



# ***Mobile Broadband Adoption, Uses, and Effects***

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# Outline

- Purpose of research
- Context in the body of research
- Empirical approach
- Conclusions and implications



## Motivation

- Examine factors that determine mobile and fixed broadband adoption, use, and substitutability



## Research Goals

- Differences between no Internet, narrowband and broadband, and between fixed and mobile broadband
- Factors driving desire to switch providers
- Usage differences between narrowband and broadband users, and between fixed and mobile broadband users
- Reasons for choosing no Internet, form of broadband access, and operator or pricing plan
- Reasons for choosing higher speed and usage options



## Broadband Research

- Index/ranking studies
- Penetration and usage studies
- Impact studies



## Index/Ranking

- OECD (2008)
  - Fixed subscribers per 100 inhabitants
- Wallsten (2008)
  - Separate business/residential; missing connections; household size; inconsistent metrics; actual vs. advertized speeds
- Ford, Koutsky, and Spiwak (2008)
  - Broadband efficiency index; demographics explain most of the penetration



## Supply Determinants

- Deployment costs
  - Bauer, Kim and Wildman (2003); Lee and Marcu (2008)
- Network unbundling increases penetration at least initially
  - Bauer, Kim and Wildman (2003); Denni and Gruber (2005); and Lee and Marcu (2008)
- Subsidies increase deployment
  - Bauer, Kim and Wildman (2003)
- Competition increases supply
  - Especially intermodal competition in fixed – Aron and Burnstein (2003); Denni and Gruber (2005); Distaso, Lupi, and Manenti (2006)
  - And in mobile – Lee and Marcu (2008)





## Demand Elasticity

- Inelastic – Varian (2002)
- Cable inelastic, but DSL elastic – Rappoport et al. (2001)
- Becoming more inelastic with time – Rappoport et al., (2002)
- Elastic – Crandall, Sidak, and Singer (2002); Ida and Kuroda (2006)
- Varies with competition -- Cardona, Schwarz, Yurtoglu and Zulehner (2007)



## Demand Determinants

- Broadband preferred over dial-up if time is valuable, usage is high, and income is high
  - Rappoport et al. (2002, 2003)
- Broadband demand decreases with age
  - Rappoport et al. (2003)
- Fixed and mobile broadband substitutes
  - Cardona, Schwarz, Yurtoglu and Zulehner (2007)

