Information Technology and the World Growth Resurgence

by

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Harvard University

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Center for the Study of Innovation and Productivity

Federal Reserve Bank of San Francisco

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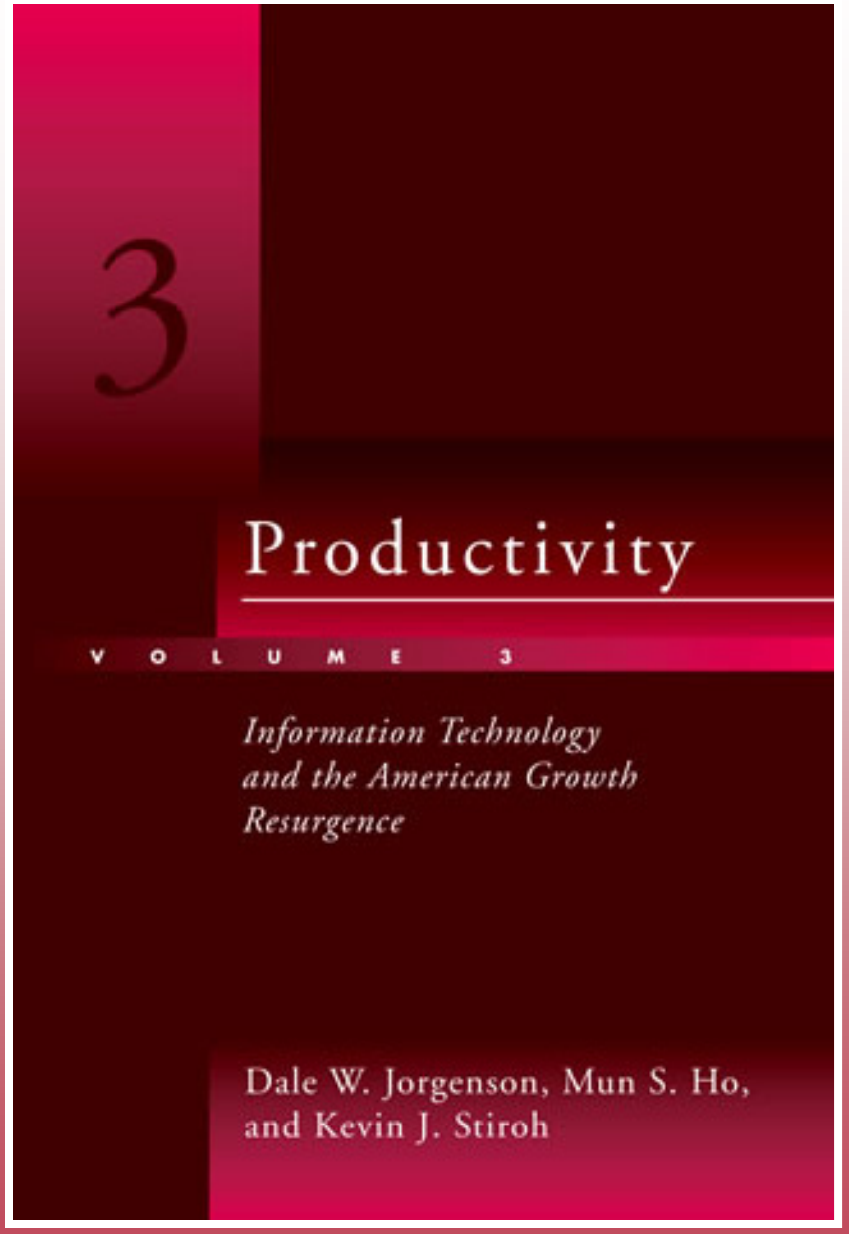
Americans can be confident that every resource is being brought to bear to address the current crisis: historical understanding, technical expertise, economic analysis, financial insight, and political leadership.

I am not suggesting the way forward will be easy, but I strongly believe that we now have the tools we need to respond with the necessary force to these challenges.

Although much work remains and more difficulties surely lie ahead, I remain confident that the American economy, with its great intrinsic vitality and aided by measures now available, will emerge from this period with renewed vigor.

Ben S. Bernanke
October 15, 2008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Productivity
VOLUME 3
Information Technology
and the American Growth
Resurgence
Dale W. Jorgenson, Mun S. Ho,
and Kevin J. Stiroh

Economic Growth in the Information Age

INTRODUCTION:

Prices of Information Technology

ROLE OF INFORMATION TECHNOLOGY:

IT Prices and the Cost of Capital

WORLD GROWTH RESURGENCE:

IT Investment and Productivity Growth

ECONOMICS ON INTERNET TIME:

The New Research Agenda

HOLDING QUALITY CONSTANT
Matched Models and Hedonics

SEMICONDUCTOR PRICE INDEXES:

Memory and Logic Chips.

COMPUTER PRICE INDEXES:

The BEA-IBM Collaboration.

COMMUNICATIONS EQUIPMENT:

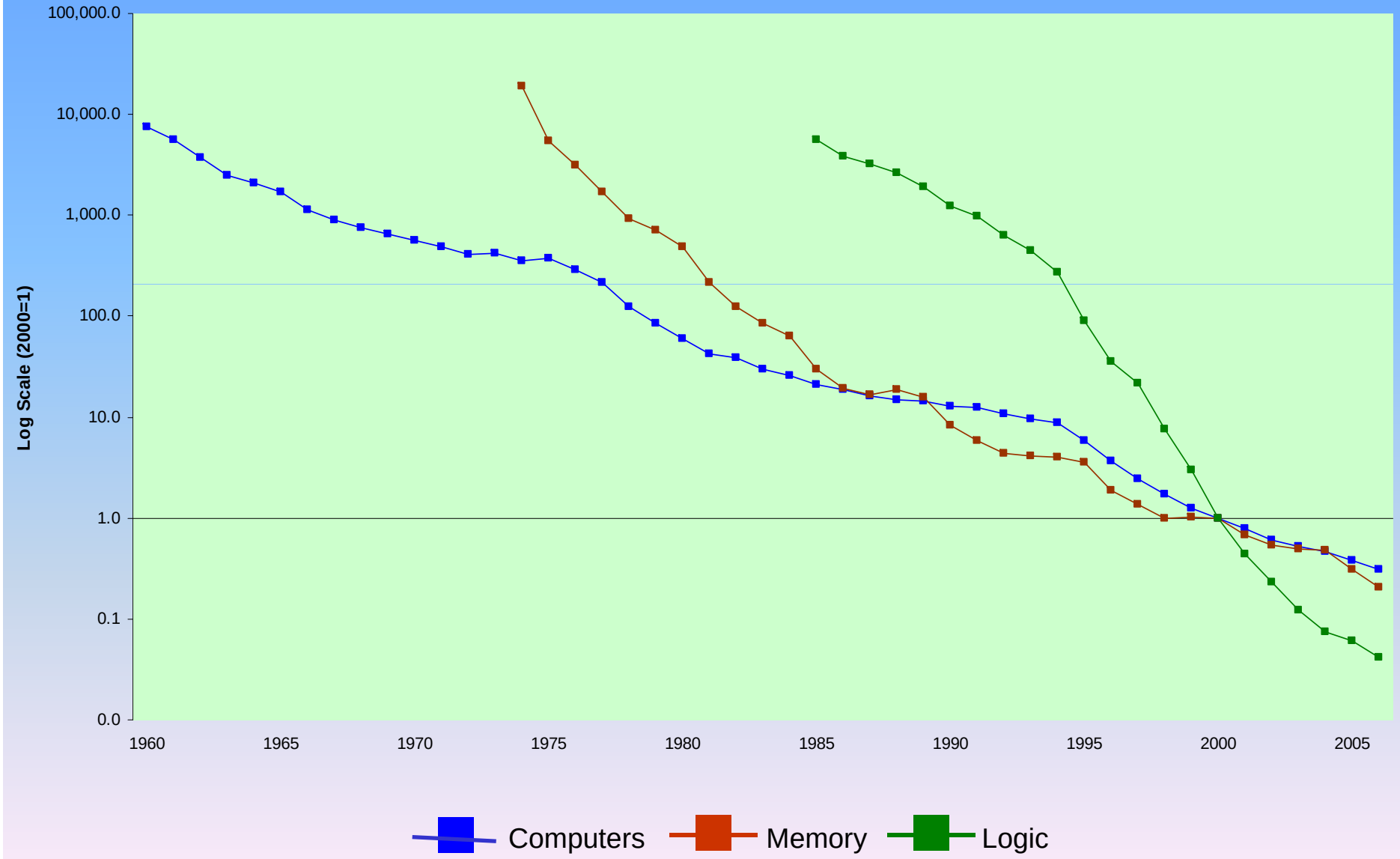
Terminal, Switching, and Transmission.

