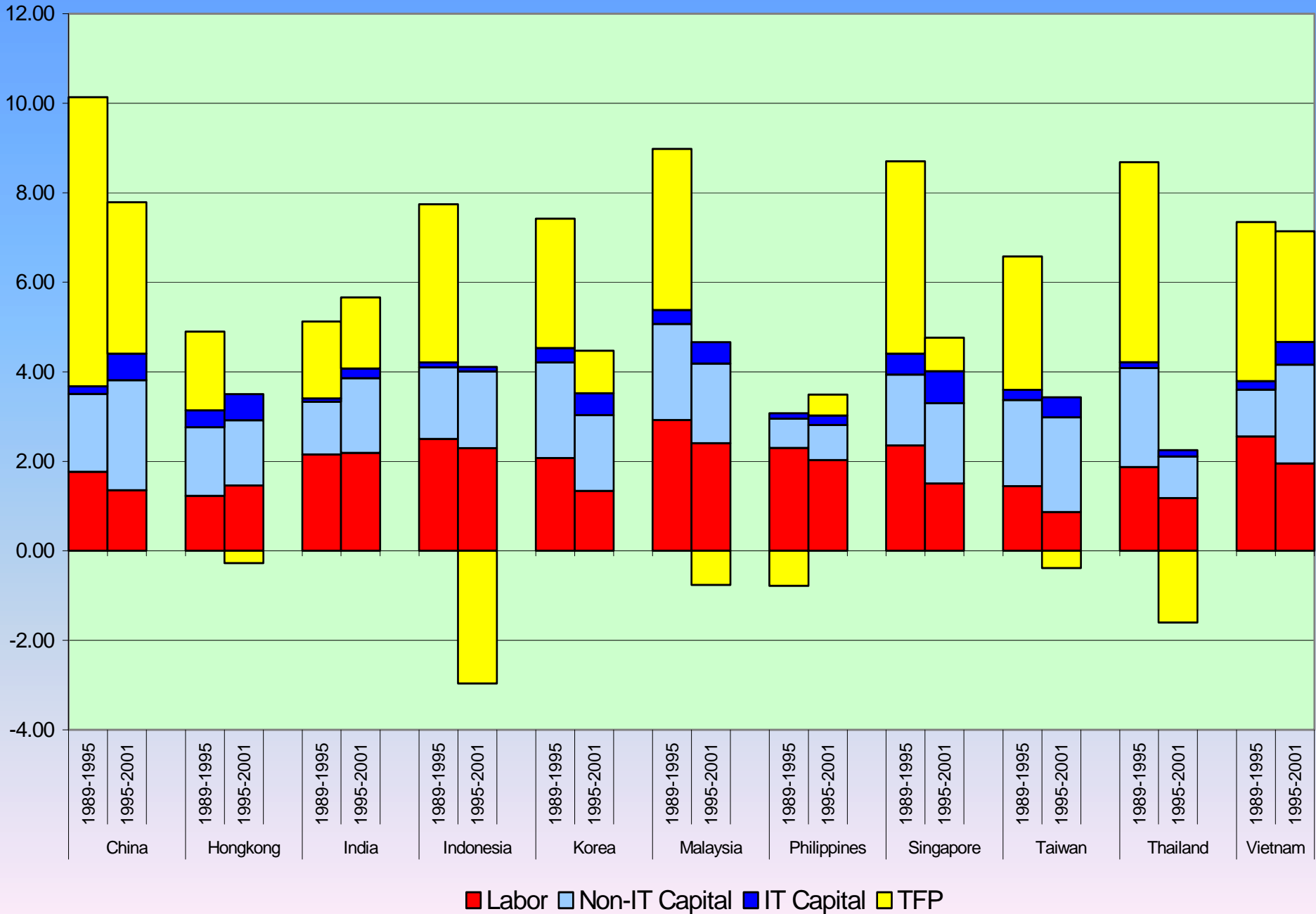
■ Labor
 ■ Non-IT Capital
 ■ IT Capital
 ■ Non-IT Total Factor Productivity
 ■ IT Total Factor Productivity

