# Potential output, the digital economy, and inflation
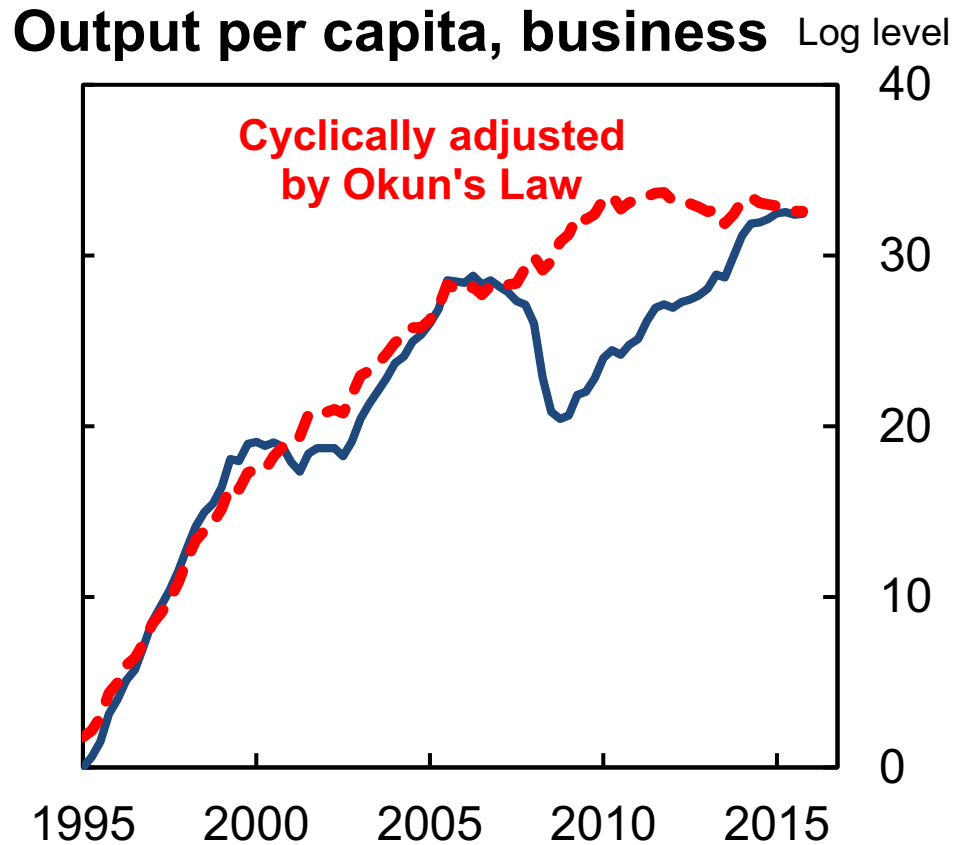
**October 26, 2018**

**John G. Fernald**

INSEAD

# Some broad macroeconomic trends since 2000

- Output growth disappointing since Great Recession
- Digital disruption everywhere…except in productivity statistics
  - U.S. slowed 2004 or 2005 (e.g., Fernald, 2014)
  - Europe prod. growth slower than U.S. since mid-1990s (e.g., Cette et al, 2016)
- U.S. "prime age" participation rates falling since 1990s
- Downward trend in real interest rates
- Persistently low inflation in aftermath of Great Recession