SOFTWARE:

Prepackaged, Custom, and Own-Account.

Relative Prices of Computers and Semiconductors, 1960-2006

All price indexes are divided by the output price index



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

INPUT SHARES OF IT:

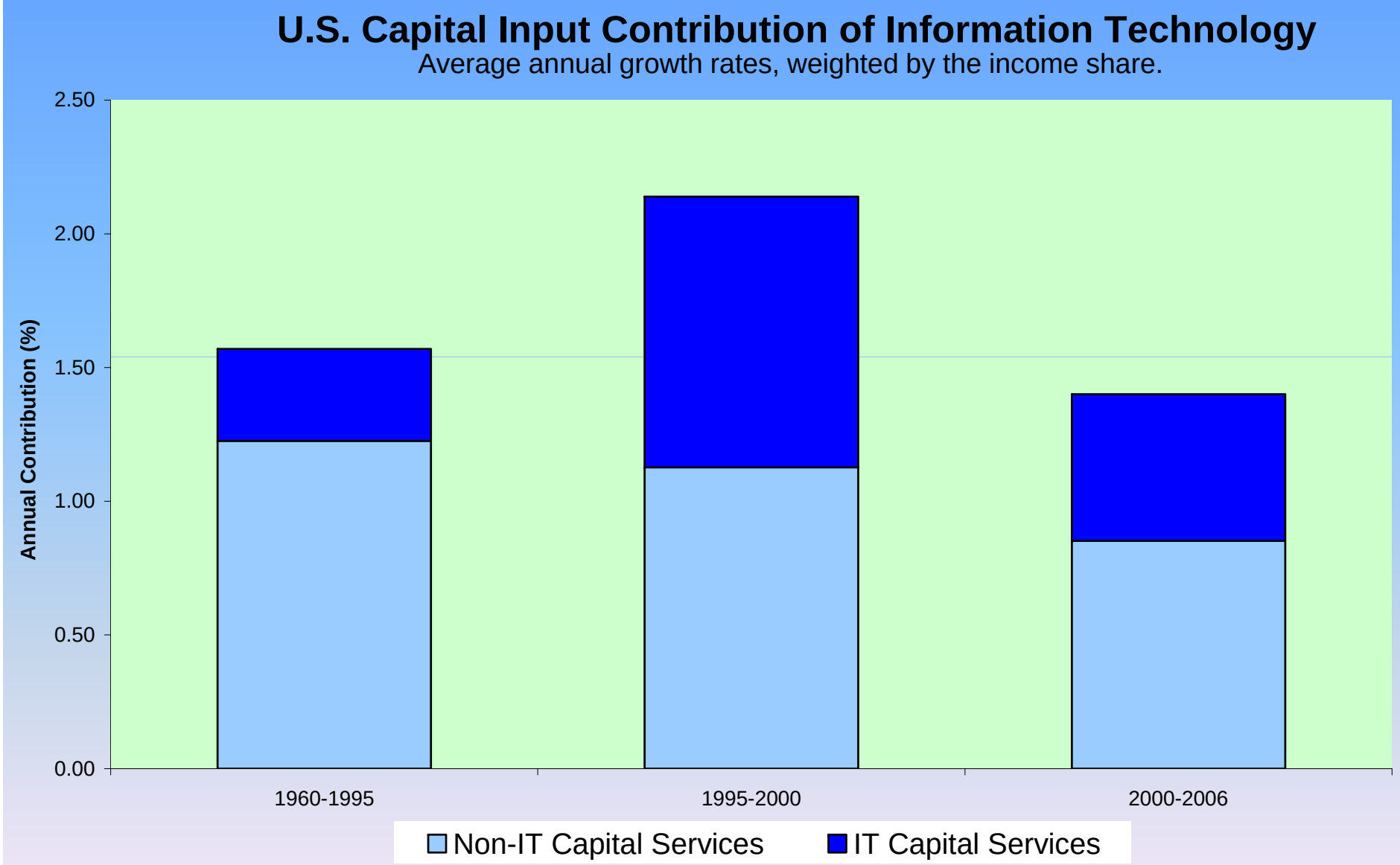
Computers, Communications Equipment, and Software.

