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Determinants of Washington's 21st Century Workforce and Economy

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Today's Topic

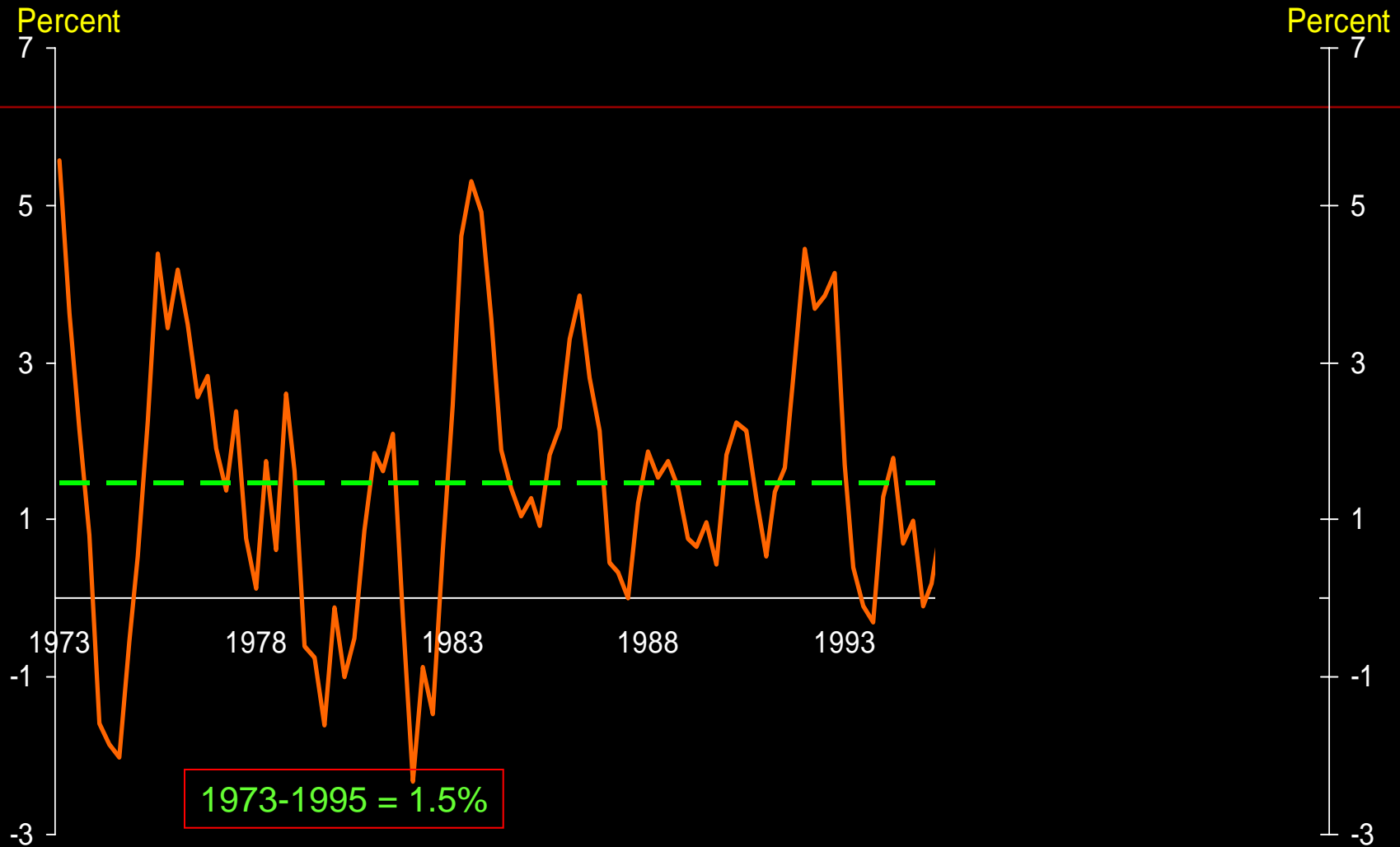
- How has the structure of the economy changed in the 21st Century ?
- How do structural changes impact the workforce and education (supply and demand)
 - Higher Education
 - K 12

What's different in the 21st Century?