Sources of Economic Growth by Country: Non-G7 Industrialized

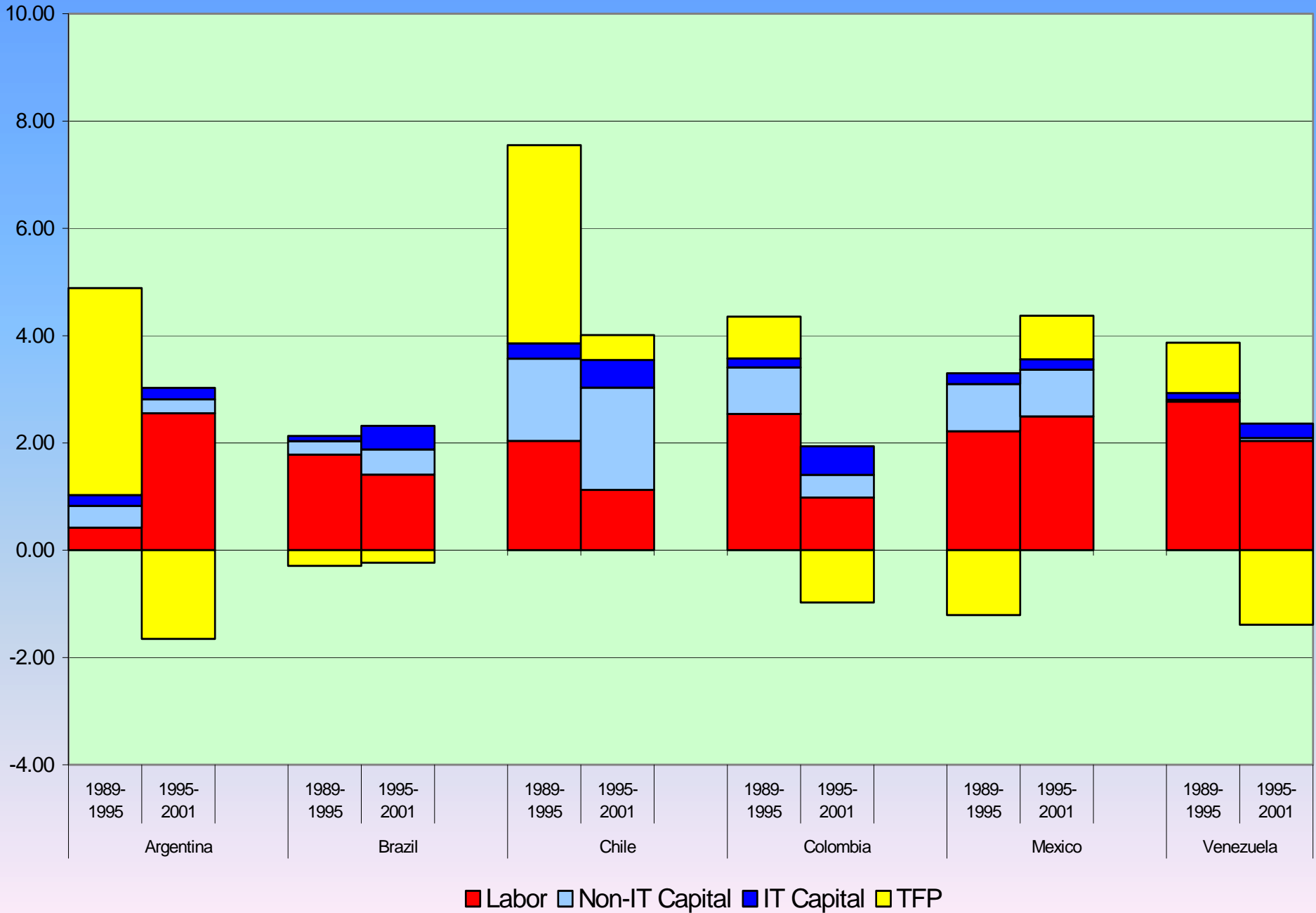


■ Labor
 ■ Non-IT Capital