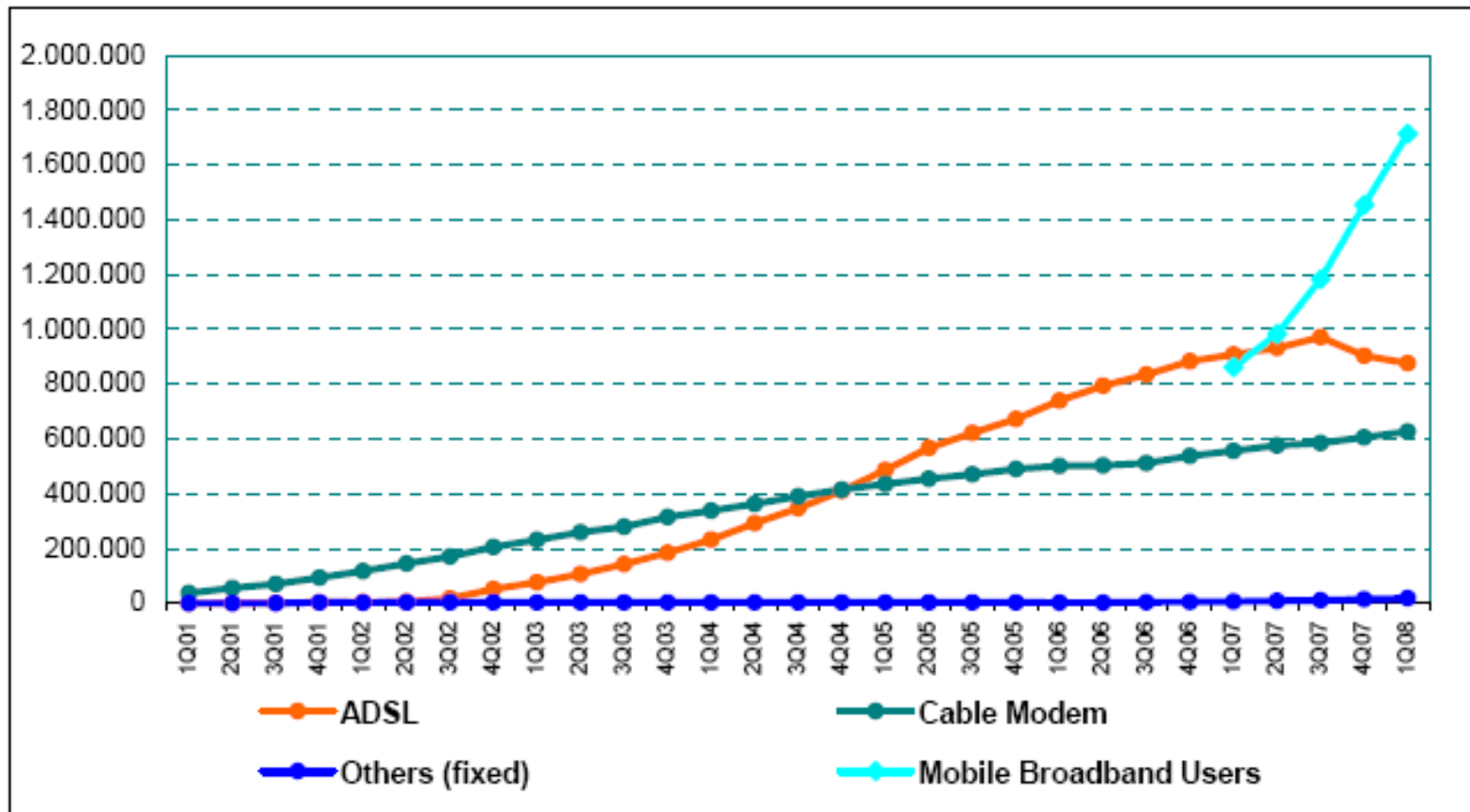


## Impact Studies

- Subscription Studies
  - Gillett et al. (2006) -- Business and job growth
  - Crandall et al. (2007) -- GDP and job growth
- Deployment Studies
  - Shideler et al. (2007) -- Employment growth and redistribution
  - Van Gaasbeck et al. (2007) -- Employment and payroll growth

# Context

## Evolution in the number of broadband customers in Portugal



Source: ICP-ANACOM

## Data

- Survey in Portugal, 2006
  - Detailed demographic and subscription data
  - Limited price and no detailed bundling data
- Survey in Portugal, 2008
  - Includes price plan data
  - Not yet analyzed



## Variables

- Type of access
- Hours of use and uses
- Demographics (age, education, employment, household size, habitat, income proxy)
- Years of service
- Region
- Satisfaction with service
- Desire to switch providers



## Goal 1: Differences between no Internet, narrowband and broadband, and between fixed and mobile

- Multinomial logit model
  - Working on nested logit
- Higher income and more highly educated are more likely to choose mobile broadband
  - Perhaps more useful for type of employment
- Otherwise, purchasers of fixed and mobile are no different statistically

## Goal 2: Factors driving desire to switch providers

- Logit and probit models
- Desire to switch if
  - Internet subscriber for longer period of time
  - Dissatisfied with speed and reliability
  - More technically oriented consumer
  - All but reliability also impact intensity of intent
- Fixed same as mobile, but mobile sample small





## **Goal 3: Usage differences between narrowband and broadband users, and between fixed and mobile broadband users**

- Ordinary least squares on hours of use
- Hours of use statistically same for fixed and mobile broadband
- Heavier users are more likely to be
  - Young
  - Satisfied with bill clarity
  - Users of online financial and tax services



## **Goal 3: Usage differences between narrowband and broadband users, and between fixed and mobile broadband users (cont.)**

- No correlation between hours of use and reliability
- Mobile broadband users more likely to manage finances and less likely to download games, music, and videos
- Cable customers most likely to use broadband for entertainment



## Further data needed

- Goal 4: Reasons for choosing no Internet, form of broadband access, and operator or pricing plan
- Goal 5: Reasons for choosing higher speed and usage options



## Tentative Conclusions

- Except for higher income customers, modes of access appear to be substitutes
- Speed and reliability appear more important than mode in determining intent to switch
- Mobile users more transaction oriented and less entertainment oriented
- Early adopters (high value customers) are more critical of providers



# Appendix



# U.S. Study Results

- Gillett et al. 2006
  - Cross-sectional panel
  - Broadband  $\Rightarrow$  job growth, number of businesses, property value. No wage impact.
- Crandall et al. 2007
  - Cross-sectional data
  - Broadband  $\Rightarrow$  more jobs and increased GDP, particularly in the service sector, such as finance, real estate, and educational services.
  - 1.0% increase in state broadband penetration yields approximately 300,000 jobs
    - magnitude of job impact increases over time



# Kentucky Study

- Shideler et al. (2007)
  - Broadband availability contributes to employment growth
  - Only accommodations and food services realized reduced employment
  - Too much or too little broadband infrastructure saturation portends lower returns on investment



# Lake County, Florida

- Ford and Koutsky (2005)
  - Impact of municipally owned broadband systems on economic growth. Comparisons to other counties.
  - Compares three years prior to and the three years after 2001, the year the broadband network was first used extensively throughout the county
  - Findings suggest 128% growth in gross sales per capita
    - Omits differing impacts of 9-11 and 2004 hurricanes





# California Study

- Sacramento Regional Research Institute (Van Gaasbeck et al. 2007)
  - Economic impact of broadband on 39 California counties from 2001 through 2006; 92% of the state population
  - Measures broadband use and not deployment
  - Broadband deployment appeared to contribute to employment and total payroll growth
    - Negative impact on number of physical business establishments



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