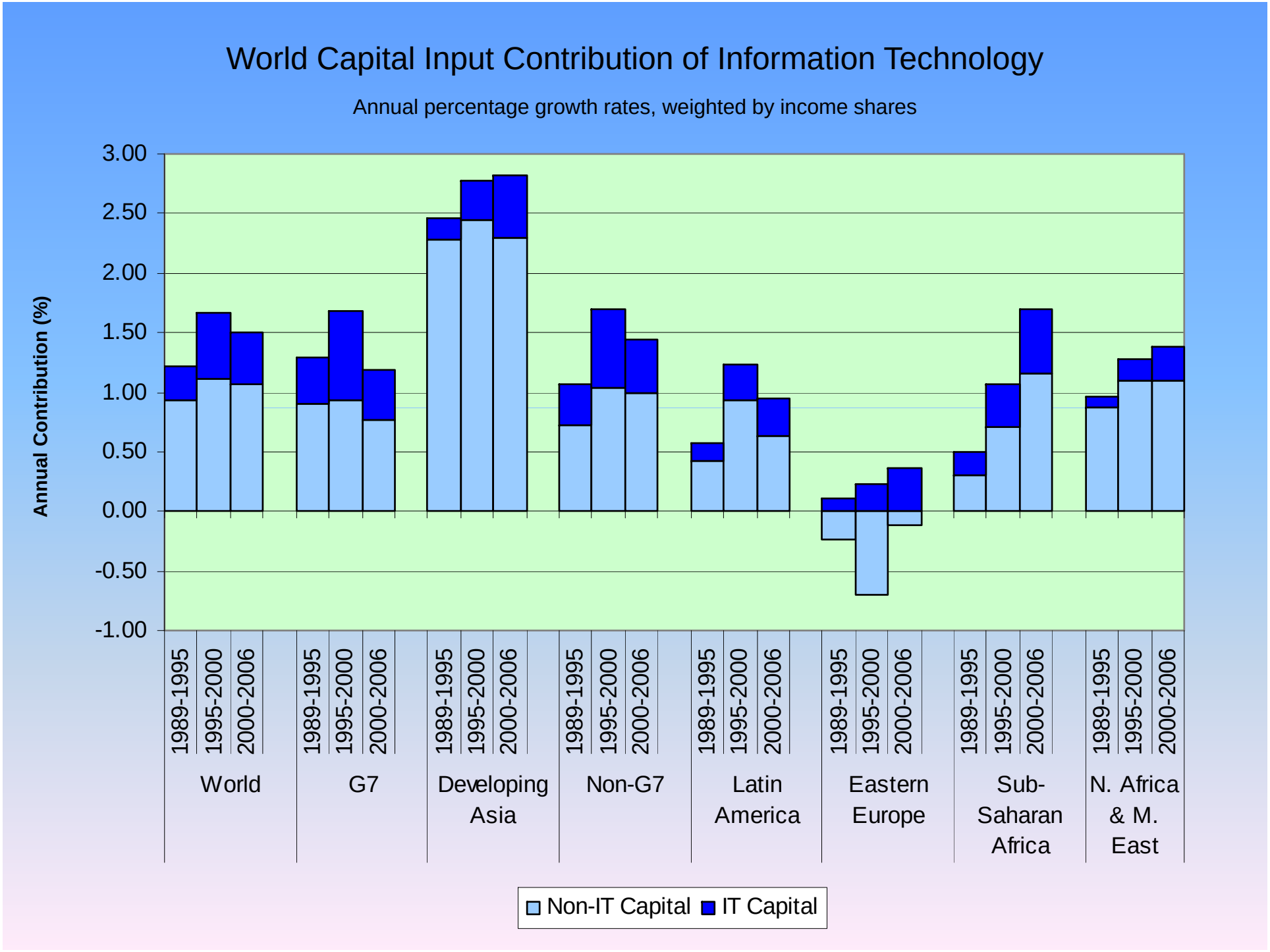
CAPITAL CONTRIBUTION:

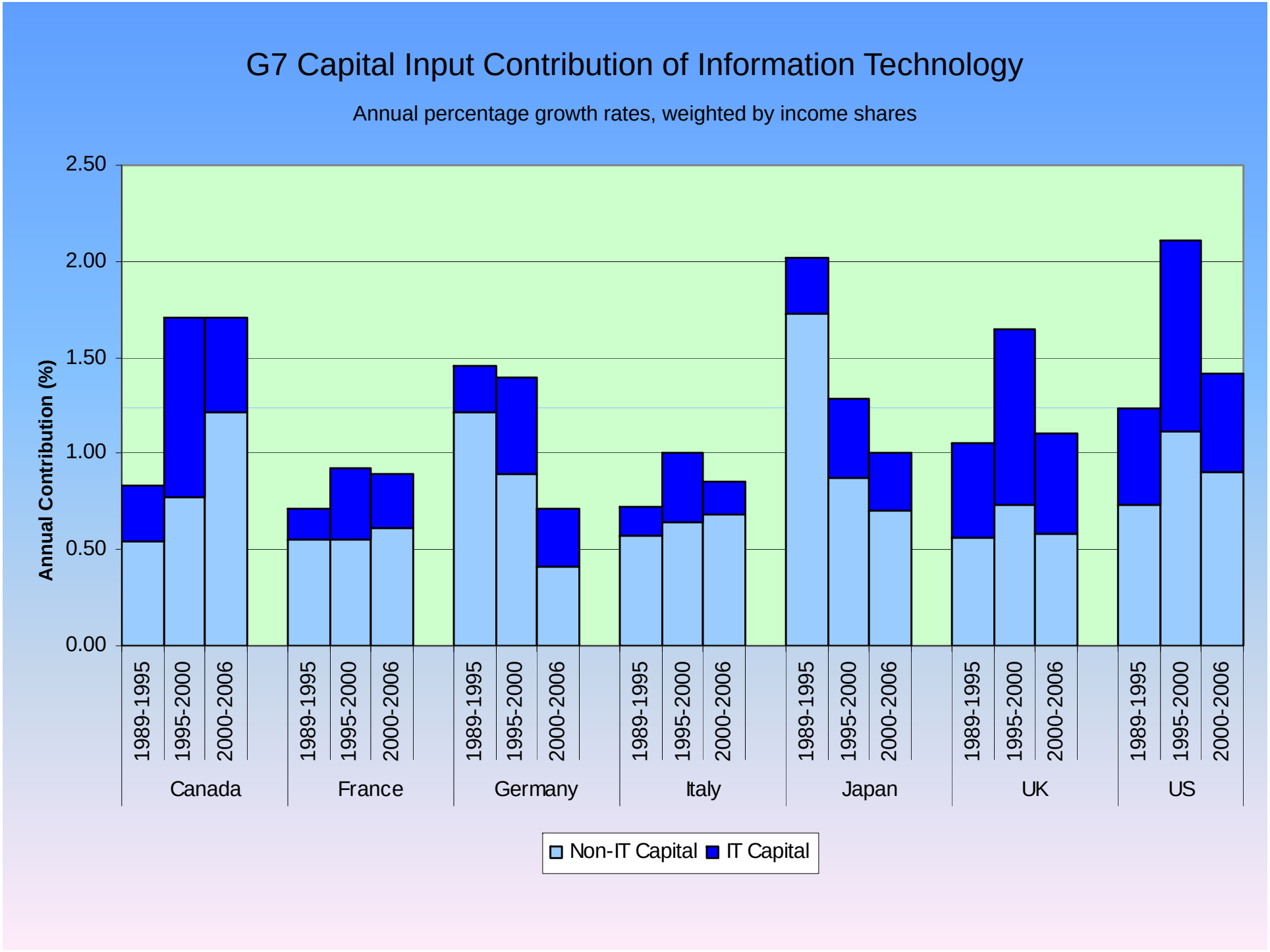
IT vs. Non-IT Capital Services.