 ■ IT Capital
 ■ TFP

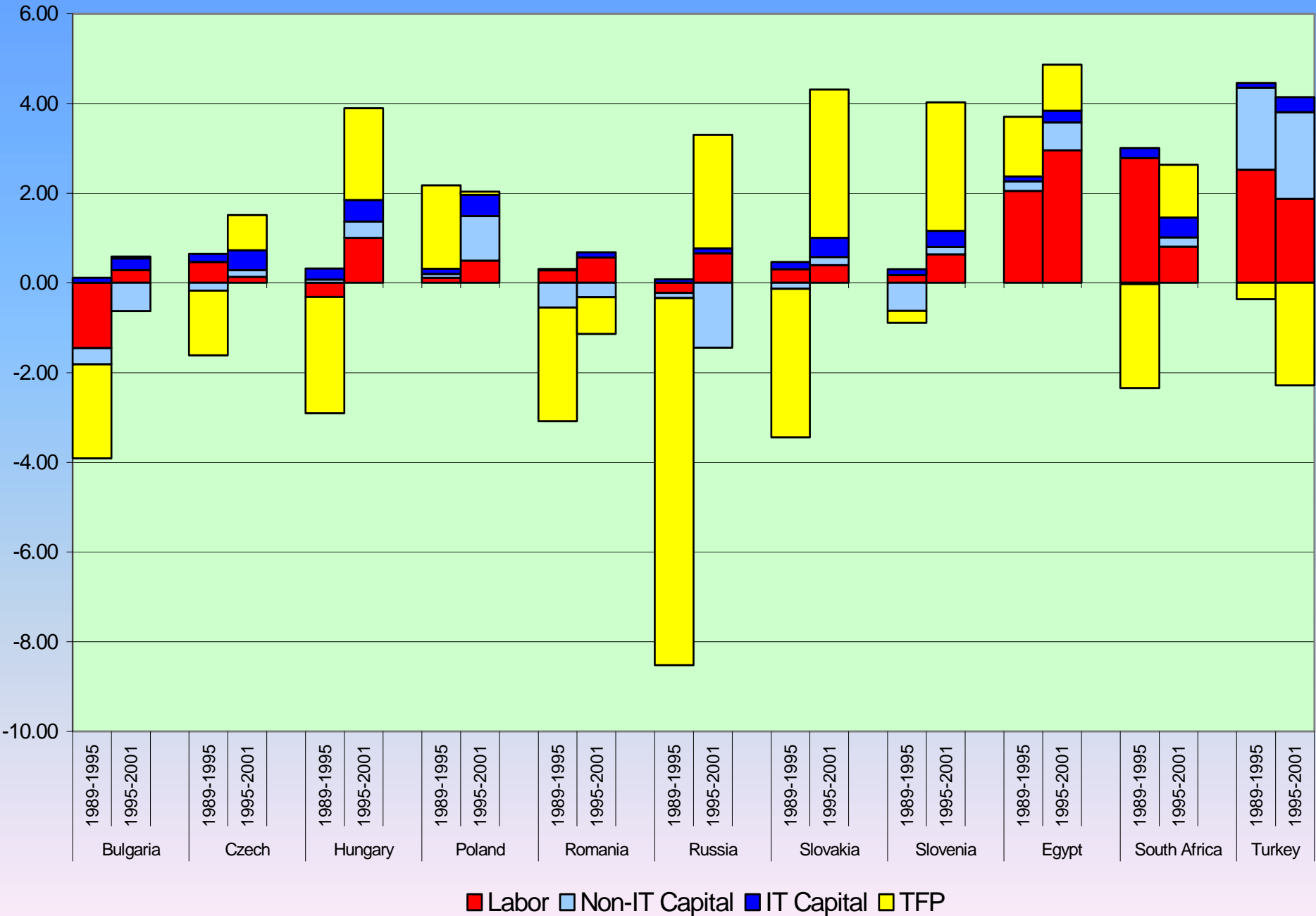
Sources of Economic Growth by Country: Developing Asia