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

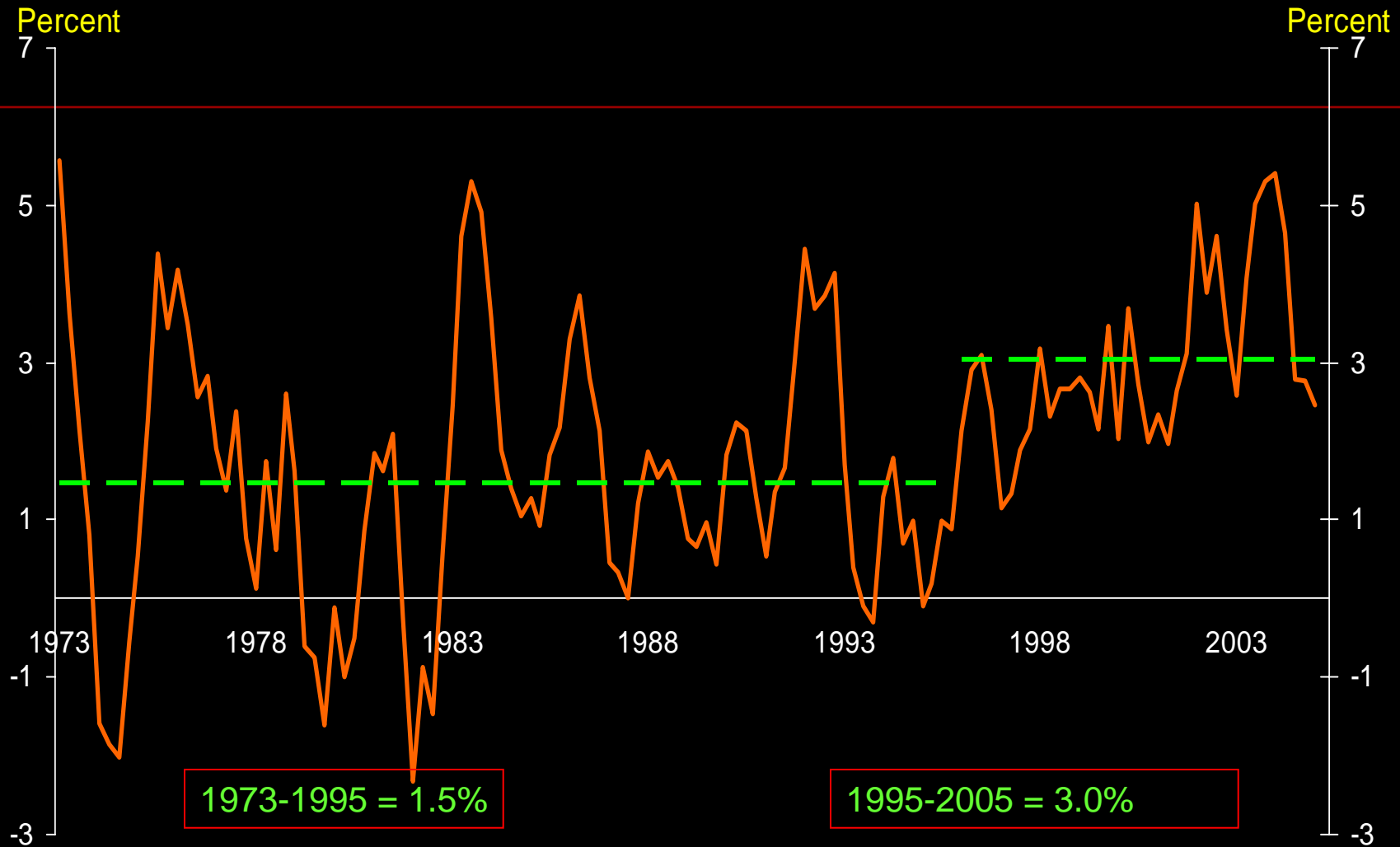
- “New Economy” – How do we measure it?
 - Accelerated Productivity Growth (output/hour worked)
 - → Productivity determines our standard of living !

Productivity Eras



You can expect wages to rise AT MOST by the rate of productivity growth

Productivity Eras



4-que

Dotted line represents averages for 1947:Q4-1973:Q4, 1973:Q4-1995:Q4 and 1995:Q4-2005:Q1. BLS (6/3/05).