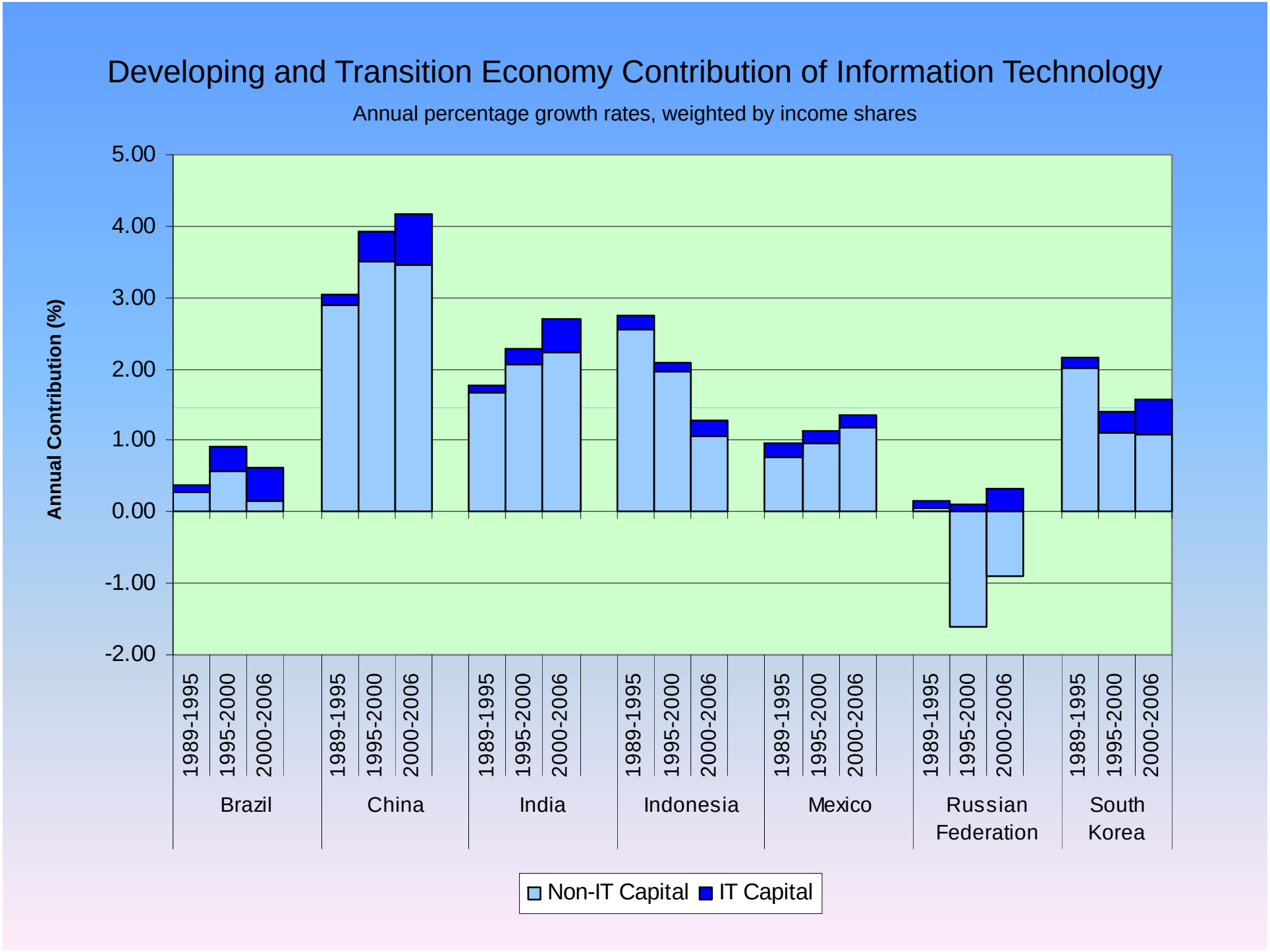
CAPITAL CONTRIBUTION BY TYPE:

Computers, Communications Equipment, and Software.


U.S. Capital Input Contribution of Information Technology
Average annual growth rates, weighted by the income share.
Annual Contribution (%)
2.50
2.00
1.50
1.00
0.50
0.00
1960-1995
1995-2000
2000-2006
Non-IT Capital Services
IT Capital Services


World Capital Input Contribution of Information Technology
Annual percentage growth rates, weighted by income shares
Annual Contribution (%)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
1989-1995
1995-2000
2000-2006
World
G7
Developing Asia
Non-G7
Latin America
Eastern Europe
Sub-Saharan Africa
N. Africa & M. East
Non-IT Capital
IT Capital


G7 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
1989-1995
1995-2000
2000-2006
Canada
France
Germany
Italy
Japan
UK
US
Non-IT Capital
IT Capital


Developing and Transition Economy Contribution of Information Technology
Annual percentage growth rates, weighted by income shares
Annual Contribution (%)
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
1989-1995
1995-2000
2000-2006
Brazil
China
India
Indonesia
Mexico
Russian Federation
South Korea
Non-IT Capital
IT Capital

WORLD GROWTH RESURGENCE:
IT Investment and Productivity Growth.

TOTAL FACTOR PRODUCTIVITY:

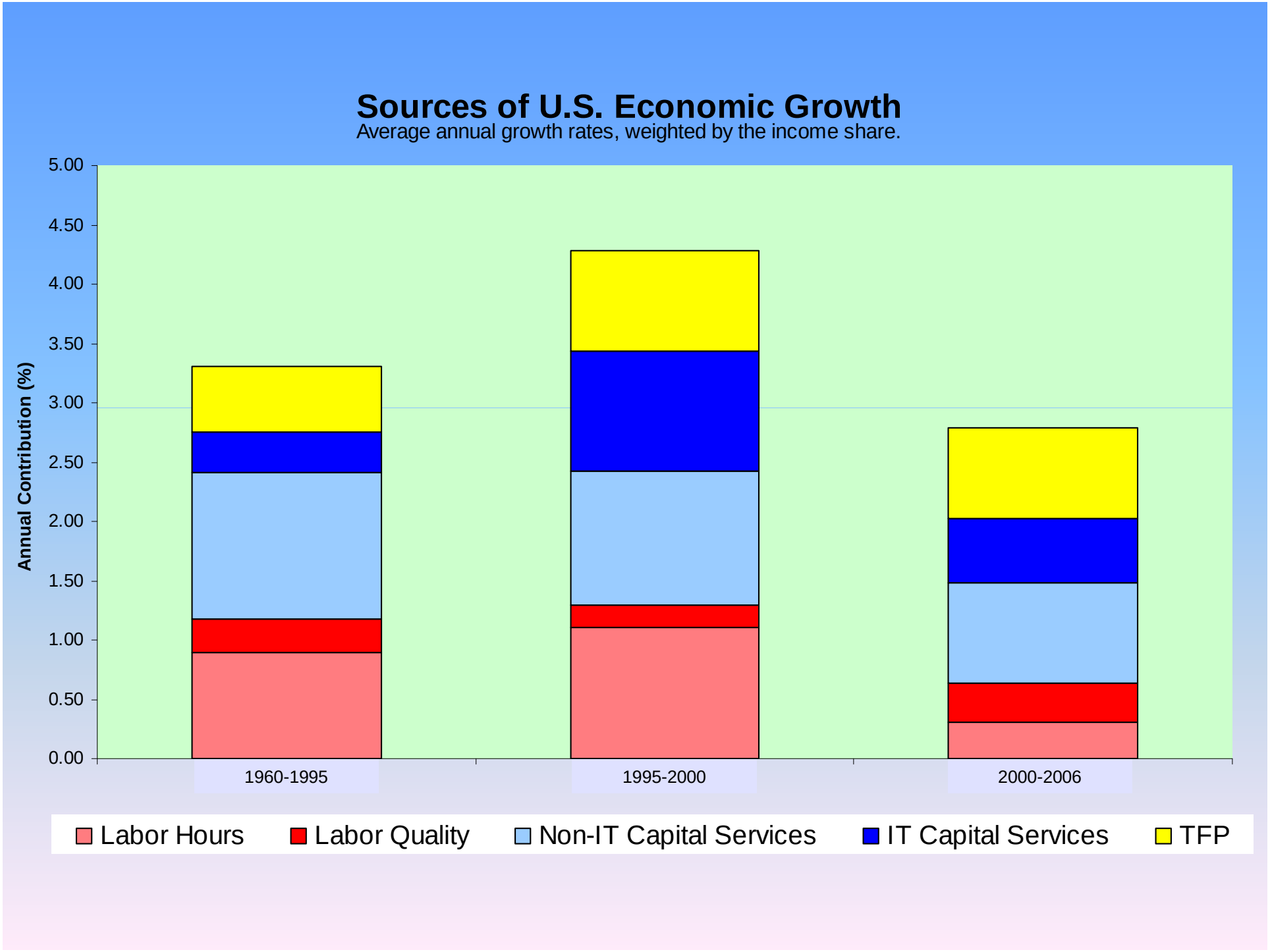
IT-Production versus Non-IT Production.

