Is Fixed-Mobile Substitution strong enough to de-regulate Fixed Voice Telephony? Evidence from the Austrian Markets

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Motivation

Motivation

- Until recently, most fixed network retail markets in Austria were regulated:
  - Access for residential as well as business users — regulated
  - National calls of residential users — regulated
  - International calls of residential users — not regulated
  - National as well as international calls of business users — regulated
- Mobile Telephony was not considered to be part of the same market
- Competitive pressure from mobile telephony seems to have increased
- Not for all markets in the same way
  - Little empirical evidence on fixed-mobile substitution on level of particular retail markets (access/calls, national/international, business/residential)

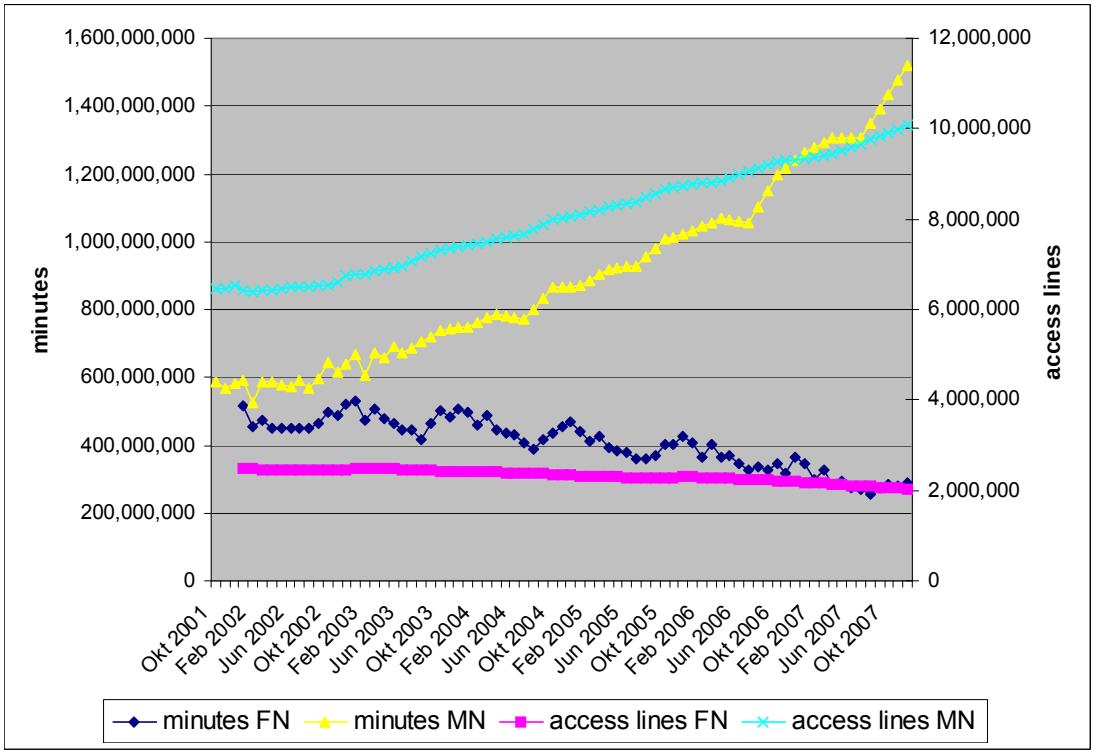
➢ In which markets is fixed-mobile substitution strong enough?

Motivation

- Mobile competition in Austria is advanced:
  - about 75% of voice traffic originated from mobile networks in 2007
  - According to the European Commission (2009) Austria also ranks first in mobile broadband penetration
- To test whether fixed-mobile substitution is strong enough, a hypothetical monopolist test is conducted
  - Test asks whether a small but significant non-transitory price increase is profitable for a hypothetical monopolist
- Estimation of demand elasticity
  - Quantity = f(own price, substitute price, income)
- Along three dimensions
  - Access vs. Calls – National calls vs. International calls – Residential vs. Non-residential consumers

Demand estimations – focus of analysis

- Estimations focus on private users
  - More homogenous
  - More likely to consider mobile as substitute
- Estimation are done for
  - National calls
  - Access



Data

Data

- Quantities
  - Number of access lines held by private users (fixed and mobile)
  - Number of minutes from private users (fixed and mobile)
- Prices
  - Average prices: Revenues divided by quantities
- Instruments
  - For the fixed network calls prices:
    - Basket of fixed and mobile termination charges
    - Number of fixed access lines
  - For the fixed network access prices:
    - Number of broadband lines
    - Number of voice over broadband lines
- All data are available on a monthly basis from Jan 02 to Dec 07
  - Exception: Data for mobile only on quarterly basis from Jul 03 to Dec 07 -> interpolated