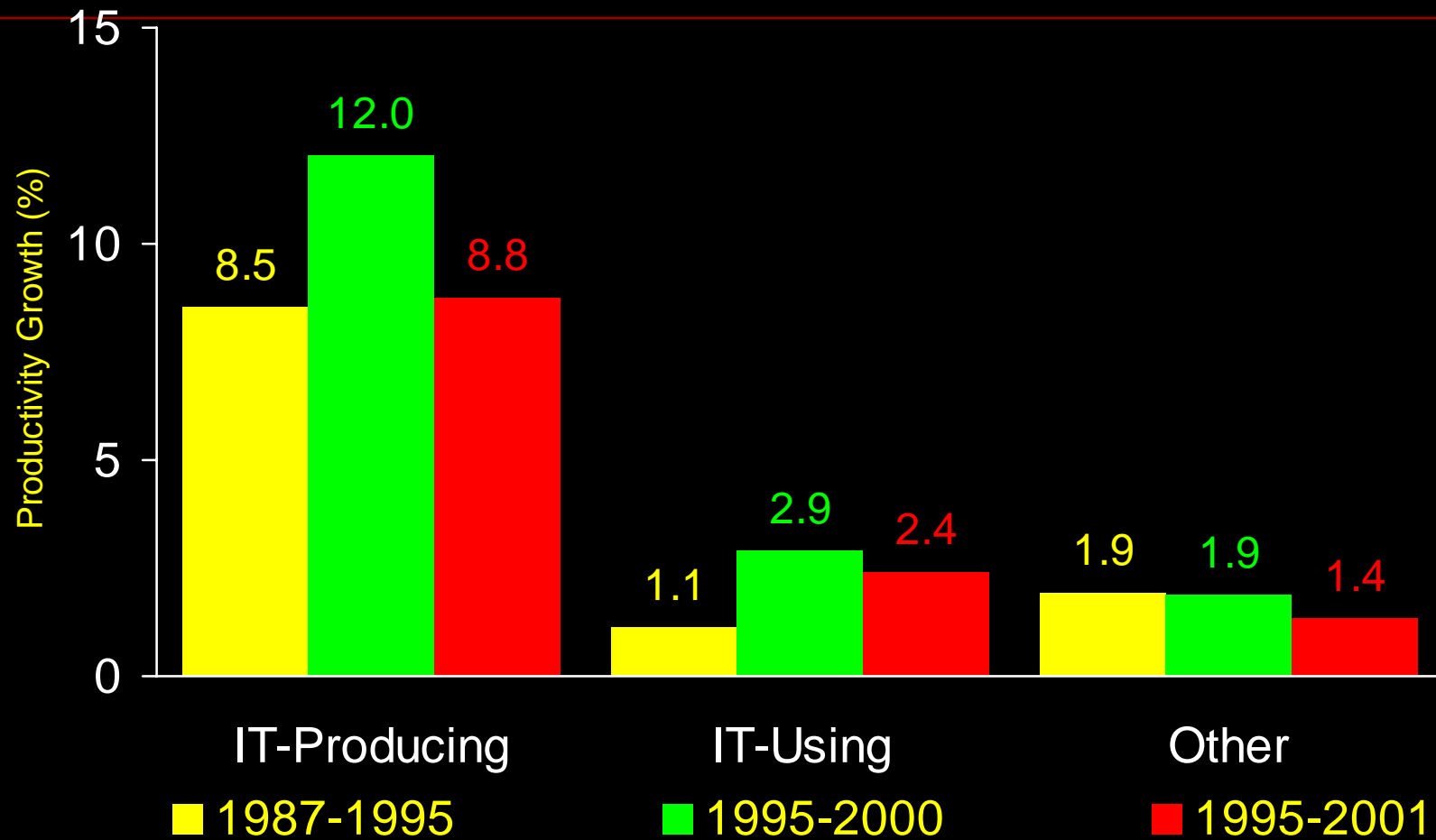
What Caused Productivity Increases ?

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?

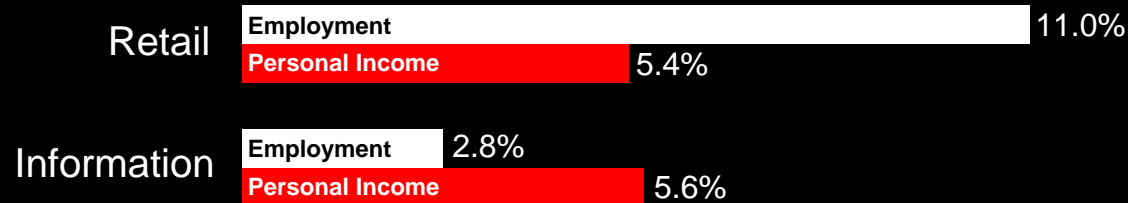
Dramatic Differences In Productivity Increases Across Industries



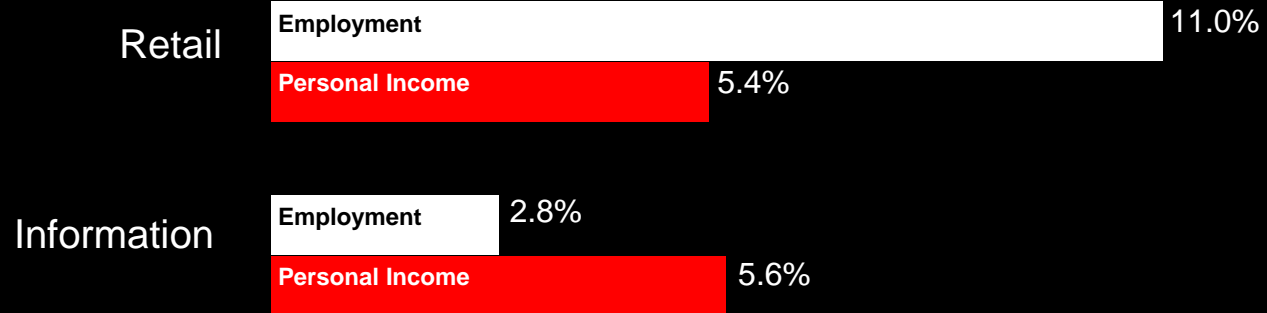
Average annual percentages. IT-using have 1995 IT capital shares above the median.
Update of Stiroh (2002) based on GPO data released in November 2002.

This is Reflected in Personal Income and Employment In Washington State

(% of total)