Sources of Economic Growth by Country: Latin America

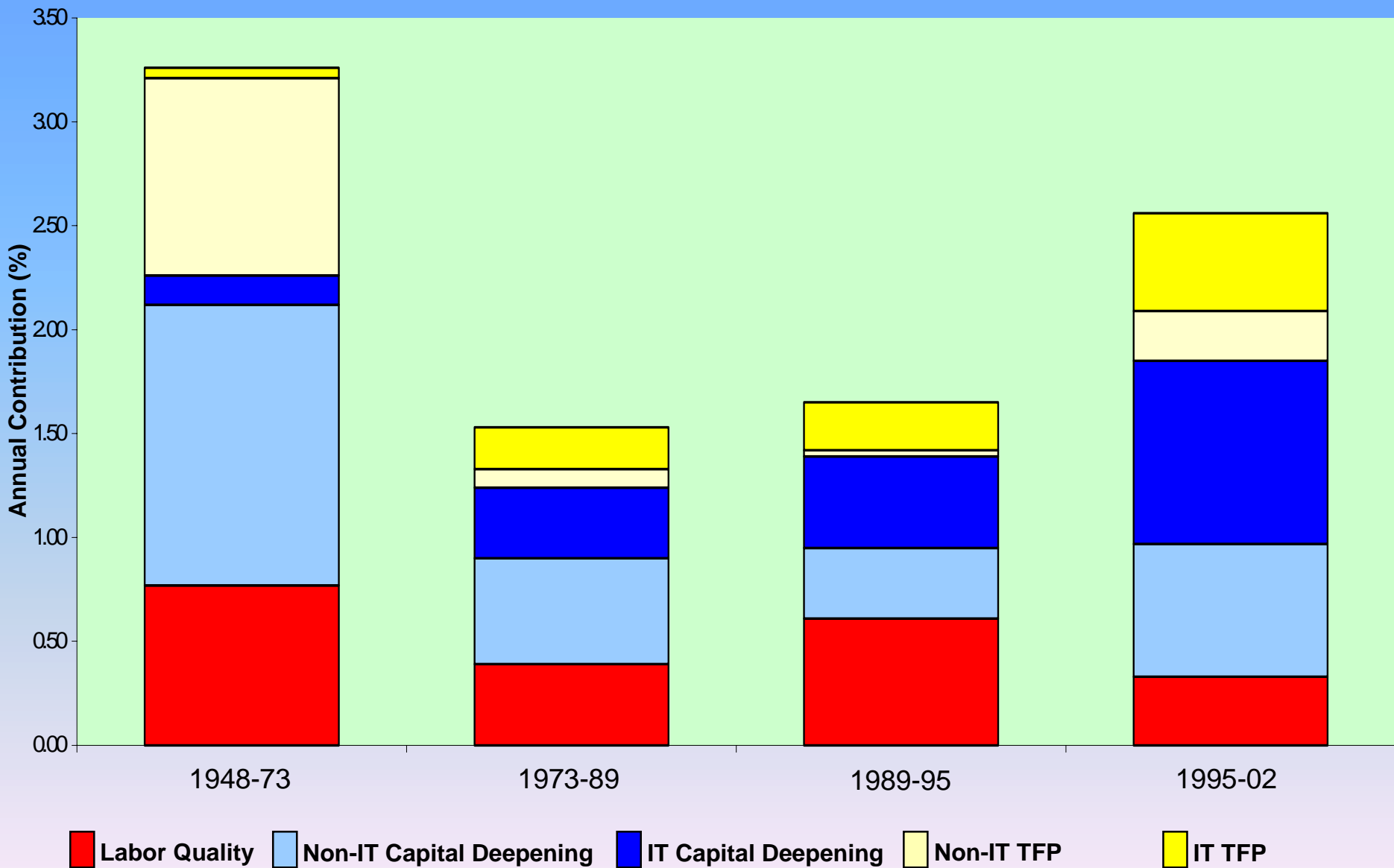


Sources of Economic Growth by Country: Eastern Europe and Other

