

# Measuring the Economic Impact of Broadband

William Lehr

Massachusetts Institute of Technology

[wlehr@mit.edu](mailto:wlehr@mit.edu)

with

Robert Crandall      Robert Litan

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# Outline: Economic Impact of Broadband

- Results
- Why measuring economic impact is difficult
- Further thoughts and challenges

Growth in  $Y(t) = f(\text{BB penetration, other variables})$

$Y(t)$ : Jobs, GDP

BB penetration = lines per capita

Other variables/controls

- \* Temperature (mean 1971-2004, °F)
- \* Tax Climate Index (1-10, higher is lower burden)
- \* Unionization (% labor force unionized)
- \* Education (% population college grads)
- \* Wage (average hourly earnings)
- \* Regional dummies (9 Census)

-- for state-level panel data set 2003-2005 (48 states)

-- 2005/2004, 2005/2003

-- non-farm, 2-digit industrial sectors 

1% increase in BB penetration results in 0.2-0.3% higher job growth over one year, or ~300k additional jobs.

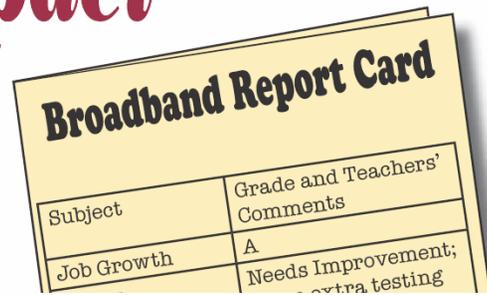
Impact strongest in service sectors (finance, education, healthcare) and manufacturing.

Impact on GDP positive, but not statistically significant

# Measuring Broadband's Economic Impact

From 1999 to 2002, American communities with broadband access did significantly better than those without

By William H. Lehr, Carlos A. Osorio,  
Sharon E. Gillett ■ *Massachusetts Institute of Technology*  
Marvin A. Sirbu ■ *Carnegie Mellon University*



- Zip-code level panel (22k)
- 1998-2002
- Job, firm growth
- (no measure of output)

**BROADBAND PROPERTIES** | [www.broadbandproperties.com](http://www.broadbandproperties.com) | DECEMBER 2005

| Economic Indicator                                  | Results (controlled comparisons at zip code level)   |
|---|--|
| Employment (Jobs)                                   | BB added about 1-1.4% to growth rate 1998-2002   |
| Wages   | No statistically measurable impact observed by 2002  |
| Housing Rents (Proxy for Property Values)           | More than 6% higher in 2000 where BB available by 1999   |
| Business Establishments (Proxy for Number of Firms) | BB added about 0.5-1.2% to growth rate 1998-2002   |
| Industry Mix  | BB added about 0.3-0.6% to share of establishments in IT-intensive sectors, 1998-2002<br>BB reduced share of small (<10 employees) establishments by about 1.3-1.6%, 1998-2002 |

## Positive impacts consistent with other research: Information Technology yields significant excess returns!

Jorgenson (2001): ICT added 1.18% to GDP growth and accounted for 2//3rds of total factor productivity growth 1995-2000.

Jorgenson, Ho, Stiroh (2007): ICT contributed 59% of growth in labor productivity from 1995-2000, and 33% from 2000-2005

Fuss and Waverman (2006): 60% of the slower productivity growth experienced by Canada (relative to US) in 2003 attributed to less intensive ICT use.

Varian, Litan, Elder, Shutter (2002): US firms have adopted Internet business solutions more intensively than European firms. In survey of 2000 US firms, they find Internet business solutions significantly improved revenue growth and reduced costs, adding \$600 billion by 2001 and contributing 0.43% to future productivity growth through 2001.

ETCetera.....

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# Why is it hard to measure economic impact broadband?

## Broadband is infrastructure

- used to produce other goods/services
- spillover/multiplier effects produce un-measured benefits
- impact greatest in service sectors, which hard to measure

## Broadband changes the way businesses operate, people live/work

- eCommerce, telecommuting, telemedicine, on-line education...
- restructures value chains (new firms, new skills needed)
- such changes take time (4.5% in 2001, 19.6% in 2006)

## Broadband is a moving target

- Rapid innovation => rapid economic depreciation
- What is BB and how used changes over time
- Benefits depend on complementary inputs (PCs, network services, etc.)

## Broadband data is not readily available

- Deregulation and growth competition => less public data
- Observe availability, but not adoption
- Broadband is *local*. Local context matters.

## Broadband causality difficult to infer

- Does BB follow or produce growth?
- Is BB consumption or investment good?

# Broadband access: what do we expect?

## Speed?

- 0B: 50kbps
- 1B: 500kbps
- 2B: 5Mbps
- 3B: 50Mbps
- 4B: 500Mbps (?)

## Coverage?

- Universal availability
- (similar service quality?)