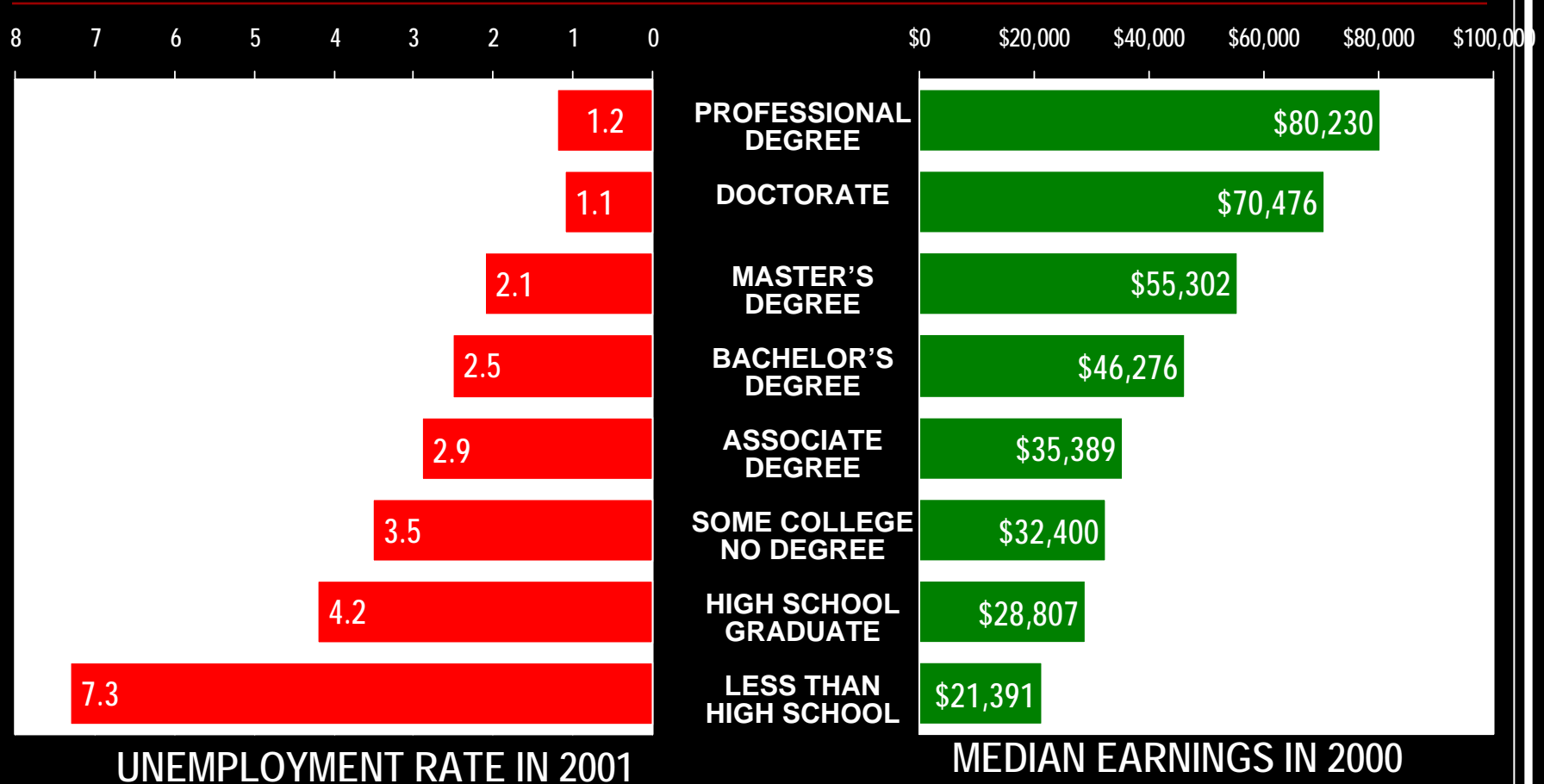


This is Reflected in Personal Income and Employment In Washington State



Who lands these high income jobs?

Higher Learning = Higher Earning & Employment



Source: Postsecondary Education OPPORTUNITY

How Did IT Create 50% of the Increase in US Standard of Living?

Three Channels :

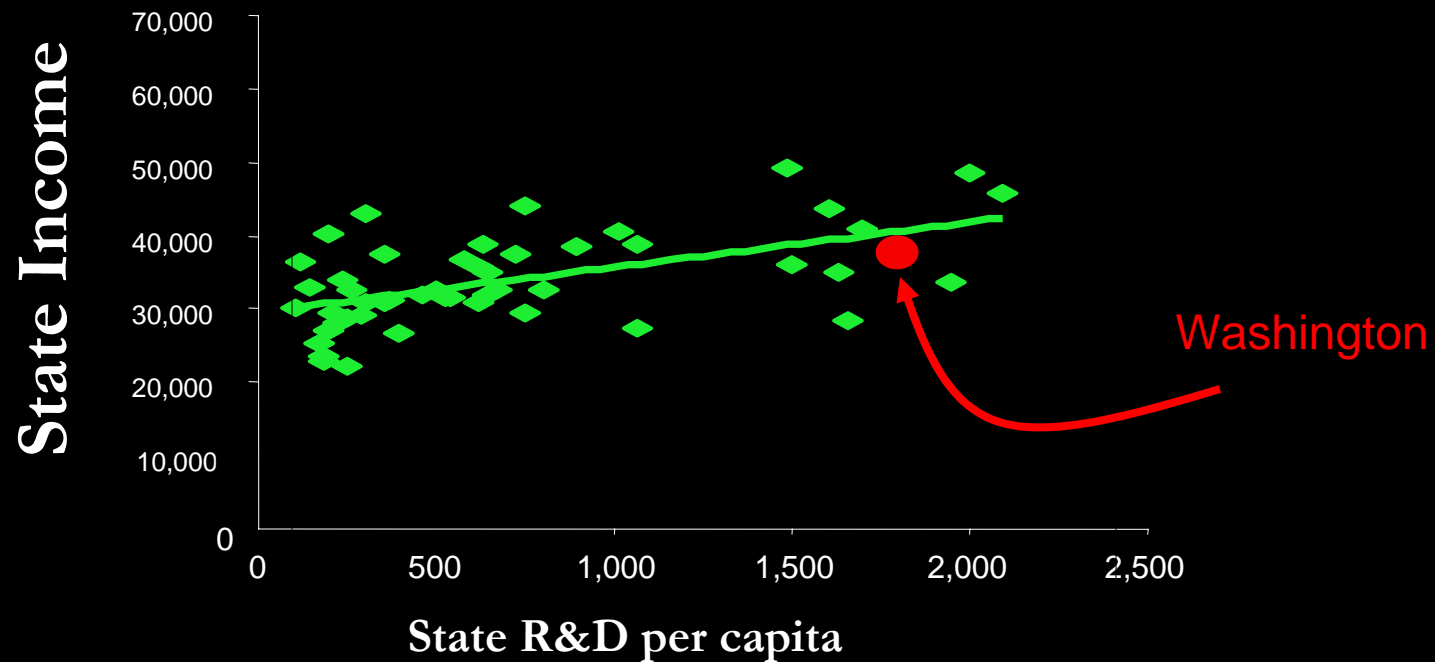
- **Investments** in IT sector generated high returns.
- **Innovations** in IT sector created higher productivity
- **Spillovers** from of IT productivity to other sectors
 - IT does not produce, but it makes production cheaper

