

The Broadband Bonus: Accounting for Broadband Internet's Impact on U.S. GDP

Shane Greenstein and Ryan McDevitt
Northwestern University

Motivation

- What is the economic value created by a new good?
 - Potentially large economic effects as a new technology replaces old.
 - In 2001: 45m hh use dial up, 10m use broadband.
 - In 2006: 34m hh use dial-up, 47m use broadband.
 - How much economic value was created through the diffusion of broadband?
 - Internet access is a big industry (\$39B in GDP in 2006). Merits attention for its own sake.
 - Questions about the extent of economic gains stemming from the deployment of a new technology.
 - Replacing dial-up creates additional complication.

Our Paper's Objective

- Provide benchmark estimates for policy discussions
 - Relentlessly quantitative. Assembles best public data.
 - Only examine households, not businesses. Only US.
- Two traditional measures in economics.
 - Revenue growth → GDP growth or producer surplus.
 - Buyer willingness to pay (WTP) → consumer surplus.
- Compare revenue & consumer surplus w/ broadband to what would have happened w/o broadband.
 - Robert Fogel: contribution to growth is contribution above what would have occurred in absence of new technology.
 - Compare with a counter-factual world with only dial-up.

Main Results

- When properly accounted for, the use of broadband in households accounted for approx \$20 - \$22B in new revenue in 2006, but that is not the same as created value.
 - Approx \$15B of newly created value.
 - Approx \$8.3B to \$10.5B is new revenue for firms.
 - Approx \$6.7B to \$4.8B is consumer surplus, which is not measured as a part of GDP.
 - Equivalent to approx 1.6% to 2.2% price decline, earlier than measured by official price indices.
- These estimates are much lower than others -- by an order of magnitude. Why?
 - Popular forecasts are not grounded in – or calibrated against – historical data, as ours are.
 - We strictly employ traditional economic methods and Fogel's conceptualization of the issues.

What Our Calculations Miss

- Growth externalities: not considered by parties during the transaction.
 - Suppliers: Benefit to Cisco from selling more Wi-Fi equipment to users. Benefit to Amazon from additional sales b/c broadband users experience more satisfying service. Benefit to Google from more ad sales b/c users stay on line longer.
 - Users: Unanticipated slowness that one neighbor's use imposes on another, or benefits that one person's participation in a p2p network confers on another (as long as there is no membership fee).
 - Still important to account for countervailing effects, however.

Summary of Findings: Suppliers

- Summary: 59% to 54% of broadband revenue is replacement of dial-up & second lines.
 - New revenue is \$10.6B in 2006 if price = \$40. That is 46% of \$22B for households.
 - \$8.3B when $P = \$36$, which is 41% of \$20.3B.
 - Aggressive conversion (too high) → \$2.3B lower, while unaggressive (too low) → \$0.9 higher.
- Not an estimate of profitability.
 - Can see cable is big grower, dial-up ISPs biggest loser. Telco gains small b/c also lose second line.
 - Revenue levels consistent w/ cost estimates for upgrade (e.g., \$150-\$400 per household).

Summary of Findings: Consumers

- CS approx \$6.7B to \$4.8B in 2006.
 - 44% or 32% of approx \$15B total value created.
 - Aggressive conversion (too high) reduces total surplus by \$0.8, while unaggressive (too low) increases \$0.6, assuming \$40 price, so the estimates are much more sensitive to assumption about pricing than conversion.
- Cautionary notes:
 - No adjustment for inelastic demanders or AOL's pricing.
 - This data is from '02. Would recent data from users w/ recent experience show greater unwillingness to give up Broadband?

Implications

- Rural broadband expensive relative to likely benefits.
 - “Broadband for Boondocks”
 - A decade of private-led build-out and retrofit of existing infrastructure by cable co. & local telcos have upgraded everywhere that is cost-viable.
 - Leaves high cost retrofits or green field upgrade.
 - *Billion dollars will not go very far in reaching high-cost households.*
- Next generation of upgrade just starting to happen.
 - Next five years: Either 3G/4G or WiMax.
 - Very unclear how to measure benefits.

Future Work

- Broadband diffusion world wide in need of a similar approach to measurement.
 - Potential for extending simple model to world-wide broadband data.
- Next step: estimate more systematic model of the demand for broadband.
 - Give a sense of the world-wide gains.