Determinants of Washington’s 21st Century Workforce and Economy

Theo S. Eicher,
Department of Economics, University of Washington

Washington Legislative Briefing, November 15, 2005
Today’s Topic

- How has the structure of the economy changed in the 21st Century?

- How do structural changes impact the workforce and education (supply and demand)
  - Higher Education
  - K 12
What’s different in the 21st Century?

“New Economy” – What is it?
- Information technology (IT)
- Globalization
- Deregulation

“New Economy” – How do we measure it?
- Accelerated Productivity Growth (output/hour worked)
  ➡️ Productivity determines our standard of living!
You can expect wages to rise AT MOST by the rate of productivity growth
Productivity Eras

- 4-quarter growth in nonfarm business labor productivity.

1973-1995 = 1.5%

1995-2005 = 3.0%
What Caused Productivity Increases?

Case Study: US Economy After 1995

- Growth rate of the standard of living doubled!
- 50% of that increase was only due to IT!

How can that be?

Jorgenson, 2002
Dramatic Differences In Productivity Increases Across Industries

This is Reflected in Personal Income and Employment In Washington State
(% of total)

Retail
- Employment: 11.0%
- Personal Income: 5.4%

Information
- Employment: 2.8%
- Personal Income: 5.6%

BEA 2004.3
This is Reflected in Personal Income and Employment In Washington State

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Information
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Who lands these high income jobs?
Higher Learning = Higher Earning & Employment

UNEMPLOYMENT RATE IN 2001

- PROFESSIONAL DEGREE: 1.2%
- DOCTORATE: 1.1%
- MASTER’S DEGREE: 2.1%
- BACHELOR’S DEGREE: 2.5%
- ASSOCIATE DEGREE: 2.9%
- SOME COLLEGE NO DEGREE: 3.5%
- HIGH SCHOOL GRADUATE: 4.2%
- LESS THAN HIGH SCHOOL: 7.3%

MEDIAN EARNINGS IN 2000

- PROFESSIONAL DEGREE: $80,230
- DOCTORATE: $70,476
- MASTER’S DEGREE: $55,302
- BACHELOR’S DEGREE: $46,276
- ASSOCIATE DEGREE: $35,389
- SOME COLLEGE NO DEGREE: $32,400
- HIGH SCHOOL GRADUATE: $28,807
- LESS THAN HIGH SCHOOL: $21,391

Source: Postsecondary Education OPPORTUNITY
How Did IT Create 50% of the Increase in US Standard of Living?

Three Channels:

- **Investments** in IT sector generated high returns.
- **Innovations** in IT sector created higher productivity.
- **Spillovers** from of IT productivity to other sectors
  - IT does not produce, but it makes production cheaper.
Shaping The Structure Of The Economy: The Role of Government

- R&D Incentives
- Leveraging Geographic Proximity
- Investing in Education
Every per capita state dollar for R&D is associated with a $6.1 increase in State per capita income!

NSF S&E Indicators (2004), simple regression
Composition of Industry R&D

- United States
  - Manufacturing: 62%
  - Trade: 13%
  - Professional Services: 11%
  - Other (Information): 14%

- Washington State
  - Manufacturing: 33%
  - Trade: 16%
  - Professional Services: 11%
  - Other (Information): 40%

Importance of Geographic Proximity Visualized

USA

3 Largest States
(Ca, TX, NY)
% of US total

Land Area 12%
Population 25%
GDP 28%
Patents (% of total) 35%

Giovanni Peri (2005)
# Importance of Geographic Proximity Visualized

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>CA</th>
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<tbody>
<tr>
<td><strong>3 Largest States</strong></td>
<td>(Ca, TX, NY)</td>
<td>(SF, LA, SD)</td>
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<tr>
<td>Land Area</td>
<td>12%</td>
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<td>Population</td>
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## Importance of Geographic Proximity Visualized

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<tr>
<td>(Ca, TX, NY)</td>
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<td>6%</td>
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<td>% of US total</td>
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<td><strong>3 Largest Metro Areas</strong></td>
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<tr>
<td>(SF, LA, SD)</td>
<td>28%</td>
<td>67%</td>
<td>53%</td>
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<td>% of CA total</td>
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<td><strong>Largest Metro Area</strong></td>
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<tr>
<td>(Seattle)</td>
<td>35%</td>
<td>90%</td>
<td>72%</td>
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<td>% of WA total</td>
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What is the state’s strategy to leverage a) proximity b) massive R&D windfall?
Who Is Using Washington R&D Dollars?

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<th>National Rank</th>
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<td>(8th)</td>
<td>S&amp;E Post Doctorates</td>
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<tr>
<td>(10th)</td>
<td>Doctoral Scientists</td>
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<td>Doctoral Engineers</td>
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<th>Doctoral Scientists (10th)</th>
<th>Doctoral Engineers (13th)</th>
<th>S&amp;E Graduate Students (43th)</th>
<th>BA Participation Rate (49th)</th>
<th>AA Participation Rate (2nd)</th>
</tr>
</thead>
</table>

*The State is a NET IMPORTER of Skilled Labor*

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On Importing Skills: Colorado Paradox

- Out of state recruitment is not a viable strategy
  - Recession made it more difficult to recruit outsiders
  - “Education Diversion”
    - (Higher Ed capacity bottlenecks negate K12 reforms)