Shaping The Structure Of The Economy:
The Role of Government

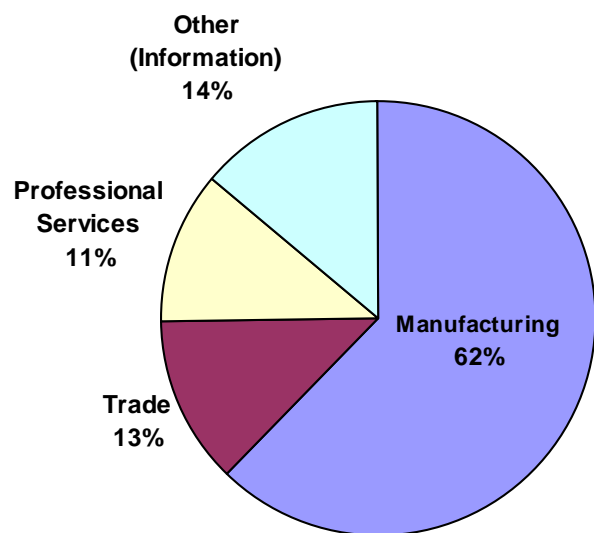
- R&D Incentives
- Leveraging Geographic Proximity
- Investing in Education

R&D

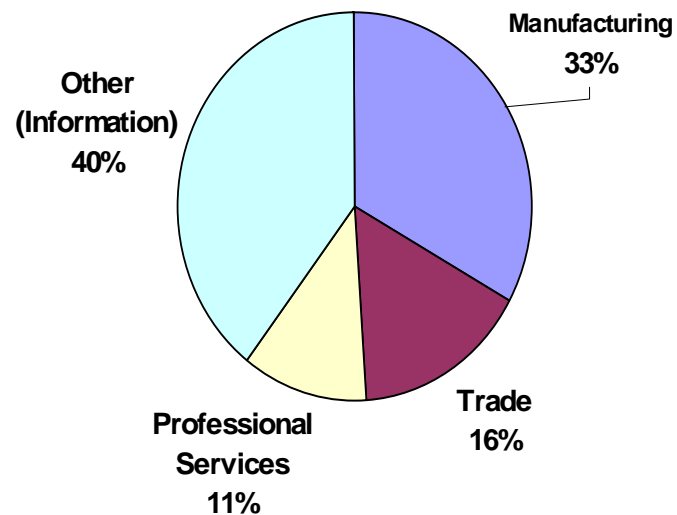
Every per capita state dollar for R&D is associated with a **\$ 6.1** increase in State per capita income !



Composition of Industry R&D



United States



Washington State

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%

Importance of Geographic Proximity Visualized

USA

CA

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

**3 Largest Metro Areas
(SF, LA, SD)
% of CA total**

Land Area

12%

10%

Population

25%

51%

GDP

28%

67%

Patents (% of total)

35%

90%

Importance of Geographic Proximity Visualized

USA

CA

WA

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

**3 Largest Metro Areas
(SF, LA, SD)
% of CA total**

**Largest Metro Area
(Seattle)
% of WA total**

Land Area

12%

10%

6%

Population

25%

51%

40%

GDP

28%

67%

53%

Patents (% of total)

35%

90%

72%

Importance of Geographic Proximity Visualized

	USA	CA	WA
	3 Largest States (Ca, TX, NY) % of US total	3 Largest Metro Areas (SF, LA, SD) % of CA total	Largest Metro Area (Seattle) % of WA total
Land Area	12%	10%	6%
Population	25%	51%	40%
GDP	28%	67%	53%
Patents (% of total)	35%	90%	72%

What is the state's strategy to leverage a) proximity b) massive R&D windfall?