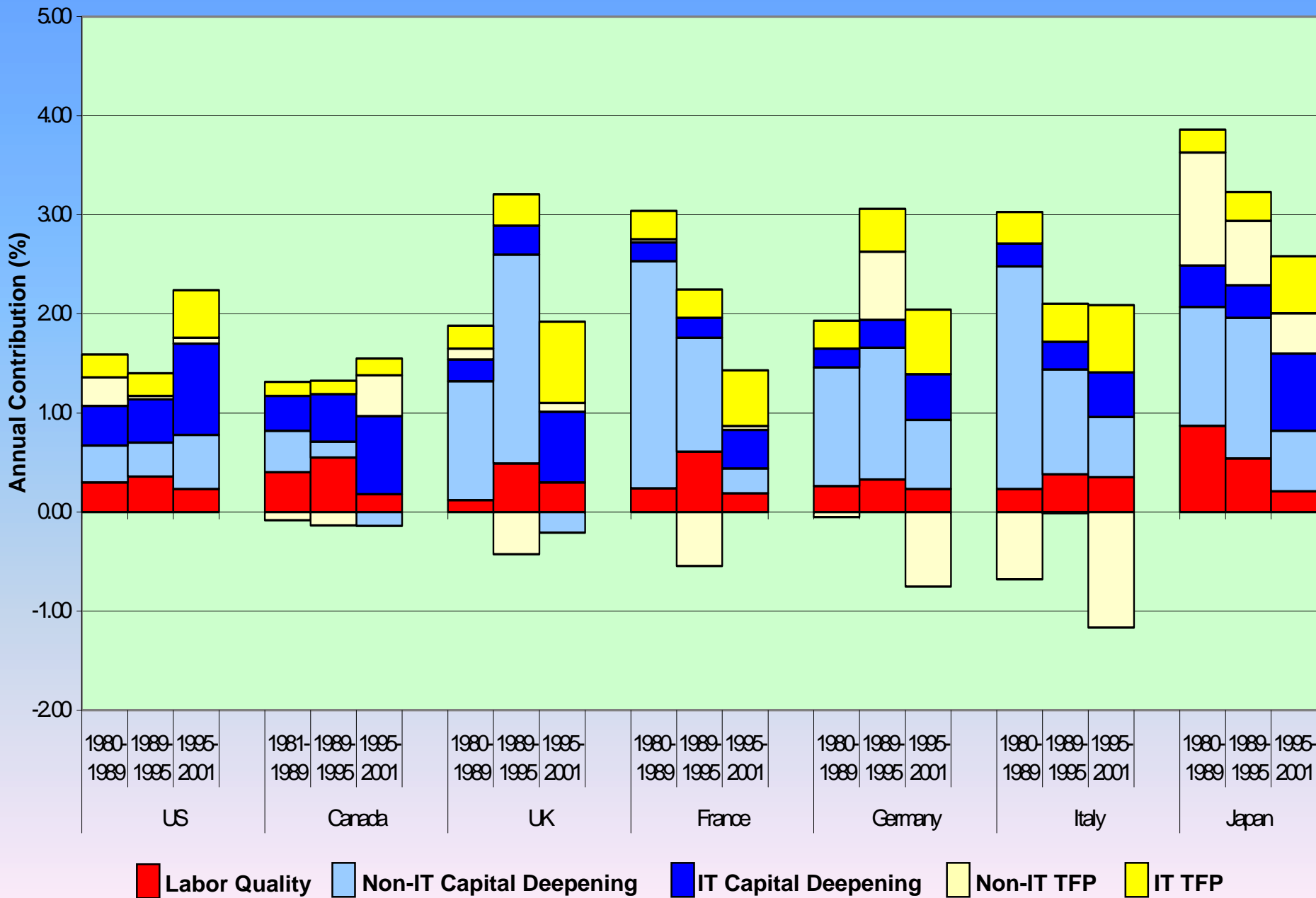


■ Labor
 ■ Non-IT Capital
 ■ IT Capital
 ■ TFP

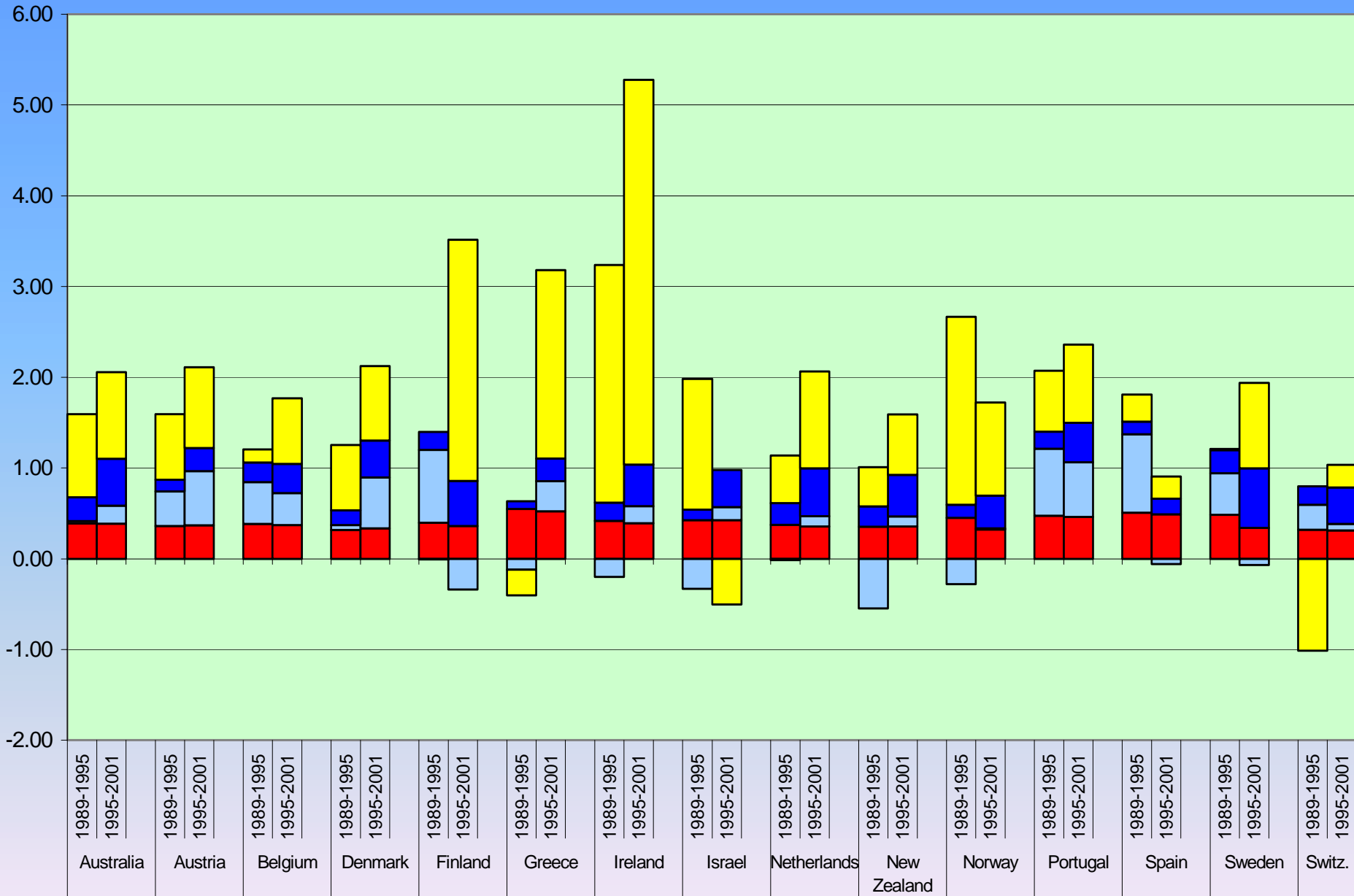
Sources of Average Labor Productivity Growth