# Question: Why has output grown so slowly since 2009?

## Output per capita, business   Log level
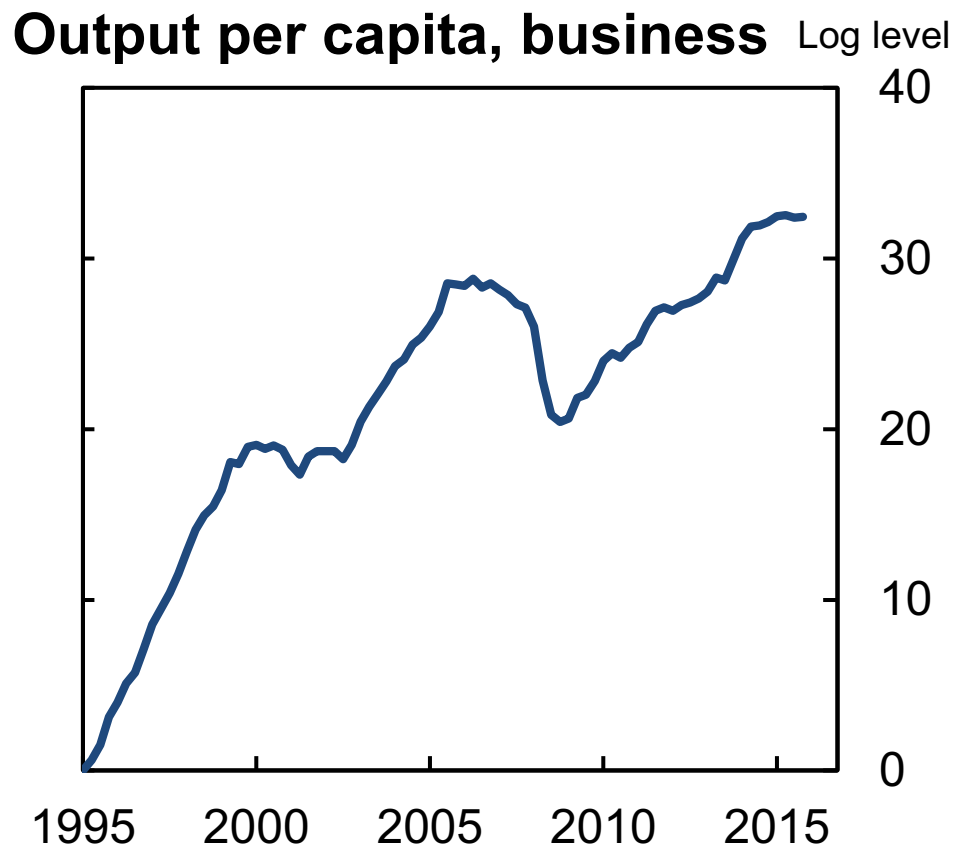
# Answer: Deep recession superimposed upon