Who Is Using Washington R&D Dollars ?

	National Rank
■ S&E Post Doctorates	(8th)
■ Doctoral Scientists	(10th)
■ Doctoral Engineers	(13th)

Who Is Using Washington R&D Dollars ?

	National Rank
■ S&E Post Doctorates	(8th)
■ Doctoral Scientists	(10th)
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■ S&E Graduate Students	(43th)
■ BA Participation Rate	(49th)
■ AA Participation Rate	(2 nd)

The State is a NET IMPORTER of Skilled Labor

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

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

- Its 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

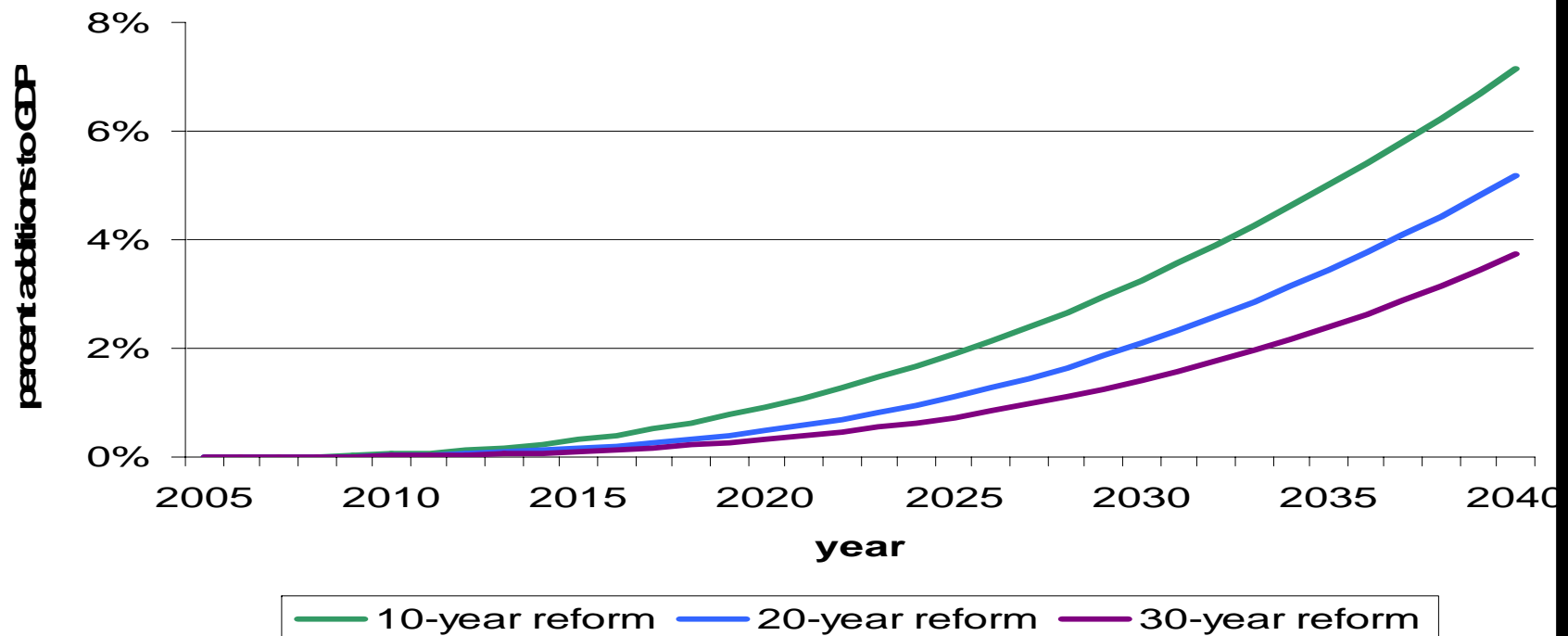
What do we know?

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)