## Services?

- Voice (telephony)
- Video (TV)
- Data
  - Web
  - eMail
  - eCommerce
  - Gaming
  - Chat/Blog
  - Streaming video
  - P2P sharing

## Characteristics?

- Always on
- Symmetric
- 3rd Party Apps
- Open platform

## Price?

- No higher than today  
(~\$100/mo triple play)
- Telephone, free?
- Data \$20-30/month
- Video ??

## Consumer choice and competition?

- \$Billions in new investment
- Industry restructuring and entry
- New technologies/business models

## Further observations on the broadband future

### Broadband is the future of the Internet...

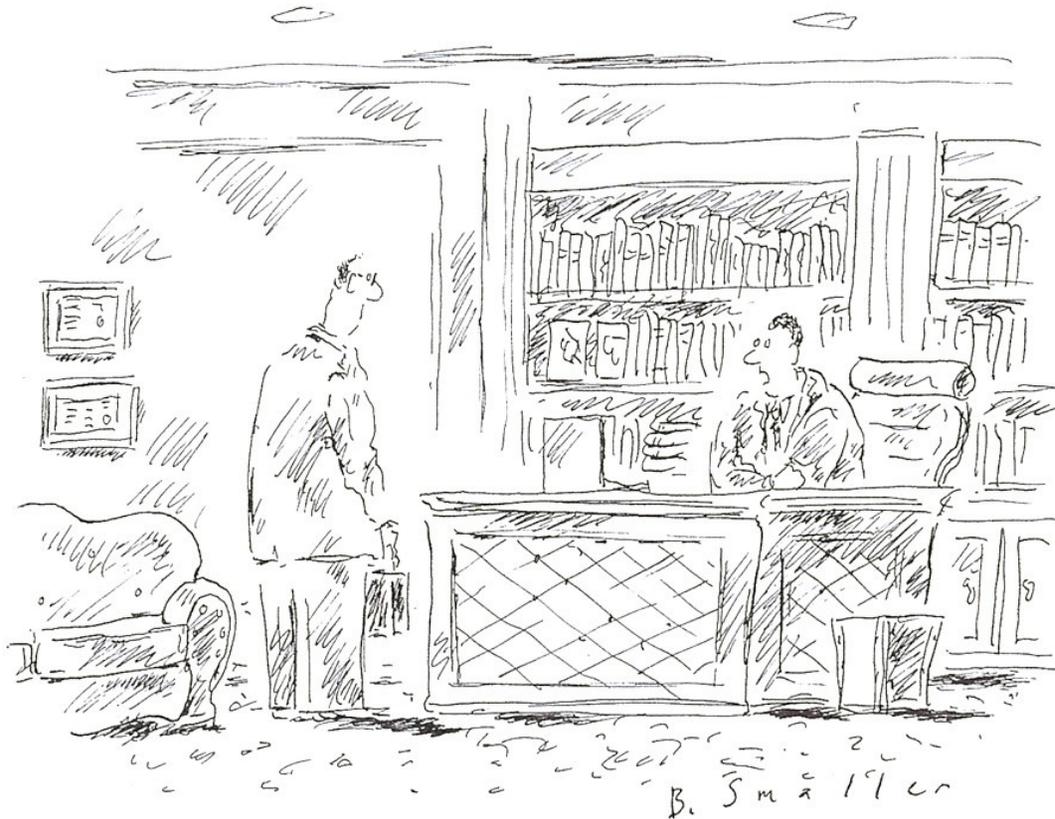
- Rich interactive, multimedia content & communications
- Imagine Google, YouTube, MySpace, Facebook, .... without BB
- Imagine a business w/o BB, or if you have at at home, going w/o
- It's an information, service economy
- Entire ICT value chain depends on it  
chips -> computers -> net services -> applications + content

### Broadband data will become more problematic to track

- Already >80-90% availability, so need adoption data to measure
- Once saturates will need usage data
- Quality of BB? Customer choice (competition)?

# Conclusions and future research

- ❑ Broadband appears to have positive measurable economic impact
  - Consistent with expectations, investment, and policy (whew!).
- ❑ Causality: Does BB follow economic growth or cause it?
  - Results stronger than expected (e.g., employment growth)
  - Are instruments used adequate econometric controls?
- ❑ Many more interesting questions remain to be answered...
  - What is impact on composition of employment (wages)? industry (investment, profitability?)
  - How does BB change behavior (firms, workers, consumers)?
  - How does public policy affect BB and its impact?
  - How does impact of BB vary with:
    - Technology: DSL/Cable v. WiFi v. FTTx
    - Business model: Open access? Competition?
    - National (regional) policies/demographics: Korea v. Europe v. US?



*"I'm not going to shoot the messenger, but I'm also  
not going to renew his grant."*

Source: New Yorker magazine, May 1, 2006

Questions/comments

email: [wlehr@mit.edu](mailto:wlehr@mit.edu) web: <http://csail.mit.edu/~wlehr>

THANKS  
for your  
attention!

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