Sources of Labor Productivity Growth by Country

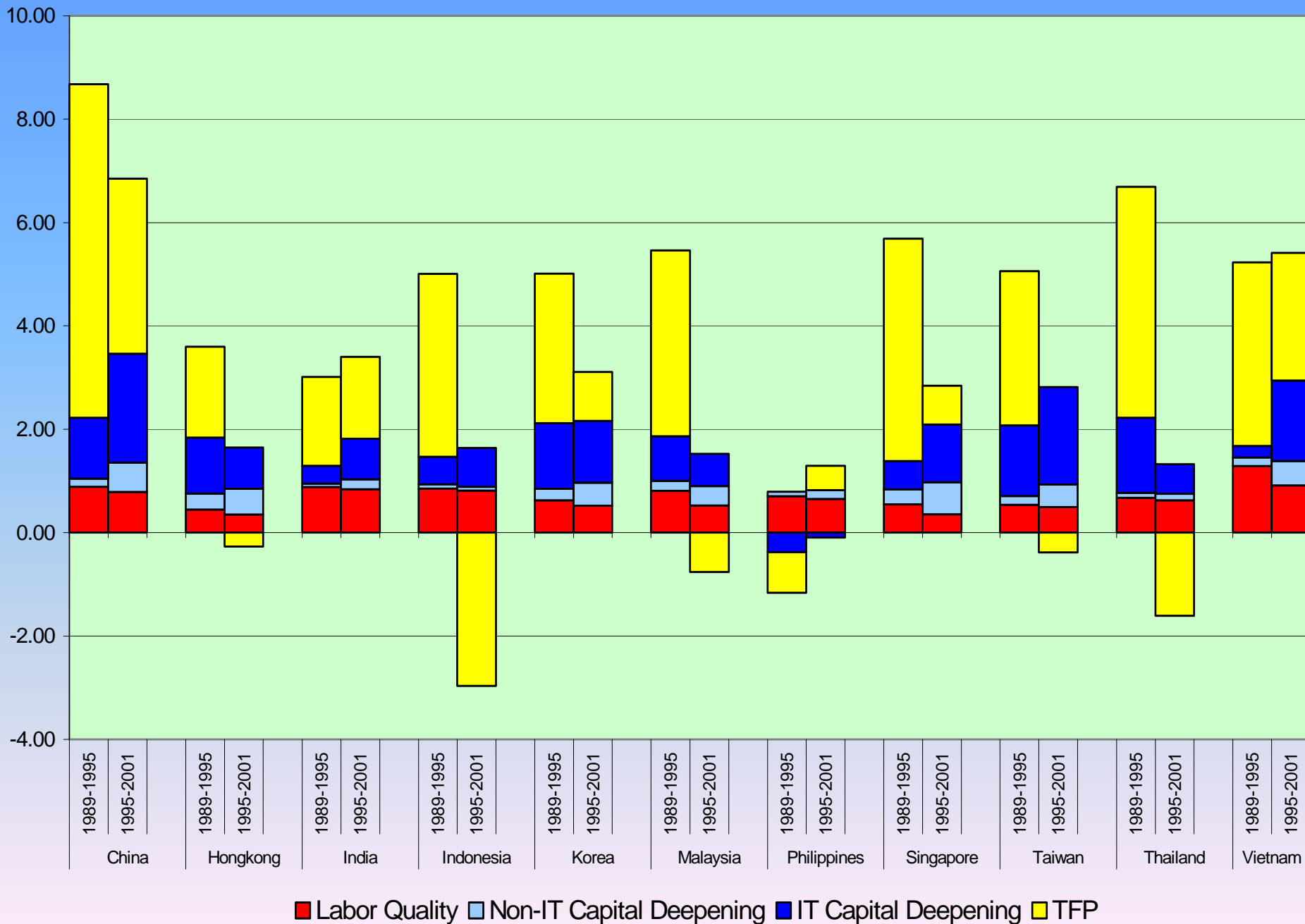


Sources of Labor Productivity Growth by Country: Non-G7 Industrialized

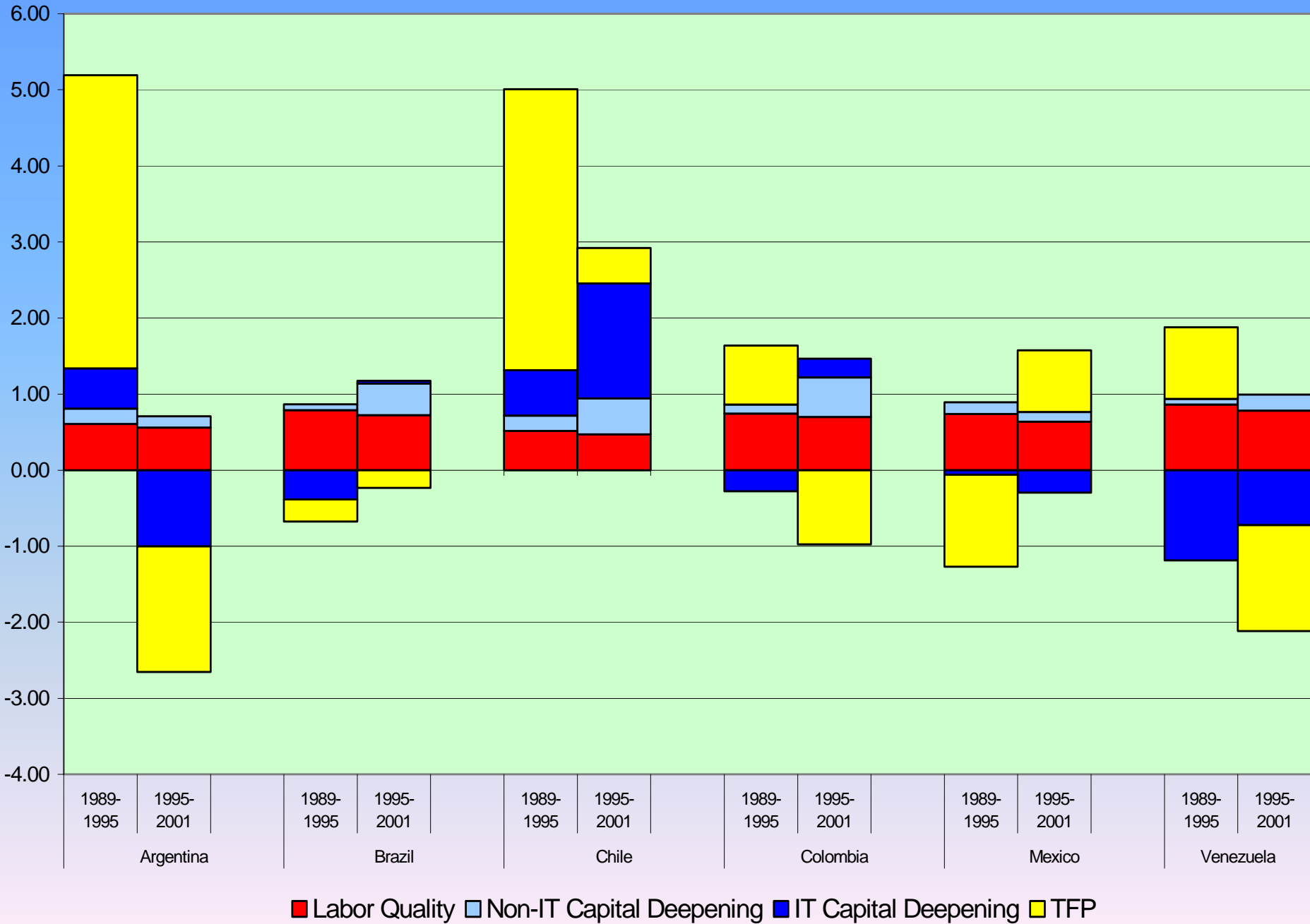