⇒ Employers rebel against low education investment

Source: Thomas Bailey, Director Columbia University Community College Research Center
Strategies for Expanding WA BA Attainment & Capacity

- Its not Rocket Science:
  - Additional Community College/University transfers
  - Additional four year institutions
  - New “University Centers” at Community Colleges
Strategies for Expanding BA Attainment and Capacity

- **It’s not Rocket Science:**
  - Additional Community College/University transfers
  - Additional four year institutions
  - New “University Centers” at Community Colleges

- **What is Rocket Science:**
  - how to manage the expansion efficiently
  - Which path provides the knowledge and education necessary
  - Which path provides greatest returns per state dollar

- **WE NEED A BLUEPRINT FOR EXPANSION**
Crucial Feeders:

Public Policy & K12 Quality

What do we know?
Education Cost Benefit

- Returns from improved instruction are huge:
  - Increase student performance from 50th percentile to 68th percentile results in 12 percent higher annual earnings
Benefits are Staggering, Long Lasting, & Take Time

Improved GDP with Moderately Strong Knowledge Improvement

- Upshot: Reform early, Reform Fast
- Cost of Waiting is high and compounds!
Ineffectiveness of Resource Policies

- Common Approach: – increase resources
  - Reduce class size
  - Increase salaries
  - Increase certification requirements for teachers

- Substantial evidence that these do not work
  - most recent study: 2 out of 18 countries would benefit from smaller class size (Greece and Iceland – the ones with the lowest wages)
# Public school resources, 1960-2000

<table>
<thead>
<tr>
<th></th>
<th>1960</th>
<th>1980</th>
<th>2000</th>
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<tbody>
<tr>
<td>Pupil-teacher ratio</td>
<td>25.8</td>
<td>18.7</td>
<td>17.3</td>
</tr>
<tr>
<td>Spending/pupil</td>
<td>$2,235</td>
<td>$5,124</td>
<td>$7,591</td>
</tr>
</tbody>
</table>

Where has all the money gone? Not teachers’ salaries! Has performance changed dramatically?
Achievements
National Assessment of Educational Progress (NAEP)
"The Nation's Report Card"

(17 year olds)
## Achievements

Trends in International Math and Science Study (TIMSS)

### Average mathematics scale scores of fourth-grade students, by country: 2003

<table>
<thead>
<tr>
<th>Country</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Singapore</td>
<td>594</td>
</tr>
<tr>
<td>+ Hong Kong</td>
<td>575</td>
</tr>
<tr>
<td>+ Japan</td>
<td>565</td>
</tr>
<tr>
<td>+ Taipei</td>
<td>564</td>
</tr>
<tr>
<td>+ Belgium-Flemish</td>
<td>551</td>
</tr>
<tr>
<td>+ Netherlands²</td>
<td>540</td>
</tr>
<tr>
<td>+ Latvia</td>
<td>536</td>
</tr>
<tr>
<td>+ Lithuania³</td>
<td>534</td>
</tr>
<tr>
<td>+ Russian Federation</td>
<td>532</td>
</tr>
<tr>
<td>+ England²</td>
<td>531</td>
</tr>
<tr>
<td>+ Hungary</td>
<td>529</td>
</tr>
<tr>
<td>● United States²</td>
<td><strong>518</strong></td>
</tr>
<tr>
<td>– Cyprus</td>
<td>510</td>
</tr>
<tr>
<td>– Moldova</td>
<td>504</td>
</tr>
<tr>
<td>– Italy</td>
<td>503</td>
</tr>
<tr>
<td>– Australia²</td>
<td>499</td>
</tr>
</tbody>
</table>

## Quality and Quantity

- Is the WA Curriculum up to date?
- Are WA students exposed to sufficient hours of science and math?
Basic Economic Principle:
*You cannot outspend your competition
You must provide better inputs / technology*

Quality and cost
Differences in student performance are not driven by national levels of school spending.

Hanushek (2005)
Figure 19: The Effect of Different Teachers on Student Achievement

Source: Sanders, William L. and Rivers, Joan C. Cumulative and Residual Effects of Teachers on Future Student Academic Achievement, 1996.
High Tech High
AZ, CA, PA

- “High Tech High” School
- High Tech Middle
- High Tech International
- Explorer Elementary
  - Max school size 450 students
  - All students are assigned personal advisors
  - All students engage in internships to apply what they learn to adult-world challenges.
  - Emphasis on project-based learning
  - Emphasis on 21st Century Skills
  - Student teacher ratio 25:1 to 20:1
  - Computer to Student Ratio 1:1 to 1.5 to 1 (WA: 20.1!)

- Results:
  - 100% of students enrolled in college
  - 60% of those students are first generation!
  - Student body is among the most ethnically diverse in the San Diego
  - Results on state-mandated tests place High Tech High among the highest achieving high schools in CA
Applications To Washington State

- **Creating Jobs**, aim for high productivity jobs (if you can)

- **The New Economy is here**, leverage Geographic Proximity

- **Build on the State Lottery**: Don’t squander 7 billion in local R&D;
  - attract industries that feed off such R&D

- **Provide EFFECTIVE education**
  - WA college graduates WILL INCREASE: Provide guidance!
  - High School Reforms WILL OCCUR: make them effective
  - Where is Washington’s High Tech High?