slowing trend

## Output per capita, business
Log level



**Cyclically adjusted by Okun's Law**

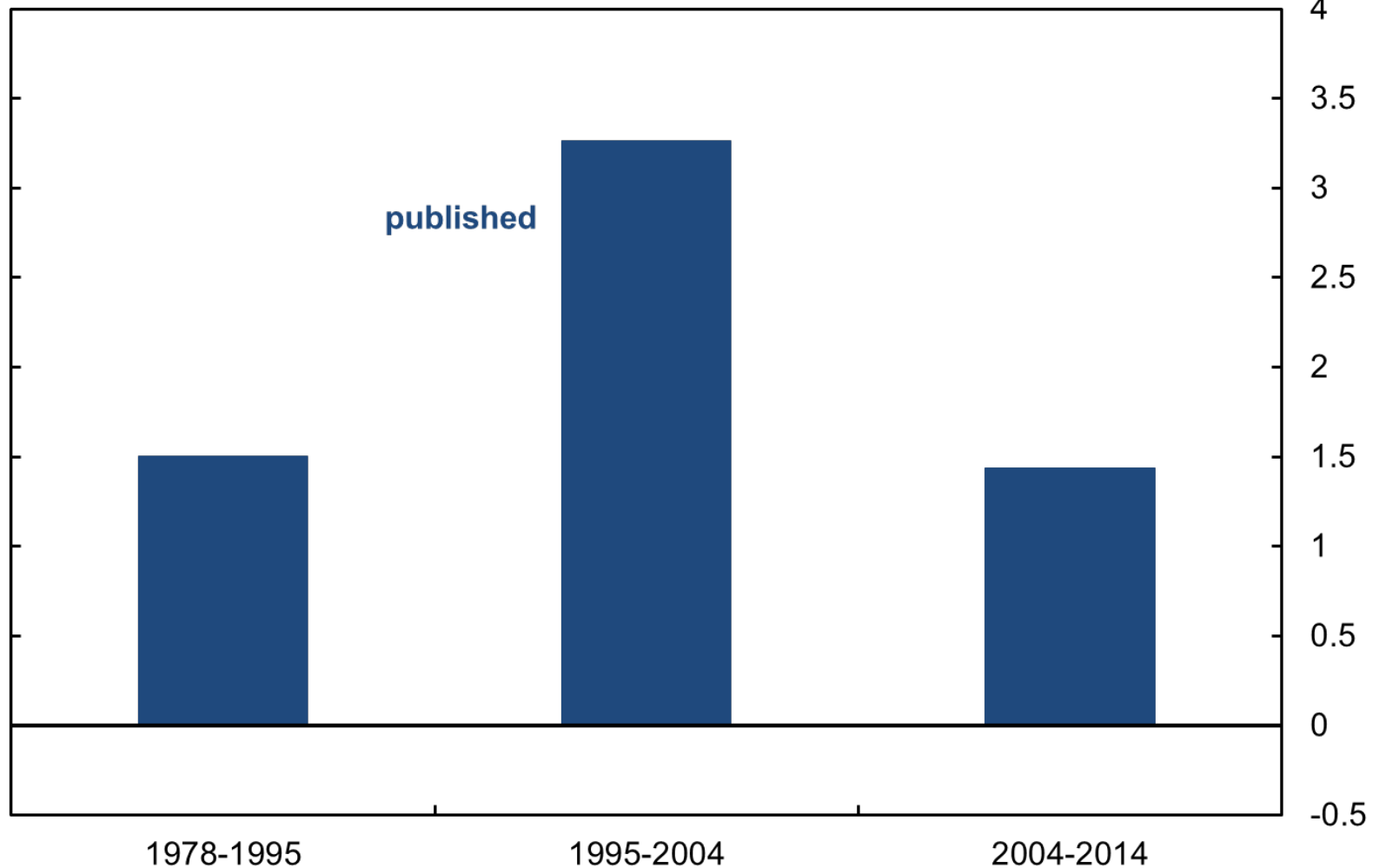Source: Fernald, Hall, Stock, and Watson 2017