Estimation and results

Model

- Tests show that quantity, prices, and income variable have a unit root
- We specify the following error correction model:

$$(1)\quad \Delta Q_t = \beta_0 + \beta_1 \Delta P_t + \beta_2 \Delta W_t + \beta_3 \Delta Y_t + \beta_4 D_1 + \beta_5 D_2 + \\ + \gamma (Q_{t-1} - \alpha_1 P_{t-1} - \alpha_2 W_{t-1} - \alpha_3 Y_{t-1} - \alpha_4 trend) + \varepsilon_t$$

- It is estimated in a two-step procedure:
  - First, equation (1) is estimated to obtain a consistent estimate of γ
  - Then, we construct $\Delta Q_t - \hat{\gamma} Q_{t-1}$ and regress it on the remaining variables in (1)
  - Instruments are used for endogenous variables on the RHS
- Residuals have to checked to be stationary
- γ describes the speed of adjustment to the long-run relation after a shock

Relation between access and calls

- Fixed and mobile operators set two-part tarifs
- In principle, FMS can be expected to depend on four prices:
  - fixed network access price,
  - mobile network access price,
  - fixed network per minute price and
  - mobile network per minute price
- We include all four prices in our initial model, however, in a further step we eliminated prices if they are not significant.
- Alternatively, we use variables incorporating both the fixed and the variable price component (e.g. total revenues divided by total users or divided by total minutes).

National calls – results

- Elasticities

Sort run elasticities		own price (fixed)	cross price (to mobile)
calls, model 1 (4 prices)	OLS	-0.84***	0.15
	TSLS	-1.76**	0.28
calls, model 2 (calls prices)	OLS	-0.74***	0.15
	TSLS	-0.75	0.06
calls, model 3 (avg. calls price)	OLS	-1.06***	0.09
	TSLS	-1.41***	0.11

Long run elasticities		own price (fixed)	cross price (to mobile)
calls, model 1 (4 prices)	OLS	-2.01***	0.34**
	TSLS	-3.57***	0.02
calls, model 2 (calls prices)	OLS	-1.95***	0.46***
	TSLS	-1.38*	0.50***
calls, model 3 (avg. calls price)	OLS	-1.20***	0.44***
	TSLS	-1.15***	0.50***

- Instrument tests
  - Instruments are correlated with prices
  - Hausman test for endogeneity of quantities and prices
- Cointegration:
  - γ significant, residuals stationary
  - -> there exists a long run relation between quantity and prices

National calls – summary of results

- Own-price elasticity:
  - Short run: significant, range from inelastic to elastic (-0.74 to -1.76)
  - Long run: significant, elastic (-1,15 to -3,57)
- Cross-price elasticity:
  - Short run: insignificant
  - Long run: singnificant, range 0.34 to 0.50

➢ Demand for fixed network calls (national calls of private users) is **elastic**, at least in the long run, **mobile** calls are a **substitute**.

➢ (long run more sensible, since short run is only a month)

Access (private users) - model

- Variables have a unit root
- Same model as for calls is estimated
- But γ is insignificant in several specifications

➢ No long run relation, model is estimated (only) in differences

  ➢ Autocorrelation in the residuals -> AR-terms

- Instruments for fixed network access price:
  - Number of broadband lines and number of voice over broadband lines

Access (private users) – results (cont.)

- Elasticities

Sort run elasticities		own price (fixed)	cross price (to mobile)
access, model 1 (4 prices)	OLS	-0,06***	-0.00
	TSLS	-0,09***	-0.00
access, model 2 (access prices)	OLS	-0,06***	-0.00
	TSLS	-0,10***	-0.00
access, model 3 (avg. calls price)	OLS	-0.01	-0.00
	TSLS	-0.01	-0.00

Long run elasticities		own price (fixed)	cross price (to mobile)
access, model 1 (4 prices)	OLS	-0.15**	-0.00
	TSLS	-0.21**	-0.00
access, model 2 (access prices)	OLS	-0.15**	-0.01
	TSLS	-0.25**	-0.01
access, model 3 (avg. calls price)	OLS	-0.01	-0.00
	TSLS	-0.02	-0.00

- Instrument tests
  - Instruments are correlated with prices
  - Hausman test for endogeneity of quantities and prices

Access – summary of results

- Own-price elasticity:
  - Short run: significant, very inelastic
  - Long run: significant, still very inelastic
- Cross-price elasticity:
  - Short run: insignificant
  - Long run: insignificant

➢ Demand for fixed network access (private users) is **inelastic**, also in the long run, **mobile** access is **not a substitute**.

