The relationship between mobile and fixed line communications: A survey

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The changing landscape

• Mobile telephony started in earnest less than 30 years ago. Now there are more than 4 billion users worldwide against only about 1.2 billion fixed-network subscribers.

• Most phenomenal growth in LDCs, where a lack of fixed network infrastructure spurred mobile penetration.

• This survey concentrates on the entirely different situation in DCs with full fixed-line penetration to begin with. Here fixed networks first nurtured mobile telephony and now are pushed back by it.

• Advanced case of Austria, where the ratio of users is almost 5:1 in favour of mobile and the ratio of telephone usage 3:1.

• Main topic is therefore fixed-mobile substitution (FMS): The replacement of fixed-line services with mobile services.
Overview

Positive questions

• What is the empirical evidence on the occurrence, extent and patterns of FMS?
• What factors explain the evidence on FMS?
• How is FMS related to competition?
• What are the policy consequences of FMS?
• What are the gaps in and shortcomings of the literature and how can they be filled?
Empirical evidence on FMS

• FMS is not really tested in the literature. Instead, there are
  – Diffusion models for mobile penetration
  – Demand elasticity estimates for own and cross effects between fixed and mobile services
Empirical evidence on FMS: Diffusion models

- Dynamic models to characterize and explain shape and speed of mobile penetration
  - Mostly cover period until 2000
  - Main explanatory variables refer to supply side
    - 1G/2G
    - Standardization
    - Competition
  - FMS is addressed by fixed penetration as explanatory variable
    - Positive effect for LDCs and emerging markets
    - Mixed effect for DCs
Empirical evidence on FMS: Cross-elasticities

• Subscription
  – Multiple countries
    • Mixed results for mobile subscription
    • Negative elasticities for fixed-line subscription (LDCs only?)
  – Single countries
    • Positive cross-elasticities for mobile and fixed-line subscriptions

• Calls
  – Only single-country estimates
  – Problems of price variables
  – All positive for fixed and mobile call demands
Empirical evidence on FMS: Own demand elasticity

• Own-price elasticity should increase as cross effects increase.
• Mobile
  – Subscription
    • Grzybowski and Pereira (2006 and 2007, Portugal): -.34
    • Waverman et al. (2005, LDCs): -1.50
  – Calls
    • Hausman (1999, U.S) and a number of other studies around -0.5
• Fixed
  – Subscription
    • Generally -0.0 to -0.1, but Briglauer et al. (2009, Austria): -0.5
  – Calls
    • Generally -0.25 to -0.7, depending on distance.
    • Briglauer et al. (2009, Austria): -1.38 long run, -0.74 short run
Empirical evidence on FMS:
Conclusions

• Weak evidence of early complementarity

• Substitutability not that strong
  – Clearer on calls than on penetration
  – No study with new data
  – Serious price data problems
  – Diffusion models dynamic but not well grounded in theory; also, shrinkage model of fixed penetration is missing
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Explaining the evidence on FMS

FMS ≈ demand substitution + network effects + competitive effects + relative supply shifts, which lead to price reductions and quality improvements
Explaining the evidence on FMS

• Theoretical demand models
    • Includes network externalities
      – Demand can be upward-sloping
  – Jeon (2001)
    • Models calling demand
      – Substitutability assumed at basic micro-level of individual calling
      – Complementarity arises from network effects
      – As penetration increases substitutability dominates.
  – Andersson et al. (2006)
    • Include call-back effects
      – Call-back effects $\approx$ complementarity
      – Complementarity increases with increased penetration.
Explaining the evidence on FMS

• Price changes in favor of mobile
  – Cost reductions: What explains supply shifts?
  – Economies of scale
    • Paucity of literature on cost functions
    • Fixed-sunk cost effect of initial network coverage
  – Learning effects
  – Technical change

• Decreases in price-cost margins
  – Increased competition: Large effect of 2nd entrant
  – Waterbed effect from high FTM termination rates
Explaining the evidence on FMS: Mobile termination

• Relevant factors
  – RPP vs. CPP: Natural experiment of U.S. vs. other countries
  – Regulated vs. unregulated FTM rates
  – Asymmetry to MTF, which is regulated virtually everywhere
  – Waterbed effect

• Factors leading to reduced termination charges
  – FTM/MTM arbitrage
    • Relevant at high mobile penetration
    • Waterbed effect does not work for MTM in symmetric networks
  – Multihoming as termination bypass

• Declining effect of FTM termination charges on mobile penetration, due to regulation and mitigating factors
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The relationship between FMS and competition

A lack of models

• Cremer et al. (1996): Feature cost structures and mobile advantage in demand

• Missing literature from areas like
  – Dynamic dominant firm models: Could explain dynamic feature of FMS
  – Models of 2-sided markets
  – Platform competition
The relationship between FMS and competition

Market convergence

• FMS → Increased competition in both sectors???

• Under market convergence mobile and fixed networks would compete with differentiated products.

• SSNIP test of single market possibly supported for calls, definitely not for subscription (Stumpf, 2007; Briglauer et al., 2009)

• Analysis of influence of mobile on ILEC market power does not require SSNIP test.
The relationship between FMS and competition
Bundling and integration of fixed and mobile services

• Incumbents offer fixed and mobile services
  – Beneficial if complements, but not necessarily so if substitutes
    • However, could be complements in supply
  – Incumbents try to avoid FMS
    • Zimmerman (2007, 2008)
    • However, Austrian incumbent?

• New trend towards bundling (quadruple play) and fixed-mobile integration
  – New market?
  – Competitive disadvantage of “-only” firms?
    • What about cable TV?
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The policy consequences of FMS: Fixed network deregulation

- Core networks and fixed line calling is/will be deregulated even without FMS.
- Fixed-line access and origination may remain regulated even with strong FMS
  - Fixed and mobile markets for independent firms may not grow together for a while: Low own and cross elasticities
  - Continued fixed network regulation leads to price rigidities that handicap fixed networks against competition from non-regulated mobile rivals.
  - Fixed-mobile integration may allow integrated incumbents a dominant status.
The policy consequences of FMS: Mobile termination charges

• No U.S. issue

• European Union and other DCs
  – Externality surcharges outdated
  – Path to lower FTM termination charges continues
  – More cost symmetry due to move towards NGN
  – Multihoming, termination arbitrage + termination bypass are possible alternatives to regulation.
The policy consequences of FMS Universal service

• Mobile communication cheaper to provide for low-density areas and low-income customers than fixed networks

• Mobile more effective in increasing total penetration (higher subscription elasticity)

• However, universal service may become a broadband-only issue, because mobile low-user access is already cheap enough.
  – Counter: Total penetration in U.S. has slipped in spite of mobile expansion
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Gaps in and shortcomings of the literature

• Empirical evidence of FMS requires
  – New, better data
  – More micro-approaches
  – More on broadband and other fixed-line developments

• Explanation of empirical evidence requires
  – More analyses of cost functions
  – Analysis of effects of broadband in limiting and possibly reversing FMS

• Competition analysis requires
  – More theoretical modeling
  – Capturing effects of fixed-mobile integration

• Policy consequences require analyses about
  – How to deal with excess capacity in fixed networks
  – Simultaneously dealing with FMS and NGN: Fixed-mobile integration