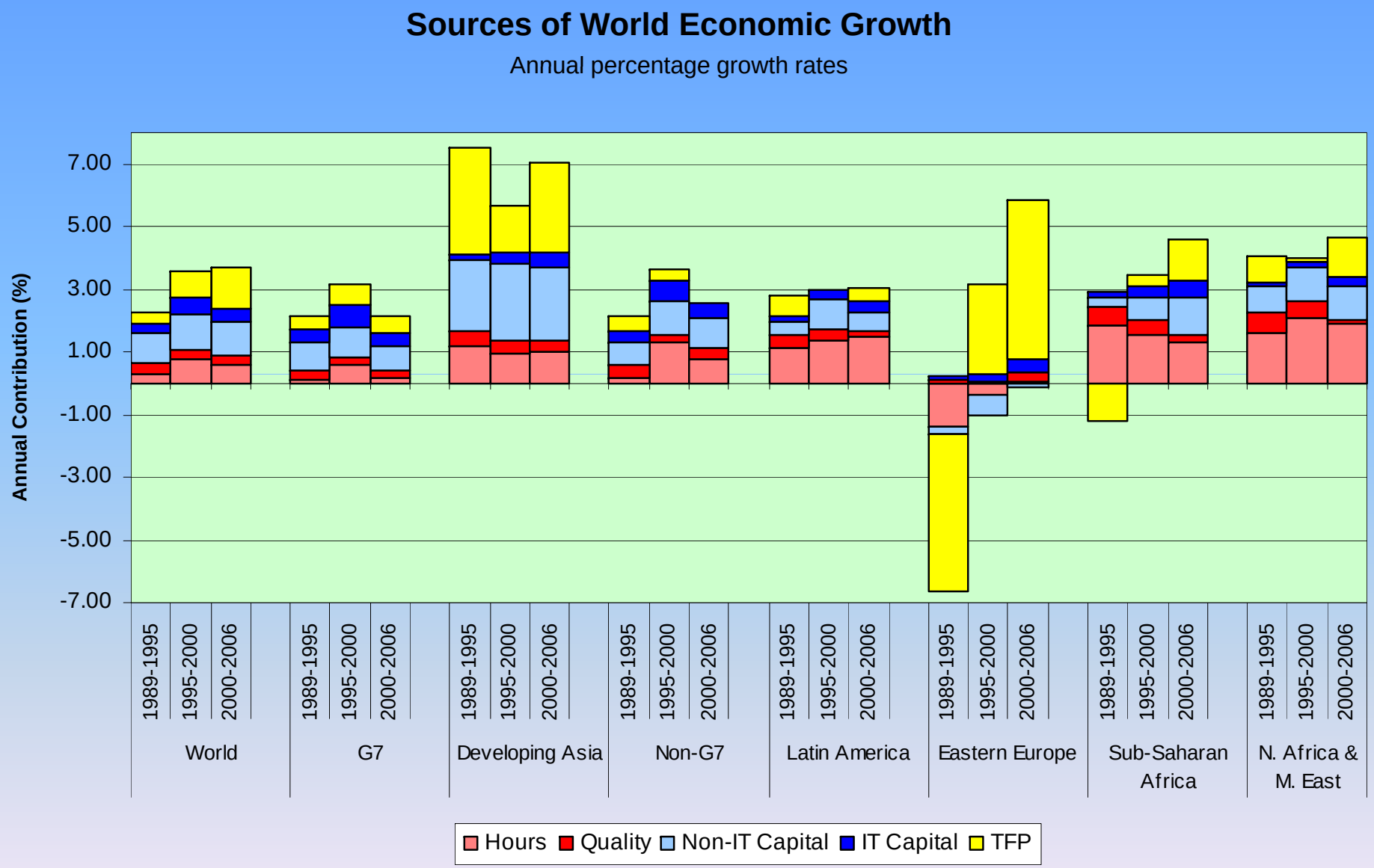
SOURCES OF ECONOMIC GROWTH:

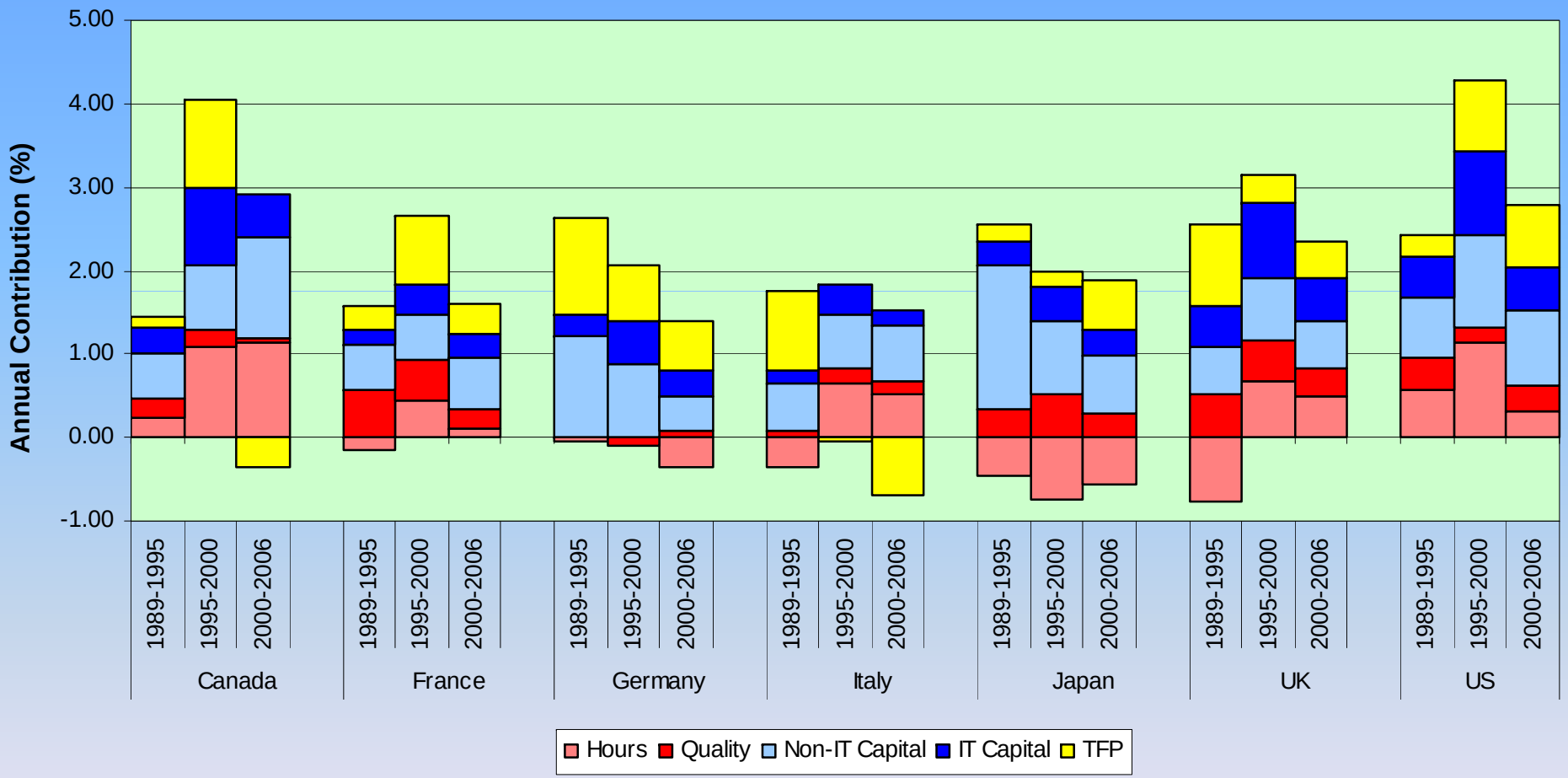
Capital Input, Labor Input, and TFP.

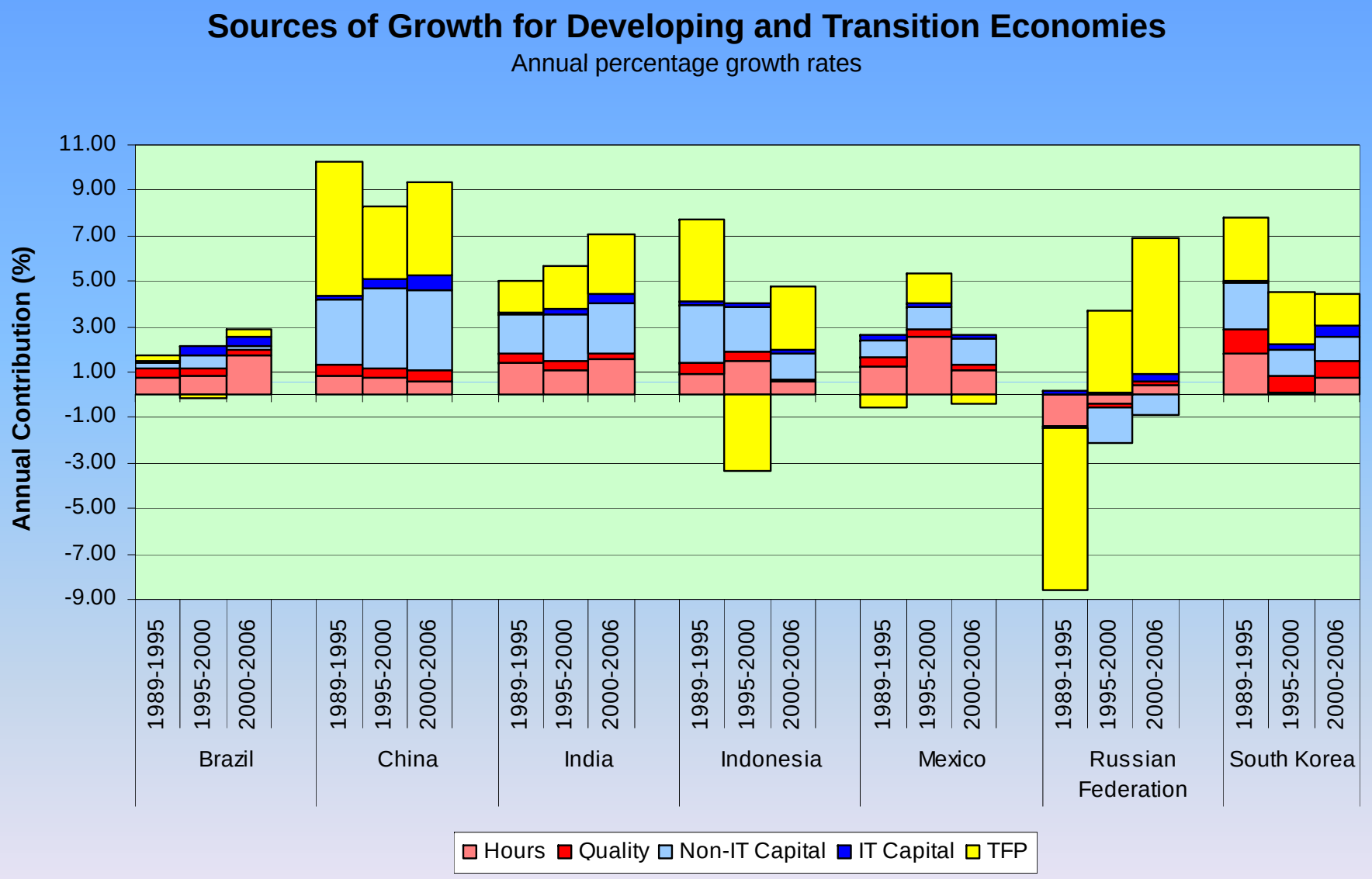
LABOR INPUT GROWTH:

Hours Worked and Labor Quality.