# Growing mismeasurement of IT isn't the answer
# (Byrne, Fernald, and Reinsdorf, 2016)



**Adjustments to growth in output per hour**

Business sector, percentage points per year

Percentage points

published

1978-1995    1995-2004    2004-2014

Source: BLS, Fernald (2014a), and authors' calculations.

# Recent work points to IT price mismeasurement

- **Cellular networks**
  - Innovations missed in communications equipment prices. (Byrne and Corrado, 2015, 2016)
- **Computers**
  - Slowdown exaggerated by offshoring and methodological problems. (Byrne and Pinto, 2015)
- **Microprocessors**
  - price trends distorted by use of list prices. (Byrne, Oliner and Sichel, 2015)
- **Specialized electronics (**e.g., military and medical)
  - Little measurement research. (Byrne, 2015)
- **Software**
  - Only 1/3 has directly observed prices

# …but shrinking domestic production of computers/communicat…



**Adjustments to growth in output per hour**
Business sector, percentage points per year

Percentage points

published

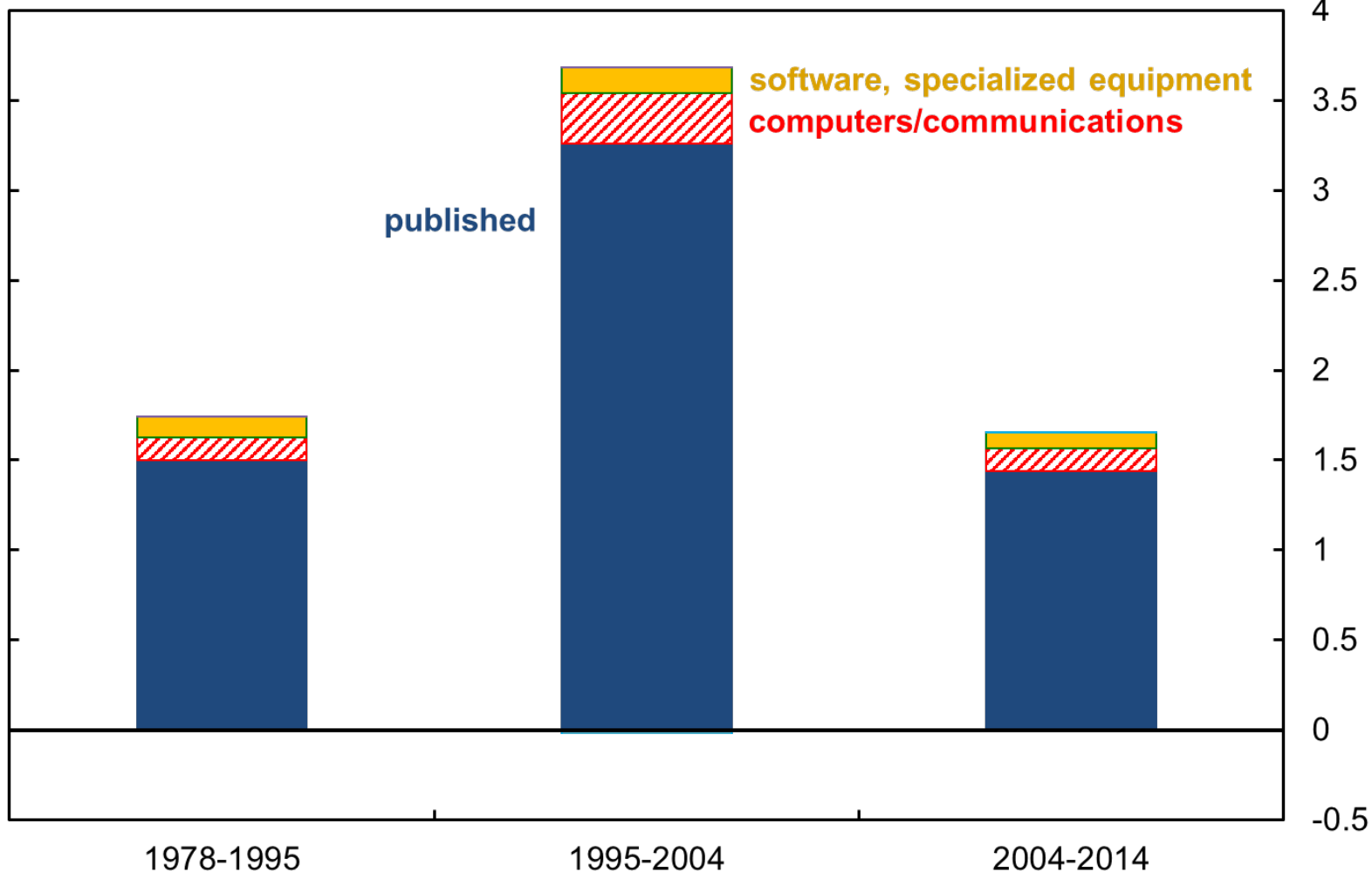computers/communications

1978-1995    1995-2004    2004-2014
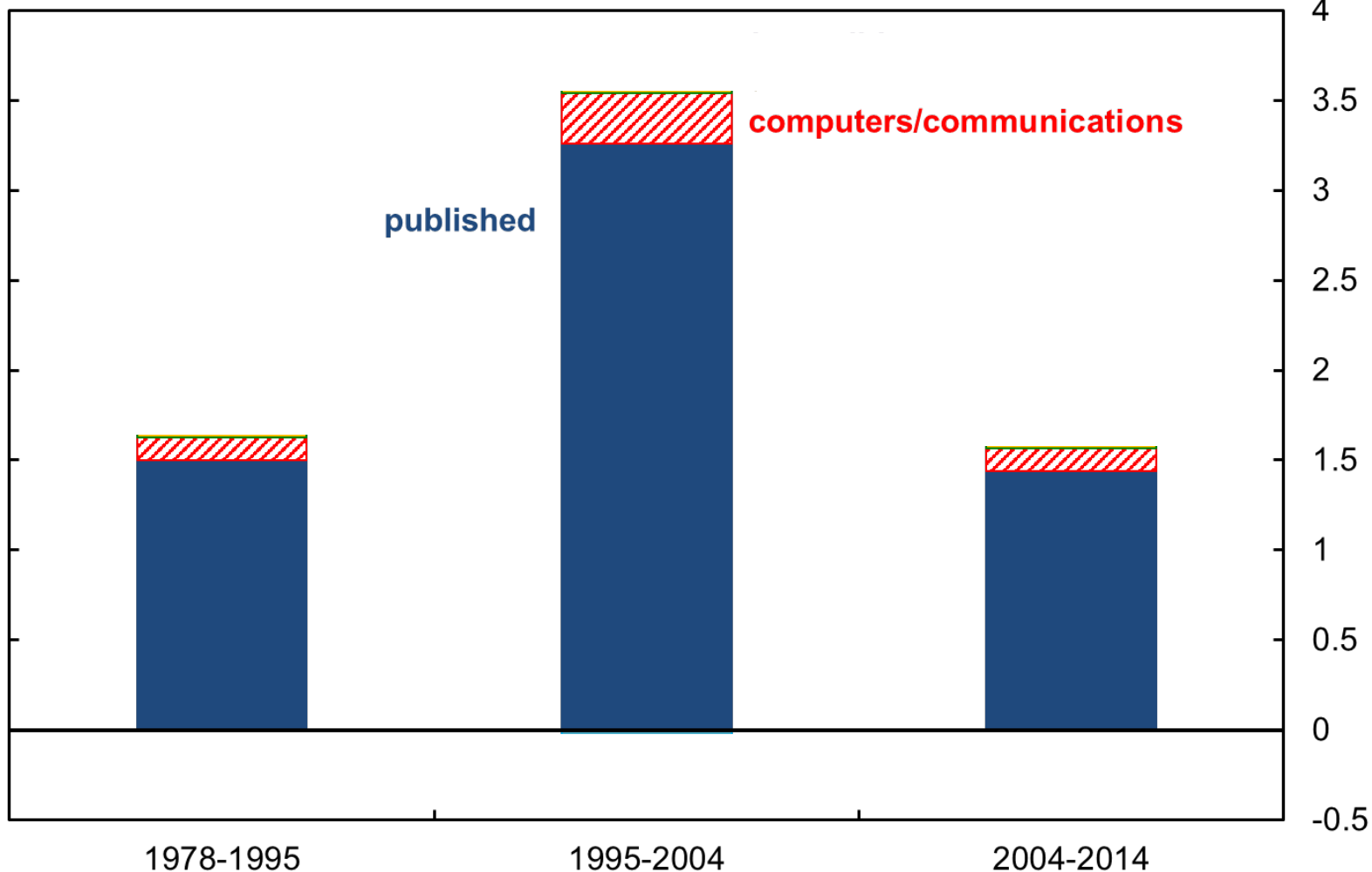
Source: BLS, Fernald (2014a), and authors' calculations. Other comprises Internet, free digital services, globalization, and fracking.

