

Ex-post evaluation of the mergers H3G/Orange and Telekom Austria/Yesss!

ACE Conference – 16 November 2017

Dominik Erharter*, BWB

*Disclaimer: The opinions expressed in this presentation and on the following slides are solely those of the presenter and not necessarily those of the Austrian Federal Competition Authority (BWB).

Background

The transactions

- **Two parallel mergers in the Austrian mobile telecom sector**
 - **H3G/Orange (COMP/M.6497):** On 12 December 2012, the Commission cleared the acquisition of Orange Austria by Hutchinson 3G Austria, subject to remedies.
 - **Telekom Austria/Yesss! (26 Kt 47, 48/12):** In a back-to-back transaction, H3G sold Orange's discounter brand Yesss! to the former telecom incumbent Telekom Austria. On 26 November 2012 the Austrian Cartel Court cleared the transaction without remedies.

- **H3G's commitments in H3G/Orange**
 - (i) Upfront MVNO agreement,
 - (ii) access for up to 16 additional MVNOs on up to 30% of own spectrum,
 - (iii) divestment of spectrum and assets to potential MNO entrant.

Subscriber based market shares	TA	TMA	Orange	H3G
Pre-merger (Q4/2012)	39.7%	30.7%	17.1%	12.6%
Post-merger (Q1/2013)	45.5%	30.4%	-	24.1%

TA...Telekom Austria, TMA...T-Mobile Austria, Orange...Orange Austria (including Yesss!), H3G...H3G Austria.

Subsequent developments (sample)

2013

- **Jan 2013:** TA raises sim-only tariff 'Smartbob XL' from EUR 10 to 19.9 per month;
- **Apr 2013:** TA introduces 'Go' family of tariffs;
- **May 2013:** H3G/Orange closes 30% of its shops and a call center and announces to dismiss 10% of its employees;
- **Jul 2013:** TMA introduces 'SmartNet' family of tariffs;
- **Aug 2013:** H3G discontinues Orange and introduces the 'Hallo' family of tariffs;
- **Oct 2013 (frequency auction):** The multi-band spectrum auction (800/900/1800 MHz) raises EUR 2.014bn; there is no MNO entrant, commitment (iii) is void;
- **Nov 2013 (price announcements):** H3G raises the cheapest 'Hallo' tariff from EUR 7.5 to 10 per month; TA and TMA comment on this in the news media and welcome the end of a "price war" and "a more rational approach to the market". TA expresses hopes that price increases will send "a strong signal to the market".

Background

Subsequent developments (sample)