Sources of U.S. Economic Growth
Average annual growth rates, weighted by the income share.
Annual Contribution (%)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1960-1995
1995-2000
2000-2006
Labor Hours
Labor Quality
Non-IT Capital Services
IT Capital Services
TFP


Sources of World Economic Growth
Annual percentage growth rates
Annual Contribution (%)
7.00
5.00
3.00
1.00
-1.00
-3.00
-5.00
-7.00
1989-1995
1995-2000
2000-2006
World
G7
Developing Asia
Non-G7
Latin America
Eastern Europe
Sub-Saharan Africa
N. Africa & M. East
Hours
Quality
Non-IT Capital
IT Capital
TFP


Sources of G7 Economic Growth
Annual percentage growth rates
Annual Contribution (%)
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
1989-1995
1995-2000
2000-2006
Canada
France
Germany
Italy
Japan
UK
US
Hours
Quality
Non-IT Capital
IT Capital
TFP


Sources of Growth for Developing and Transition Economies
Annual percentage growth rates
Annual Contribution (%)
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
-3.00
-5.00
-7.00
-9.00
1989-1995
1995-2000
2000-2006
Brazil
China
India
Indonesia
Mexico
Russian Federation
South Korea
Hours
Quality
Non-IT Capital
IT Capital
TFP

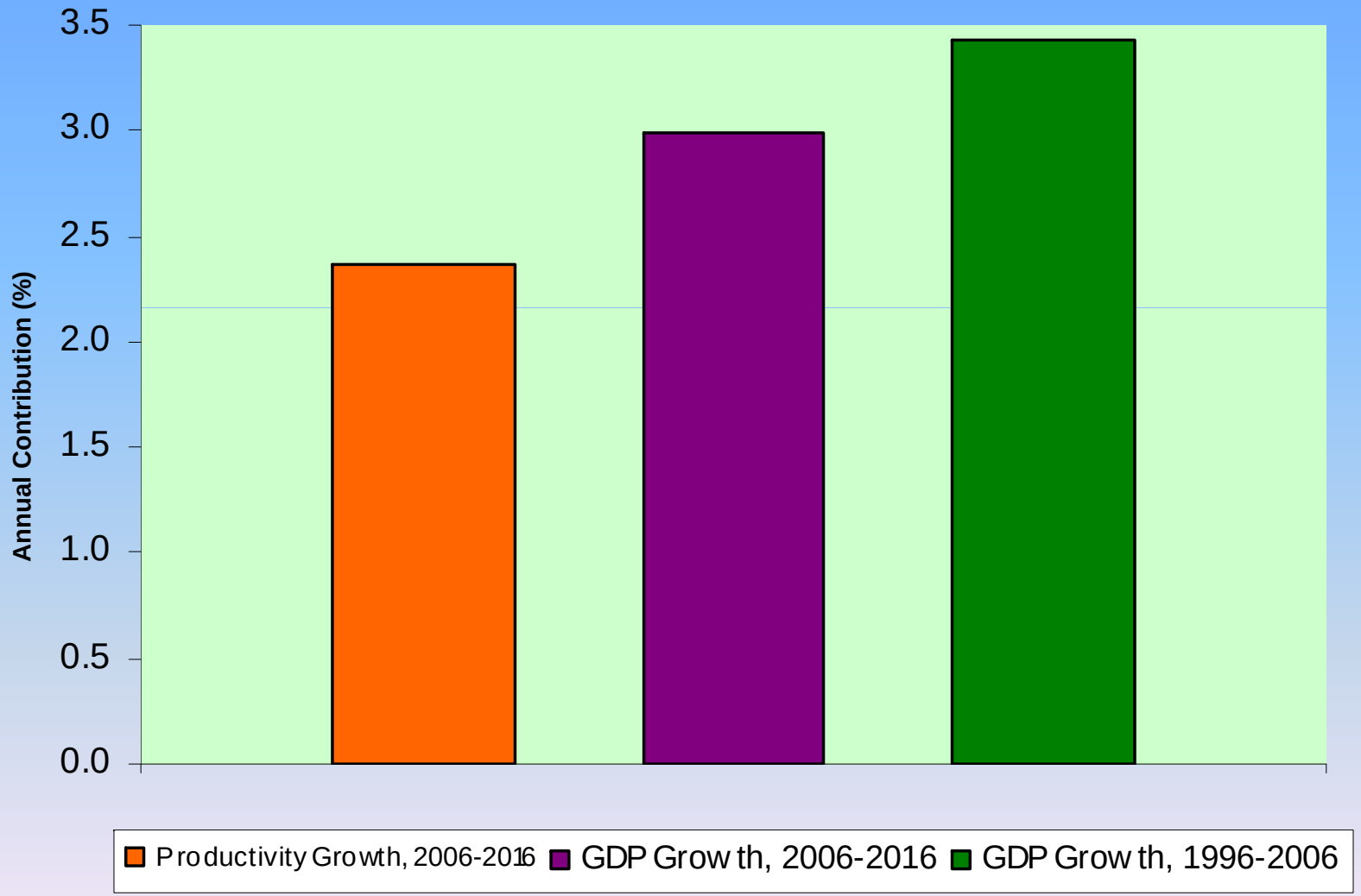
Projecting Growth of the U.S. and the World Economy

Hours Worked from Labor Force Projections;
Labor Quality from Projections of Educational Attainment

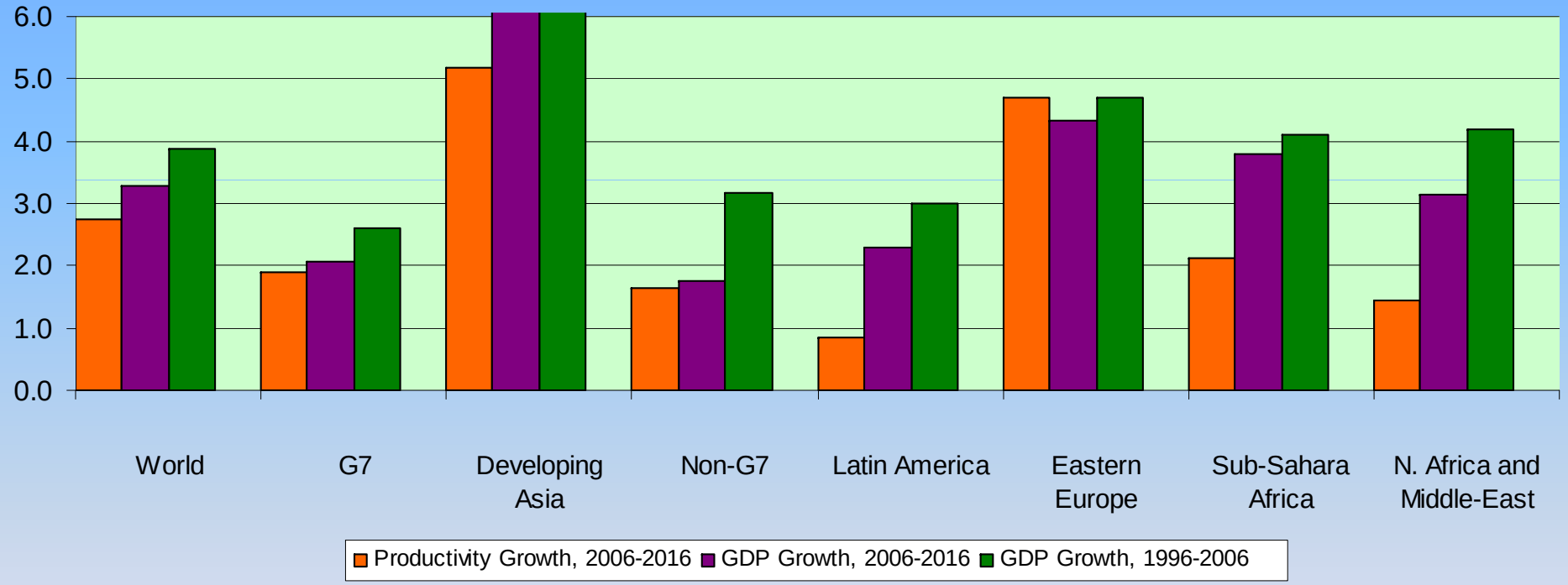
Productivity Growth from Production Possibility Frontier:
IT and Non-IT Productivity Growth, Capital Quality, and the Gap between Growth of Output and Capital