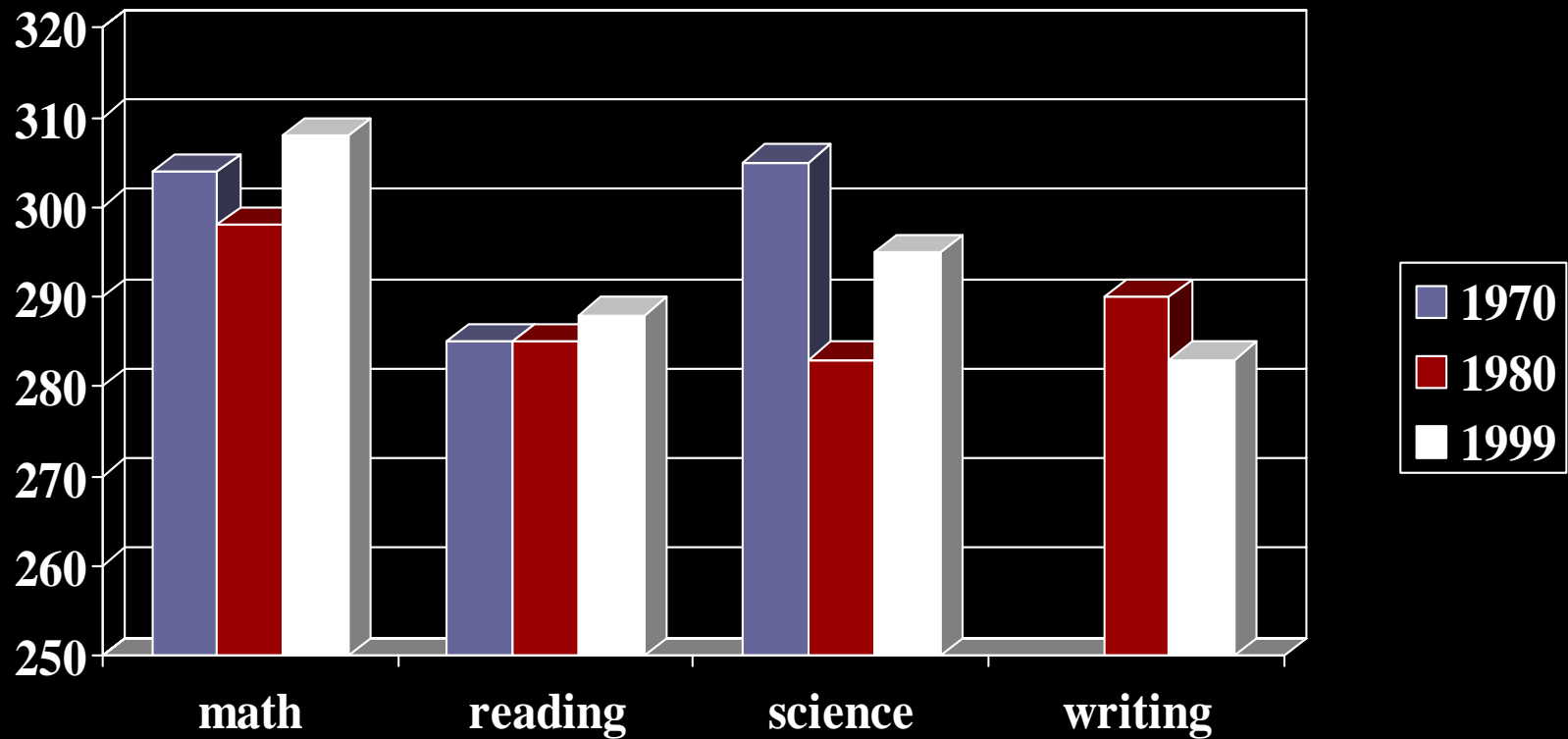
Public school resources, 1960-2000

	1960	1980	2000
Pupil-teacher ratio	25.8	18.7	17.3
Spending/pupil	\$2,235	\$5,124	\$7,591

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

Country	Average score
+ Singapore	594
+ Hong Kong	575
+ Japan	565
+ Taipei	564
+ Belgium-Flemish	551
+ Netherlands ²	540
+ Latvia	536
+ Lithuania ³	534
+ Russian Federation	532
+ England ²	531
+ Hungary	529
• United States ²	518
– Cyprus	510
– Moldova	504
– Italy	503
– Australia ²	499

Quality and Quantity

- Is the WA Curriculum up to date?
- Are WA students exposed to sufficient
- Hours of science and math?

Basic Economic Principle:

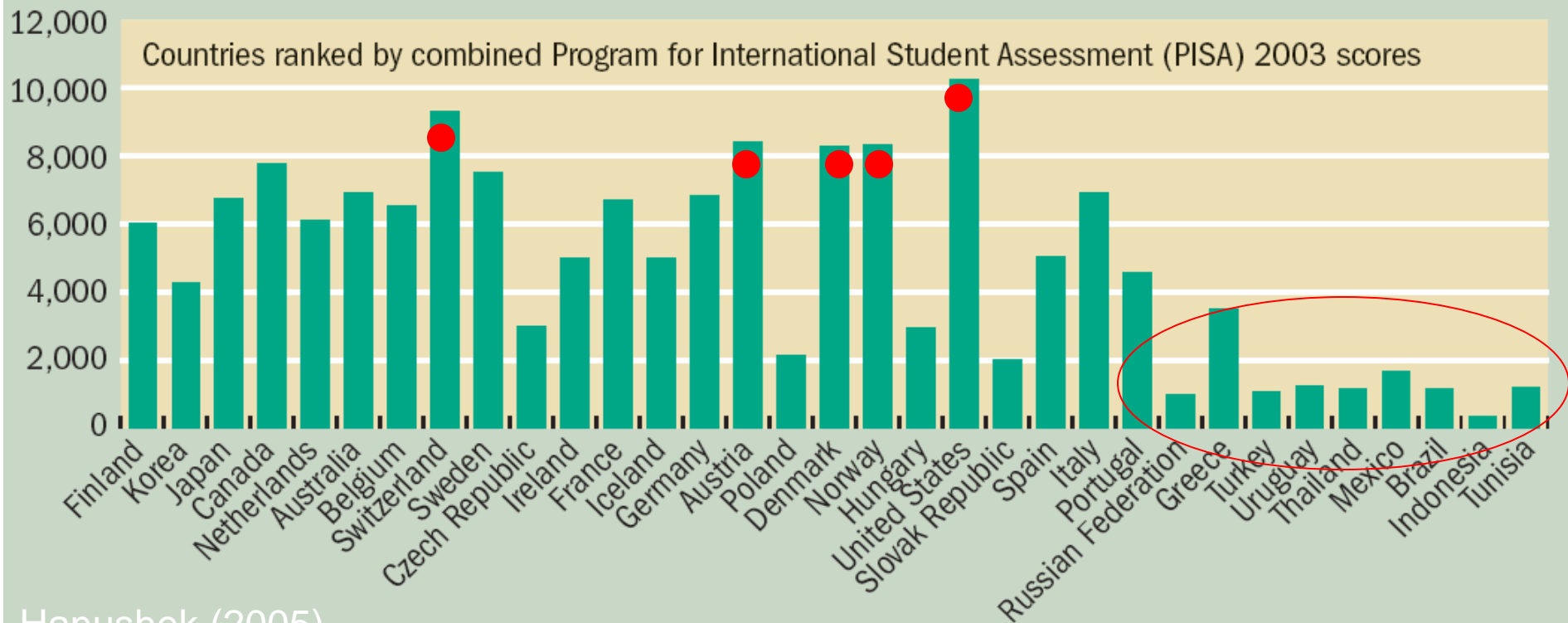
You cannot outspend your competition

You must provide better inputs / technology

Quality and cost

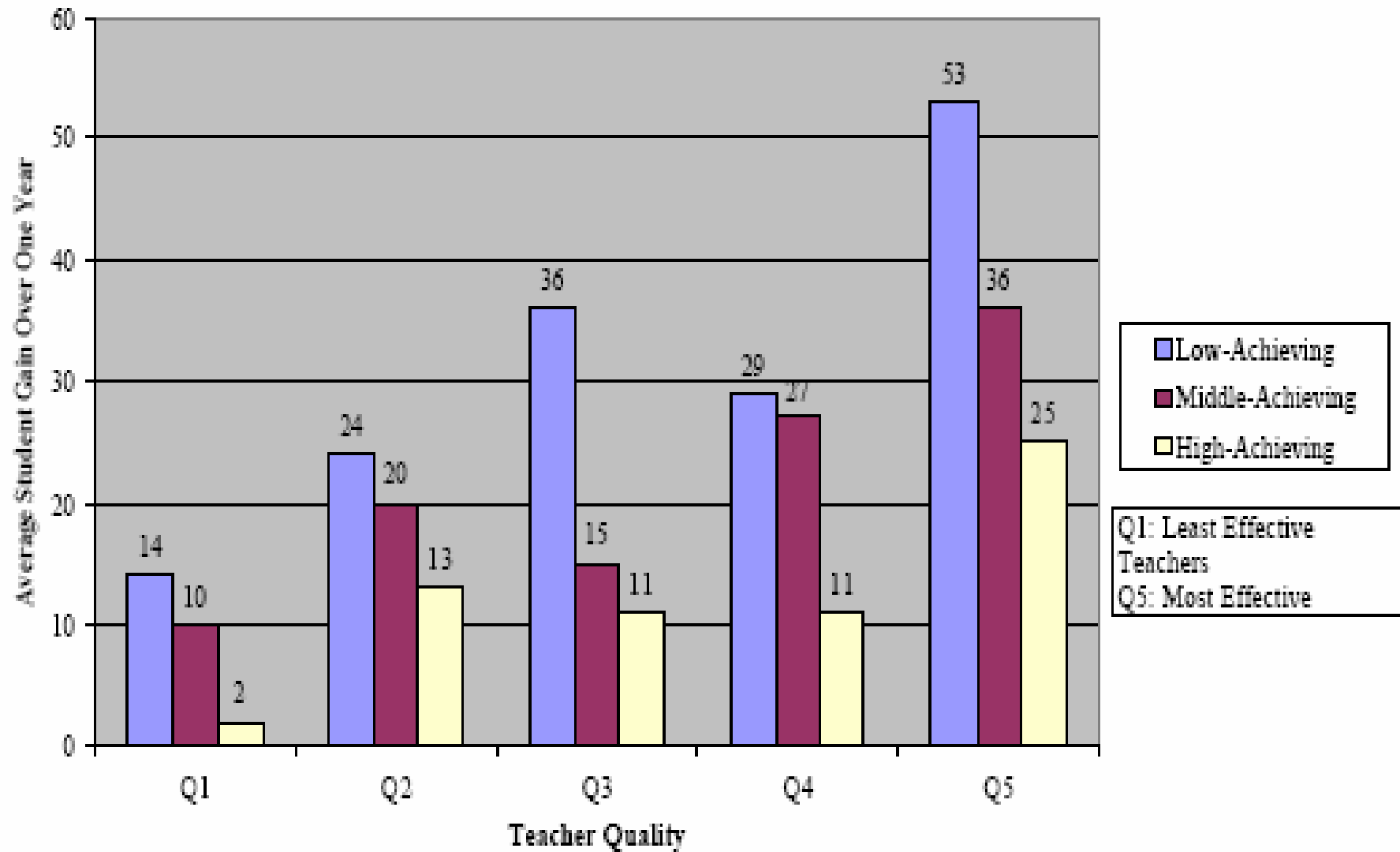
Differences in student performance are not driven by national levels of school spending.

Spending per student (U.S. dollars)



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?