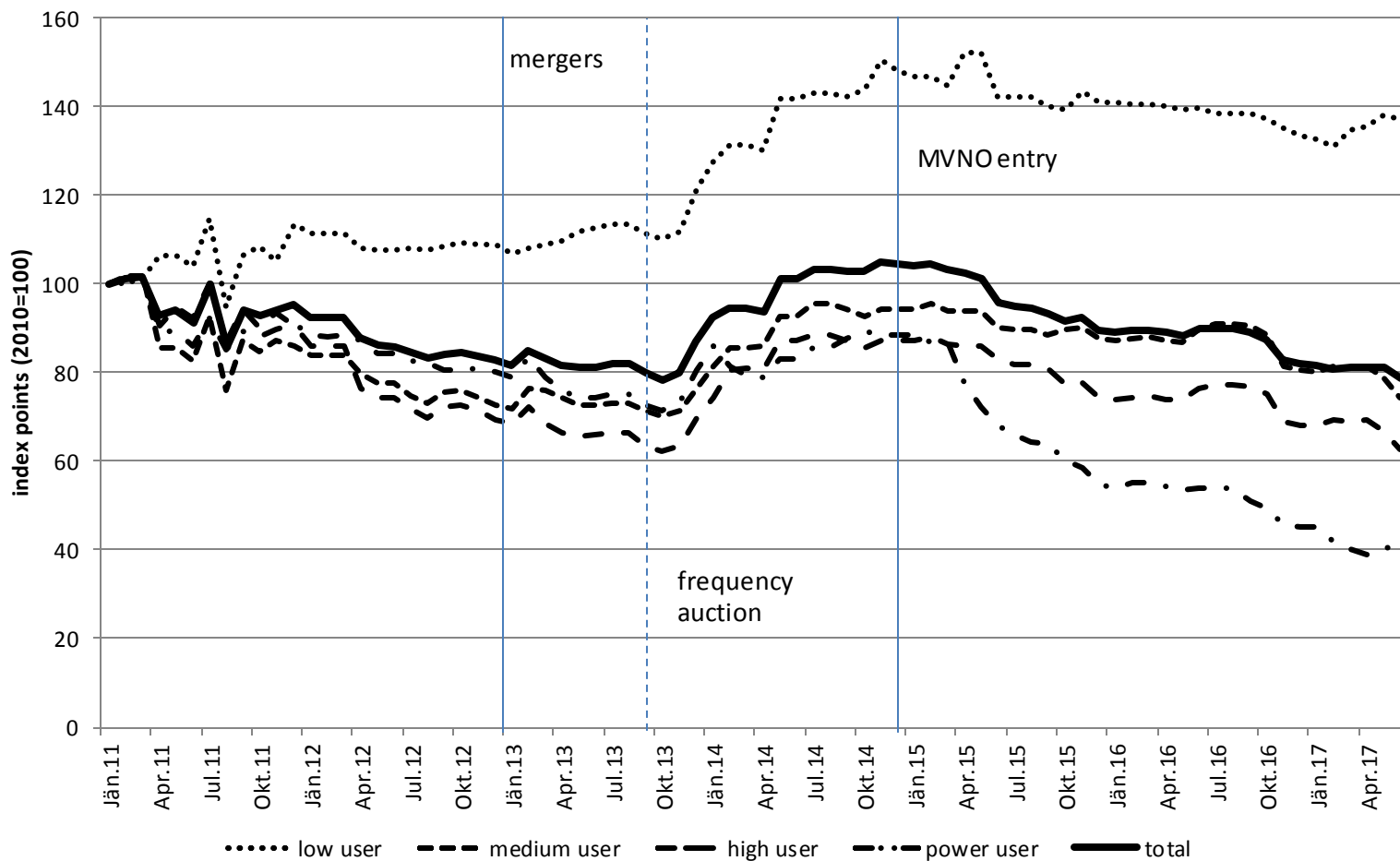
2014

- **Mar-May 2014:** TA stops to offer Go sim-only tariffs, increases setup fees, decreases handset subsidies and increases prices for *regular* subscribers;
- **Jul-Oct 2014:** TMA increases prices for *regular* subscribers;
- **Oct 2014:** H3G increases prices for *regular* subscribers;
- **Dec 2014:** Upfront MVNO UPC enters the market (commitment (i));

2015

- **Jan 2015 (MVNO entry):** Ventocom becomes an MVNO on the TMA network and introduces HoT brand, distributed in a JV with grocery retailer Hofer (Aldi); several other MVNOs follow;
- **Feb 2015:** TA decreases price per minute from 6.8 to 3.9 cent; HoT claims to have won 50k subscribers within two months (~0.6% MS);
- **Sep 2015:** 33 MVNOs are active in the Austrian market;
- **Dec 2015:** HoT claims to have won 500k subscribers within one year (~6% MS);

Prices over time: RTR new customer price index



Source: Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR)