GDP Growth Is the Sum of Growth in
Hours Worked and Productivity Growth

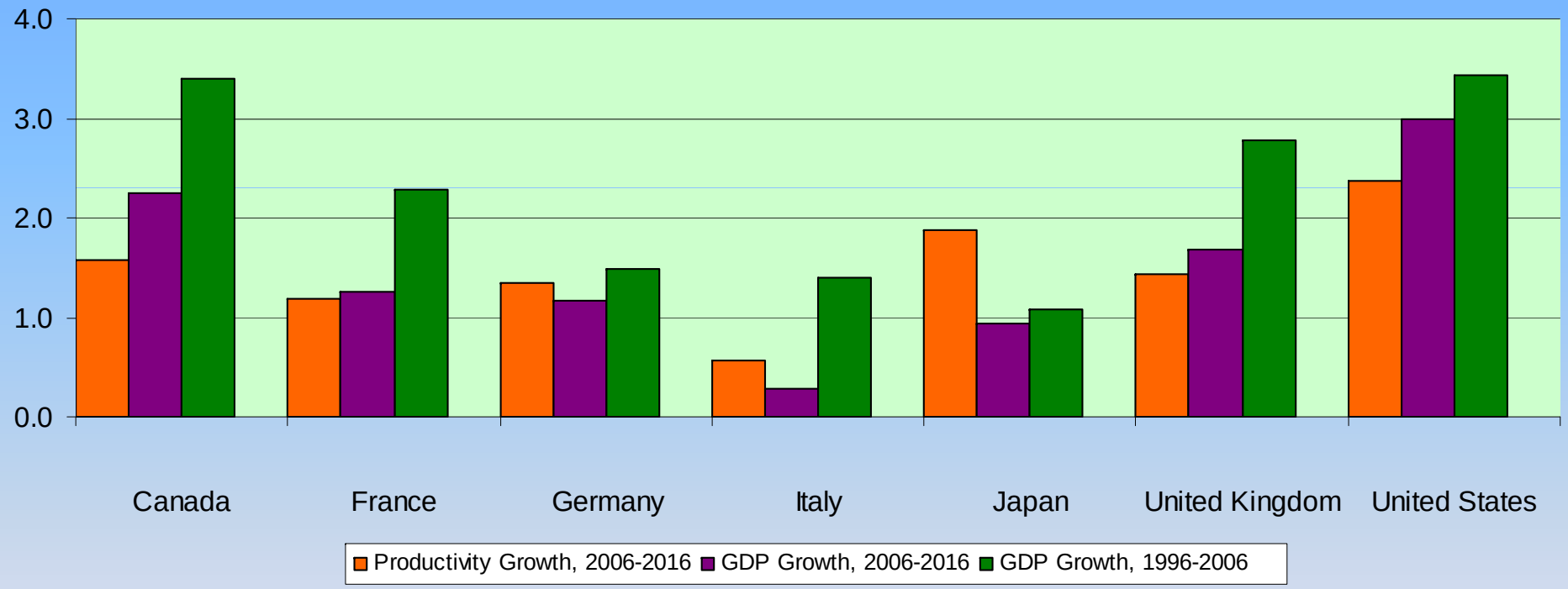
U.S. Growth Projections



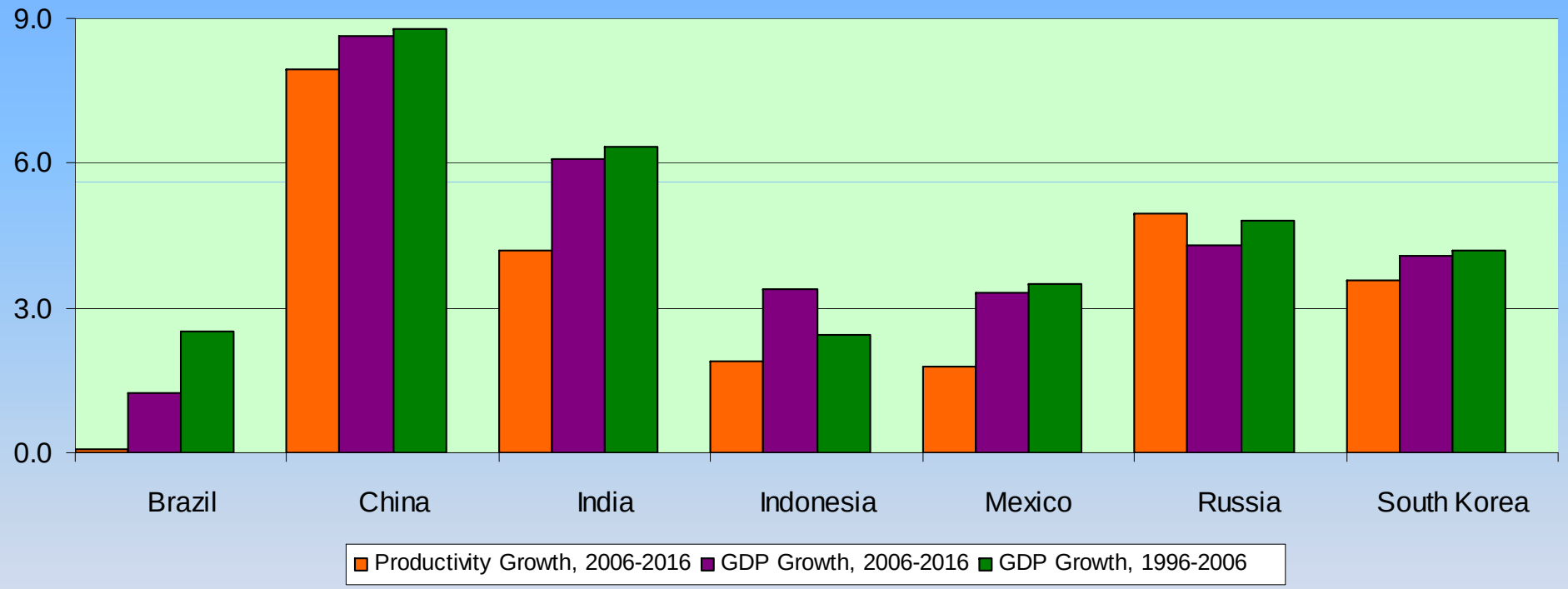
World and Major Regions: Growth Projections, 2006-2016



G7: Growth Projections, 2006-2016



Major Developing and Transition Economies: Growth Projections, 2006-2016



Economics on Internet Time
The New Research Agenda

RESEARCH ON ECONOMIC GROWTH:

Relative Importance of Investment and Productivity

OFFICIAL STATISTICS:

Implementation of a New Architecture for the National Accounts

POLICY ANALYSIS:

Potential Growth in the U.S. and the World Economy