Lessons for Japan from the U.S. Growth Resurgence

Dale W. Jorgenson
Harvard University

May 30, 2003
Three Goals of this Presentation

• Analyze the sources of recent U.S. economic growth
  – Incorporate 2002 GDP revisions
  – Evaluate the impact of information technology
    • Jorgenson, Ho, and Stiroh (2002)
    • Oliner and Sichel (2002)

• Project the potential growth of average labor productivity
  – Highlight uncertainties about IT development

• Project average labor productivity Growth for Japan
Reviewing the Historical Record

• **Fundamental Identity**
  – Growth of GDP is the sum of growth of hours worked and growth of labor productivity (GDP/hour worked)

• **Data issues**
  – Output defined as gross domestic product (GDP), including government, and household sectors
  – Headline BLS productivity figures are for the nonfarm business sector, excluding government, housing, and farm sectors

• **Compare 1995-2000 to 1973-1995**
  – Examine sources of output and labor productivity growth
  – Incorporate new and revised data on output, investment, and labor input
Hours and Labor Productivity
Accelerated after 1995

1973-1995

- Hours: 1.44
- Labor Productivity: 1.33

1995-2000

- Hours: 1.99
- Labor Productivity: 2.07
Three Sources of Labor Productivity Growth

• **Capital deepening**
  – Investment provides more and better capital to workers.

• **Labor quality growth**
  – Increase in the proportion of more productive workers.

• **Total factor productivity (TFP) growth**
  – TFP defined as output per unit of capital and labor inputs.
What Changed after 1995?

- **Capital deepening increased**
  - IT capital input accelerated.
  - Non-IT capital input decelerated.
Stronger IT Capital Deepening

Average annual share-weighted growth rate.
What Changed after 1995?

- **Capital deepening increased**
  - IT capital input accelerated
  - Non-IT capital input decelerated

- **Labor quality growth slowed**
  - Unemployment rate plummeted
  - Labor force participation rate increased
Labor Quality Contribution Slowed

Average annual share-weighted growth rate.
What Changed after 1995?

• **Capital deepening increased**
  – IT capital input accelerated
  – Non-IT capital input decelerated

• **Labor quality slowed**
  – Unemployment rate plummeted
  – Labor force participation rate increased

• **TFP growth accelerated**
  – Productivity in IT production rose
  – Productivity in Non-IT production also rose
Faster TFP Growth

Average annual share-weighted growth rate.
IT Drove the U.S. Productivity Revival

1995-2000
Less
1973-1995

Growth in Labor Productivity

- 0.74

Capital Deepening, IT- Inputs
0.50

Capital Deepening, Other
-0.06

Labor Quality
-0.06

TFP, IT- Production
0.24

TFP, Other
0.12
Projecting Productivity Growth

• Two key assumptions to remove transitory effects
  – Output and reproducible capital grow at the same rate
  – Hours growth matches labor force growth

• Three scenarios
  – Pessimistic
  – Base Case
  – Optimistic
Two Sets of Assumptions

• Alternative assumptions vary across scenarios
  – TFP growth in IT production
  – TFP growth elsewhere in the economy
  – Capital quality growth

• Common assumptions in all scenarios
  – Hours and labor quality growth from demographic projections
  – Capital, labor, and IT output shares at historical averages
Calibrating Alternative Assumptions

• Base Case scenario
  – “International Technology Roadmap for Semiconductors”
    • Eventual reversion to 3-year product cycle
  – Use 1990-2000 averages
Calibrating Alternative Assumptions

- **Base Case scenario**
  - "International Technology Roadmap for Semiconductors"
    - Eventual reversion to 3-year product cycle
  - Use 1990-2000 averages

- **Optimistic scenario**
  - Continuation of the 2-year product cycle
  - 1995-2000 averages continue
Calibrating Alternative Assumptions

• **Base Case scenario**
  – “International Technology Roadmap for Semiconductors”
    • Eventual reversion to 3-year product cycle
  – Use 1990-2000 averages

• **Optimistic scenario**
  – Continuation of the 2-year product cycle
  – 1995-2000 averages continue

• **Pessimistic scenario**
  – Revert to 1973-1995 averages
Average annual percentage.
Other TFP Contribution

1995-2001 Pessimistic Base Case Optimistic

Average annual percentage.
Capital Quality Growth

Average annual percentage.
Putting it All Together

• Demographic projections put hours growth at 1.0% per year in all scenarios
Slower Hours Growth

Average annual growth rate.
Putting it All Together

• Demographic assumptions put hours growth at 1.0% per year in all scenarios

• Labor quality growth continues to slow
  – 0.157% in all scenarios
Slower Labor Quality Growth

Average annual growth rate.

- 1995-2001: 0.381
- Pessimistic: 0.157
- Base Case: 0.157
- Optimistic: 0.157
Putting it All Together

• Demographic assumptions put hours growth at 1.0% per year in all scenarios

• Labor quality growth continues to slow – 0.157% in all scenarios

• Alternative assumptions about capital quality and TFP growth – Pessimistic, Base Case, and Optimistic
Range of Labor Productivity Projections

1995-2001

2.02

0.39

1.40

2.02 Average annual share weighted growth rate.

Pessimistic

1.14

0.37

0.68

1.14

Base Case

1.78

0.48

1.21

1.78

Optimistic

2.38

0.60

1.69

2.38

Labor Quality
Capital Deepening
TFP

Average annual share weighted growth rate.
Range of Output Projections

1995-2001

Hours  Labor Productivity

Pessimistic Base Case

1995-2001

3.55

1.53

2.02

1.14

2.14

1.00

2.78

1.00

3.36

2.38

Average annual growth rate.
Projection Summary

- Base Case productivity below 1995-2000, due to slower capital deepening, and less labor quality growth

- Slower output growth due to reduced growth in hours and labor productivity

- Future of information technology is the key
  - Drives IT-related TFP and capital quality growth
  - Considerable uncertainty remains
Lessons For Japan

• Demographic assumptions put hours growth at –0.55% per year in all scenarios

• Labor quality growth continues to rise at 0.49%, the average for 1995-2000, in all scenarios

• Alternative assumptions about capital quality and TFP growth – Pessimistic, Base Case, and Optimistic
Alternative Assumptions

• Base Case scenario
  – Use 1980-1995 averages

• Optimistic scenario
  – Revert to 1995-2000 averages

• Pessimistic scenario
  – 1990-2000 averages continue
Average annual share weighted growth rate.
Range of Output Projections (Japan)

1995-2000

Pessimistic Base Case Optimistic

Averaged annual growth rate: Hours Labor Productivity

-0.71 -0.55 -0.55 -0.55
2.84 1.73 2.27 2.44

-1.0 0.0 1.0 2.0 3.0 4.0 5.0

-1.0 0.0 1.0 2.0 3.0 4.0 5.0
Conclusions

• Labor productivity growth for the U.S. will be lower than 1995-2000, but higher than 1973-1995.

• Labor productivity growth for Japan will also be lower than 1995-2000, and lower than 1980-1995.

• Output growth for the U.S. will be considerably lower than 1995-2000, and about the same as 1973-1995.

• Output growth for Japan will be lower than 1995-2000, and lower than 1980-1995.