Overview

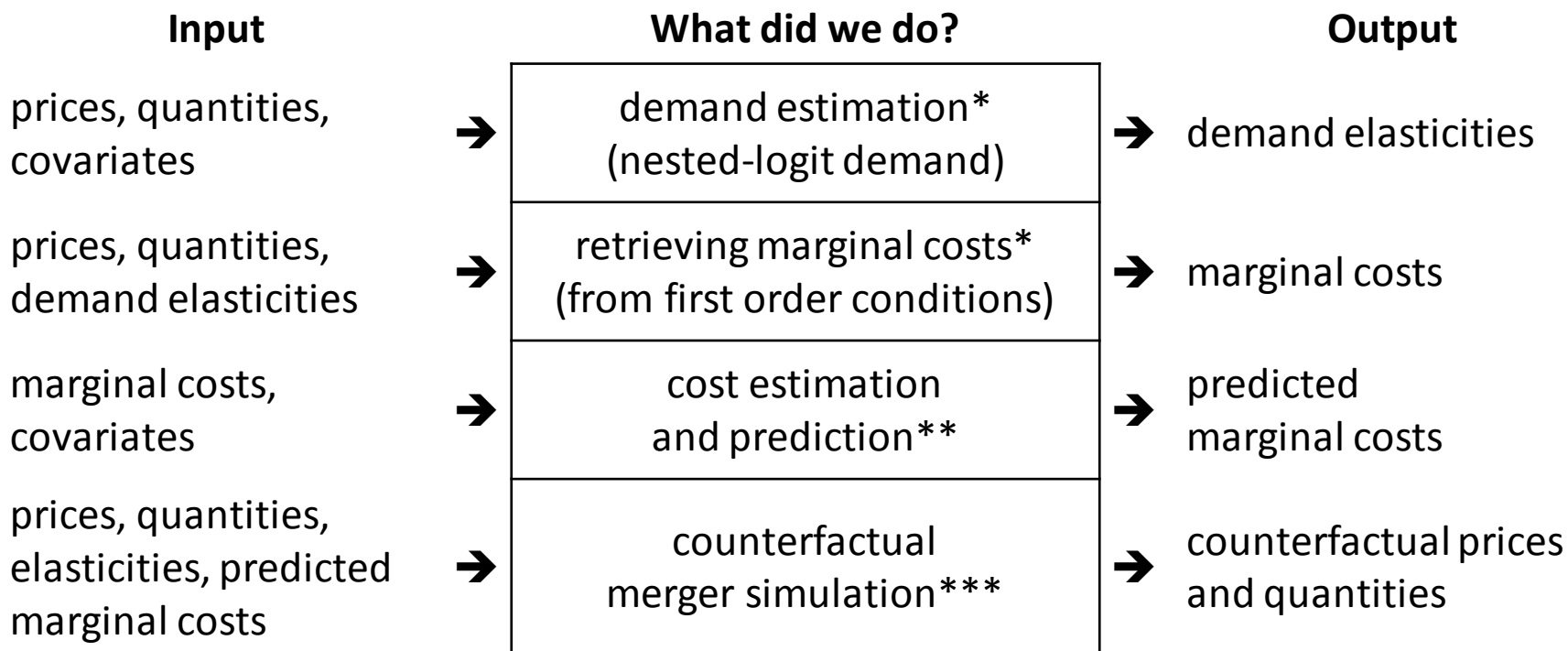
- **The BWB study**

- In July 2014 the Austrian Competition Authority (BWB) launched an ex-post evaluation of the H3G/Orange and TA/Yesss! mergers.
- Formally BWB conducted a sector inquiry on the Austrian mobile telecommunications market (July 2014 – March 2016).

- **Scope/Method**

- Data covers **regular customers**;
- Data covers only **private customers** and bundles that include **voice** (no data-only bundles);
- No comparable data from other (national) markets, no regional variation within Austria → standard Panel/diff-in-diff methods could not be used.
- Instead, **merger simulation** techniques were used;

Overview



*) standard merger simulation

**) fairly standard (eg Björnerstedt and Verboven, 2016)

***) fairly novel (eg Miller and Weinberg, 2016)

Data and key variables

- **Data**
 - Monthly tariff level data on prices, quantity, usage (min/sms/MB) and for all Austrian mobile operators from 1/2011 – 12/2014.
 - Firm level data on marketing/sales costs and investment.
- **Product, price and quantity variable**
 - product: a mobile tariff, consisting of a vector of characteristics;
 - price: constructed from fee structure and average usage per tariff (excluding roaming, extra charges etc.);
 - quantity: number of regular subscribers;

Estimation/Simulation

- **Demand estimation**

- Nested-logit demand with the following nests: tariff, payment method/tariff, contract/tariff, payment method/brand/tariff.
- 2SLS estimation with BLP instruments and higher lags of dependent variable to account for serial correlation.