Conclusions

Conclusions

- National calls for private users seem to be elastic, CPE to mobile positive
- Estimated elasticity likely larger than critical elasticity for HM-test (~1.2)
  - Assumptions: 25% variable costs, 10% price increase, linear demand

➢ Fixed and mobile are likely to be part of the same market for national calls of private users -> retail market has been deregulated

- Access for private users is inelastic, CPE to mobile insignificant

➢ Mobile unlikely to be part of the same market for private users

Conclusions for other markets

- Business customers / international calls
  - Consumer surveys / market data show that fixed-mobile substitution is less pronounced in the business segment
  - ➢ Mobile unlikely to be part of the same market
  - Same goes for international calls (still large price differences)
- Other countries
  - Austria is relatively advanced concerning fixed-mobile substitution
    - Highest share of mobile compared to fixed revenues (OECD)
    - Highest penetration of mobile broadband (14th Implementation Report)
  - ➢ Questionable, whether fixed-mobile substitution is strong enough in other countries

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RTR

Thank you for your attention!!!

National calls - results

Dependent Variable: D(LQ_FN_USE)
Method: Least Squares
Date: 09/15/08 Time: 18:12
Sample (adjusted): 2002M02 2006M10 2007M01 2007M12
Included observations: 69 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LQ_FN_USE(-1)	-0.396930	0.098133	-4.044833	0.0002
LRPI_FN_USE(-1)	-0.775141	0.199417	-3.887040	0.0003
LRPI_MN_USE(-1)	0.182965	0.057930	3.158355	0.0025
LRPROD_05A(-1)	0.250446	0.174949	1.431532	0.1576
@TREND	-0.002844	0.000963	-2.952110	0.0045
C	5.139436	1.770735	2.902431	0.0052
D(LRPI_FN_USE)	-0.740866	0.181711	-4.077167	0.0001
D(LRPI_MN_USE)	0.145601	0.242799	0.599674	0.5511
D(LRPROD_05A)	0.463820	0.152461	3.042224	0.0035
D_SEAS3A	-0.118047	0.012648	-9.333081	0.0000
D_SEAS3B	-0.062331	0.007654	-8.143576	0.0000

R-squared	0.855658	Mean dependent var	-0.009090
Adjusted R-squared	0.830771	S.D. dependent var	0.061937
S.E. of regression	0.025109	Akaike info criterion	-4.385984
Sum squared resid	0.036568	Schwarz criterion	-4.029822
Log likelihood	162.3164	F-statistic	34.38224
Durbin-Watson stat	2.560445	Prob(F-statistic)	0.000000

γ

*1/γ = Long run elasticity

Dependent Variable: D(LQ_FN_USE)+0.39693*LQ_FN_USE(-1)
Method: Two-Stage Least Squares
Date: 10/14/08 Time: 10:59
Sample (adjusted): 2002M02 2006M10 2007M01 2007M12
Included observations: 69 after adjustments
Instrument list: LRPI_MN_USE(-1) LRPROD_05A(-1) @TREND C D(LRPI_MN_USE) D(LRPROD_05A) D_SEAS3A D_SEAS3B LQ_FN_ACC_C(-1) D(LQ_FN_ACC_C) D(LRPB_TERMR(-10)) LRPB_TERMR(-11)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRPI_FN_USE(-1)	-0.542339	0.296697	-1.827921	0.0726
LRPI_MN_USE(-1)	0.198253	0.039261	5.049565	0.0000
LRPROD_05A(-1)	0.163691	0.223889	0.731126	0.4676
@TREND	-0.001708	0.001549	-1.102889	0.2746
C	6.163320	1.616604	3.812511	0.0003
D(LRPI_FN_USE)	-0.749358	0.555425	-1.349162	0.1824
D(LRPI_MN_USE)	0.061363	0.282834	0.216959	0.8290
D(LRPROD_05A)	0.400864	0.188954	2.121494	0.0381
D_SEAS3A	-0.108675	0.015328	-7.089962	0.0000
D_SEAS3B	-0.059327	0.012101	-4.902551	0.0000

R-squared	0.927811	Mean dependent var	7.855239
Adjusted R-squared	0.916800	S.D. dependent var	0.090249
S.E. of regression	0.026032	Sum squared resid	0.039981
Durbin-Watson stat	2.474134	Second-stage SSR	0.062315

Short run elasticities