# Specialized equipment/software more speculative/judgmental



**Adjustments to growth in output per hour**
Business sector, percentage points per year
Percentage points

Legend: published; software, specialized equipment; computers/communications

Categories: 1978-1995, 1995-2004, 2004-2014

Source: BLS, Fernald (2014a), and authors' calculations. Other comprises Internet, free digital services, globalization, and fracking.
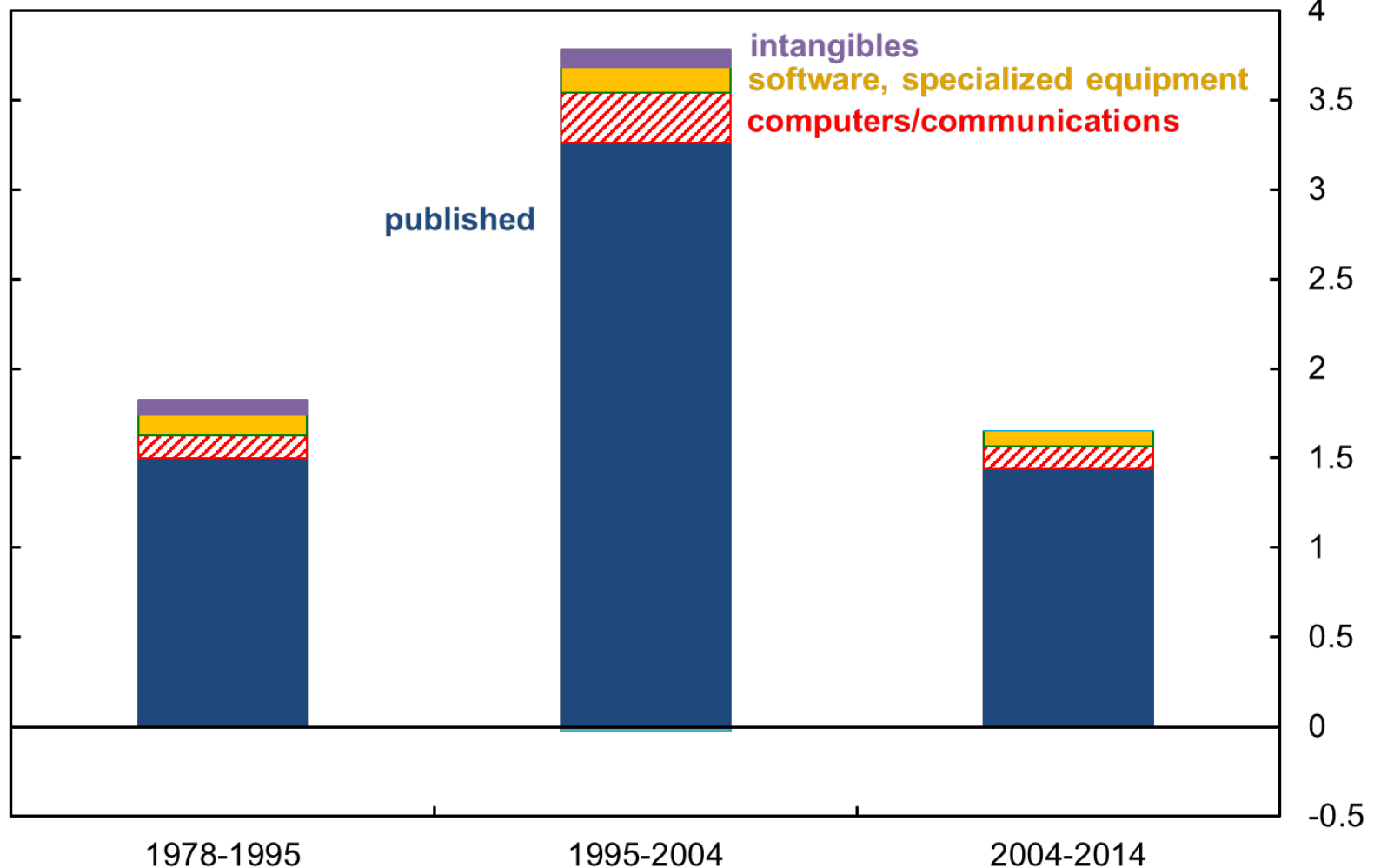
# Non-NIPA intangibles growing fast in 1980s, 1990s
## (Organizational capital, training, branding, and design)