- **Cost estimation/prediction**

- In telecommunications marginal costs have been decreasing over time in the past 15 years. Based on FOC, we observed decreasing implied marginal costs before the merger and increasing after the merger.
- We regressed marginal costs on observable tariff characteristics and predicted how marginal costs should have evolved without the merger.

- **Simulation**

- Static Bertrand-Nash equilibrium.
- Counterfactual: pre-merger ownership structure, no collusion.

Merger effects – main results

model (demand/cost)	(2/I)	(2/II)	(2/III)
cost prediction	logarithmic time trend	quadratic time trend	linear time trend
all segments	14.22%	17.89%	19.52%
pre-paid segment	19.71%	25.87%	30.05%
post-paid segment	12.94%	16.08%	17.15%
- sim-only	10.36%	14.79%	15.25%
- contract	14.03%	16.87%	18.25%

Subscriber-weighted price effect for regular customers in 12/2014. Source: BWB.

Merger effects – prices over time

	2013	2014	overall
observed			
observed prices (EUR)	10.75	11.85	11.34
MC from FOC (EUR)	4.93	6.12	5.56
gross margin (%)	54.2%	48.3%	51.0%
counterfactual			
predicted prices (EUR)	10.69	10.64	10.66
predicted MC (EUR)	5.46	5.92	5.7
gross margin (%)	48.9%	44.4%	46.5%
price effect (%)	0.6%	11.4%	6.4%

Main model (2/I). Subscriber-weighted averages. Source: BWB.

Merger effects – alternative counterfactuals

Counterfactual: both mergers blocked	unilateral effects (conduct=0)	coordinated effects (conduct=0.1463)
H3G/Orange cleared, TA/Yesss! cleared	5.79%	14.22%
H3G/Orange cleared, TA/Yesss! blocked	4.59%	12.90%
H3G/Orange blocked, TA/Yesss! cleared	2.48%	10.61%

Subscriber-weighted price effect (over all segments) in 12/2014, model 2/I. Source: BWB.

- In the pre-paid segment, the unilateral effect of clearing both mergers would have been 10.73%, the unilateral effect of clearing only H3G/Orange would have been 4%, and the unilateral effect of clearing only TA/Yesss! would have been 10.54%.
- Coordinated effects: The conduct parameter of 0.1463 is calibrated to match the average price effect over all segments (14.22%).

Conclusion - effects

- **Price effects of H3G/Orange and TA/Yesss!**
 - The BWB study (and other studies) point to significant price increases;
 - The BWB study also suggests
 - tariff and segment level heterogeneity;
 - that prices increased over time, not immediately after the merger;
 - that price increases might be largely due to coordinated effects;
- **Remedies:** No MNO entry, late MVNO entry, non-operative up-front entrant;
- **Challenging to disentangle effects:** Two parallel transactions, spectrum auction, remedies, MVNO entry;
- **Implications for future mergers:** market definition, coordinated effects, remedy design;

Conclusion - methods

- **Reduced form models**
 - less assumptions;
 - require good data for non-treated units;
 - relatively simple to apply;
- **Structural models**
 - stronger (but more explicit?) assumptions;
 - different data requirements (quantity data needed, no control group);
 - different counterfactuals can be simulated;
 - complex to implement (demand estimation, simulation);
- **Implications for future studies:** timing of evaluation, data, methods;

Many thanks for your attention!

wettbewerb@bwb.gv.at

www.bwb.gv.at

BACKUP

H3G/Orange and TA/Yesss!

