Lessons for Japan from the U.S. Growth Resurgence

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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

- Hours 1973-1995: 1.44
- Hours 1995-2000: 1.33
- Labor Productivity 1995-2000: 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**
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  – Continuation of the 2-year product cycle
  – 1995-2000 averages continue
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• Optimistic scenario
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  – 1995-2000 averages continue

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

Average annual percentage.

1995-2001

Pessimistic Base Case

Optimistic

-0.01

0.06

0.11

0.17
Capital Quality Growth

Average annual percentage.

- 1995-2001: 2.45%
- Pessimistic: 0.88%
- Base Case: 1.63%
- Optimistic: 2.30%
Putting it All Together

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

Average annual growth rate.

1995-2001: 1.53
Pessimistic: 1.00
Base Case: 1.00
Optimistic: 1.00
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.
Putting it All Together

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

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• Alternative assumptions about capital quality and TFP growth – Pessimistic, Base Case, and Optimistic
Average annual share weighted growth rate.
Range of Output Projections

<table>
<thead>
<tr>
<th>Year Range</th>
<th>1995-2001</th>
<th>Pessimistic Base Case</th>
<th>Optimistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>1.53</td>
<td>1.14</td>
<td>1.00</td>
</tr>
<tr>
<td>Labor Productivity</td>
<td>2.02</td>
<td>2.14</td>
<td>2.78</td>
</tr>
<tr>
<td>Average annual growth rate.</td>
<td>3.55</td>
<td>2.14</td>
<td>3.36</td>
</tr>
</tbody>
</table>

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
Range of Labor Productivity Projections (Japan)

1995-2000: 2.84
- Labor Quality: 1.08
- Capital Deepening: 1.47
- TFP: 0.29

Pessimistic: 2.27
- Labor Quality: 1.08
- Capital Deepening: 0.82
- TFP: 0.58

Base Case: 1.73
- Labor Quality: 1.07
- Capital Deepening: 0.28
- TFP: 0.58

Optimistic: 2.44
- Labor Quality: 1.08
- Capital Deepening: 0.28
- TFP: 0.28

Average annual share weighted growth rate.
Range of Output Projections (Japan)

1995-2000

Pessimistic Base Case Optimistic

Average annual growth rate. Hours Labor Productivity
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.