**Adjustments to growth in output per hour**

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Percentage points



published

intangibles
software, specialized equipment
computers/communications

1978-1995          1995-2004          2004-2014

Source: BLS, Fernald (2014a), and authors' calculations. Other comprises Internet, free digital services, globalization, and fracking.
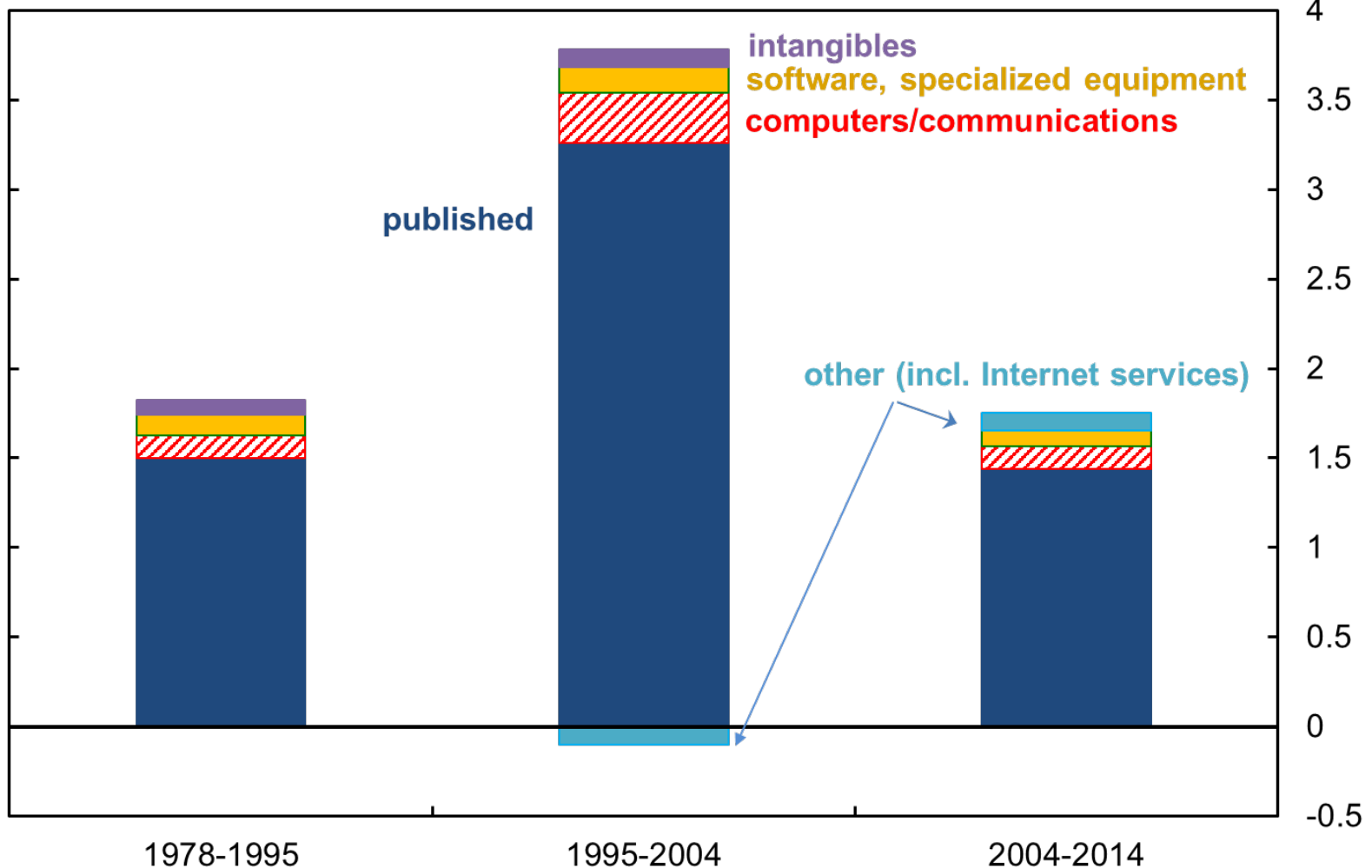
Intangibles (Corrado and Jager, 2015)

# Globalization, fracking, Internet access contribute to slowdown



**Adjustments to growth in output per hour**
Business sector, percentage points per year

Percentage points

Legend:
- intangibles
- software, specialized equipment
- computers/communications
- published
- other (incl. Internet services)

X-axis: 1978-1995, 1995-2004, 2004-2014

Y-axis: -0.5 to 4

Source: BLS, Fernald (2014a), and authors' calculations. Other comprises Internet, free digital services, globalization, and fracking.

# What about overall low inflation?

$$P = \mu \cdot MC$$

- In growth rates

$$\pi = \Delta ln\mu + \Delta ln\text{MC}$$

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[Low]     [Rising?]          [Low?]

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- In growth rates

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[Low]     [Rising?]        [Low?]

- Are rising markups a competing story?

# Rising markups can potentially explain many macro trends

- **Trends I started with**
  - Weak output growth (from reduced factor demand)
  - Falling participation (wages for low-skilled pushed down)
  - Low real interest rates (from weak capital demand)
  - *Maybe* weak measured TFP growth

- **Plus some others**
  - Falling labor share
  - Rising concentration

# Do rising markups contribute to weak measured TFP growth?

- Competition may boost innovation
- Measured TFP isn't technology with markups
  - Back-of-the-envelope calculations with aggregate data suggest it's *not* the reason for slow growth in Solow residual
  - With "average" estimates of markups and RTS from De Loecker-Eeckhout (2017), true technology growth is (a bit) lower than measured, not higher

# Have anti-competitive markups really risen sharply?

- Alternative interpretation: Superstar firms
- Markups as high as Jan and Jan estimate have strong implications
  - Susanto Basu (forthcoming) calculates that they imply that 70% (!) of GDP is paid as economic profits

# Takeaways

- Potential growth is slow
- I am skeptical that it is rising mismeasurement of prices or sharply rising markups
- My guess: Phillips Curve will reassert itself, and inflation will pick up