Price effects in comparison

	RTR (2016)	BWB (2016)	Valetti et al (2015)
price effect	22-90%	14-20%	6.60%
method	diff-in-diff	structural	Panel estimation
data			
source	Tarifica	MNOs	Teligen
time	2011q1-2014q4	2011m1-2014m12	2002Q3-2014Q2
countries	11	1	33
operators	All MNOs, some MVNOs, sub-brands	all operators	2 largest MNOs
observations	16,791	24,653	4,550
measurement			
customers	new	new and existing	new
usage	basket	observed	basket
effect	1 and 2 years	2 years	long-run

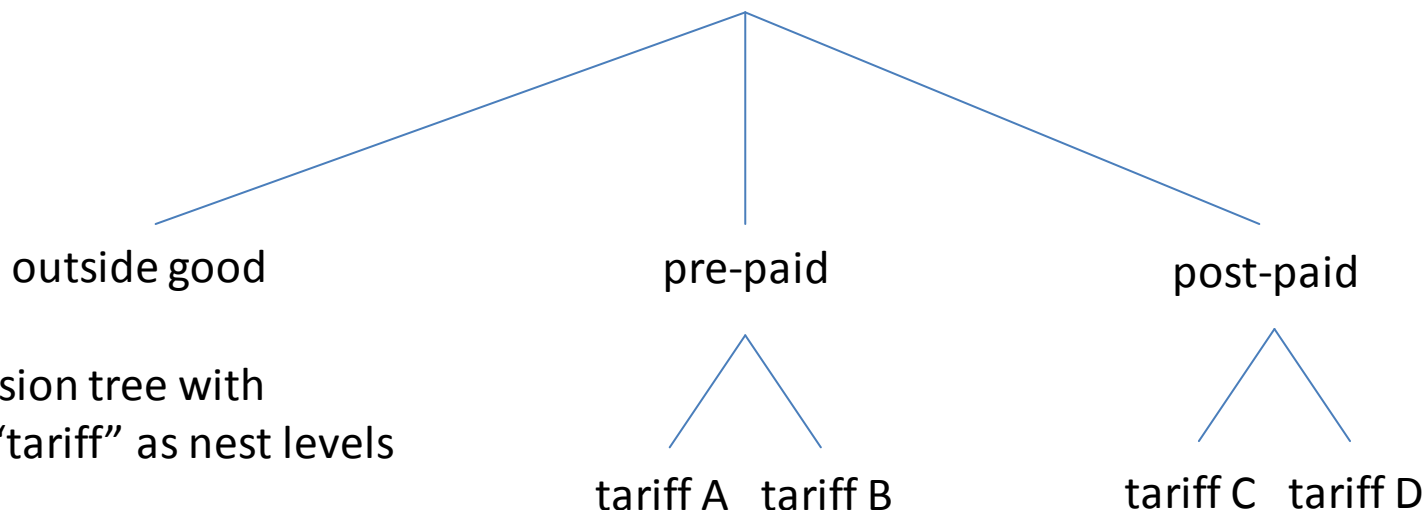
The mobile telecom industry

- **Industry trends**
 - Frequent introduction of new or higher quality services;
 - Generally falling prices (for a given usage level) → pre- and post-merger prices cannot be compared;
 - Shift from voice and short messages to data;
- **Complex tariffs**
 - Many price dimensions, many products (bundles);
 - Bundles may include handsets (possibly subsidized);
 - Non-linear tariffs (quantity discounts) and lock-in periods;
- **Entry barriers**
 - Frequency auctions;
 - Mobile network infrastructure;
 - Marketing and sales (also relevant for MVNOs);

Demand model – general idea

- **Nested-logit model**

- Consumers choose one good from a set of goods (incl. outside good).
- Utility depends on a number of characteristics, including price.
- Demand for good j is given by the average probability of choosing j times the number of consumers. Choice probabilities depend on utility.
- Some goods might be closer substitutes (belong to the same “nest”).



Nested-logit decision tree with “payment” and “tariff” as nest levels

BWB ex-post evaluation study

Oligopoly model – general idea

Static differentiated multi-product price competition.

- **Example:**

- Pre-merger 3 firms each producing one product (1,2,3 respectively)
- There is then a merger between firms A+B=M

Profit maximisation problem for one product firm (A):

$$\max_{p_1} \pi^A = (p_1 - c_1)q_1(p_1, p_2, p_3) - F_A$$

First order condition (FOC):

$$\frac{\partial \pi^A}{\partial p_1} = q_1 + (p_1 - c_1) \frac{\partial q_1}{\partial p_1} \equiv 0$$

We can deduct marginal costs based on observed prices ("observed marginal costs"):

$$c_1 = p_1 - \frac{q_1}{-\frac{\partial q_1}{\partial p_1}}$$

Oligopoly model – general idea (Cont.)