■ Labor Quality
 ■ Non-IT Capital Deepening
 ■ IT Capital Deepening
 ■ TFP

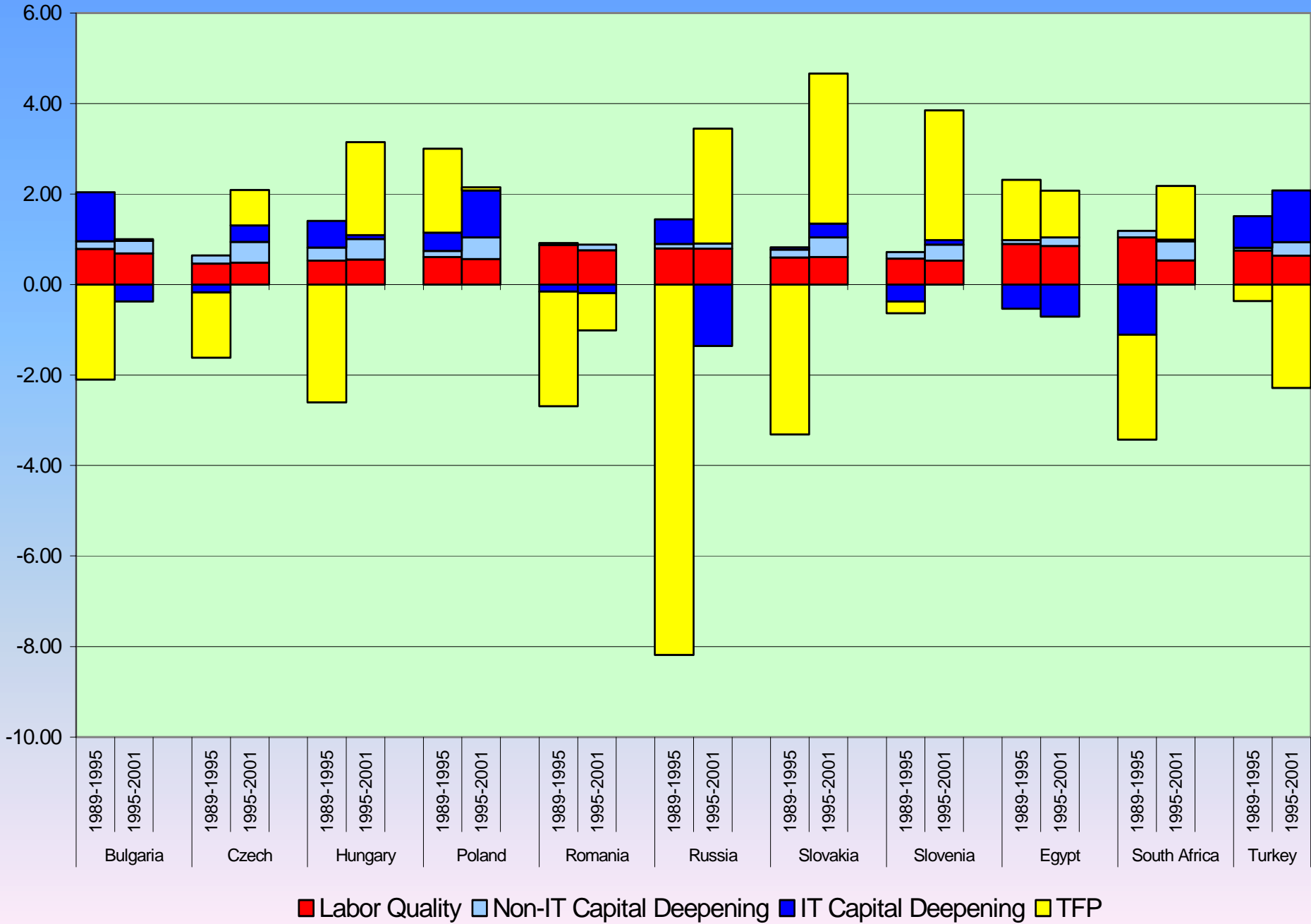
Sources of Labor Productivity Growth by Country: Developing Asia



Sources of Labor Productivity Growth by Country: Latin America



Sources of Labor Productivity Growth by Country: Eastern Europe and Other



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.