Profit maximisation for two product (merged) firm (M):

$$\max_{p_1, p_2} \pi^M = (p_1 - c_1)q_1(p_1, p_2, p_3) + (p_2 - c_2)q_2(p_1, p_2, p_3) - F_M$$

First order conditions (FOCs) for optimal prices:

$$\begin{aligned} \frac{\partial \pi^M}{\partial p_1} &= q_1 + (p_1 - c_1) \frac{\partial q_1}{\partial p_1} + (p_2 - c_2) \frac{\partial q_2}{\partial p_1} \equiv 0 \\ \frac{\partial \pi^M}{\partial p_2} &= q_2 + (p_1 - c_1) \frac{\partial q_1}{\partial p_2} + (p_2 - c_2) \frac{\partial q_2}{\partial p_2} \equiv 0 \end{aligned}$$

FOCs imply higher margins post- merger:

$$p_1 = c_1 + \frac{\overbrace{q_1 + (p_2 - c_2) \frac{\partial q_2}{\partial p_1}}^{>0}}{-\frac{\partial q_1}{\partial p_1}}$$

➔ Model implies that margins increase instantaneously after merger occurs

Oligopoly model – general idea (Cont.)

- **Example (Cont.).** The first-order conditions can be stacked to obtain

$$\begin{pmatrix} q_1 \\ q_2 \\ q_3 \end{pmatrix} + \left(\begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} * \begin{pmatrix} \frac{\partial q_1}{\partial p_1} & \dots & \frac{\partial q_1}{\partial p_3} \\ \vdots & \ddots & \vdots \\ \frac{\partial q_3}{\partial p_1} & \dots & \frac{\partial q_3}{\partial p_3} \end{pmatrix} \right) \left(\begin{pmatrix} p_1 \\ p_2 \\ p_3 \end{pmatrix} - \begin{pmatrix} c_1 \\ c_2 \\ c_3 \end{pmatrix} \right) \equiv \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

- ➔ By changing the ownership matrix, we can solve for post-merger (or counterfactual) prices ➔ merger simulation.
- ➔ We can model coordinated effects by allowing firms to take the profits of their rivals into account.

Demand estimation

Model (FD)	(1) Logit Tariff	(2)† 1 Nest Level Payment method/ Tariff	(3) Contract/ Tariff	(4) 2 Nest Levels Payment method/ Brand/Tariff
dependent variable	M_{jt}	M_{jt}	M_{jt}	M_{jt}
price	0.334 *** (-0.062)	-0.031 *** (-0.013)	-0.012 (-0.008)	-0.032 *** (-0.013)
lagged dependent	0.288 *** (-0.045)	0.036 *** (-0.011)	0.039 *** (-0.012)	0.036 *** (-0.011)
post-merger	-0.03 *** (-0.008)	-0.072 *** (-0.004)	-0.093 *** (-0.004)	-0.072 *** (-0.004)
post-auction	0.045 *** (-0.006)	0.035 *** (-0.002)	0.039 *** (-0.002)	0.035 *** (-0.002)
sales cost	0.0533 *** (-0.014)	0.015 *** (-0.003)	0.028 *** (-0.003)	0.015 *** (-0.003)
advertising cost	0.36 *** (-0.04)	0.097 *** (-0.012)	0.159 *** (-0.011)	0.096 *** (-0.011)
time trend (fd)	-0.001 *** (-0.001)	-0.001 *** (-0.0001)	-0.001 *** (-0.0001)	-0.001 *** (-0.001)
constant	0.032 *** (-0.008)	0.016 *** (-0.001)	0.016 *** (-0.002)	0.016 *** (-0.001)
group share		0.881 *** (-0.026)	0.867 *** (-0.028)	0.881 *** (-0.026)
sub-group share				0.887 *** (-0.027)
Root MSE	0.126	0.037	0.039	0.037
F	71	8316	7819	960
observations	24,653	24,653	24,653	24,653
clusters (tarrifs)	849	849	849	849

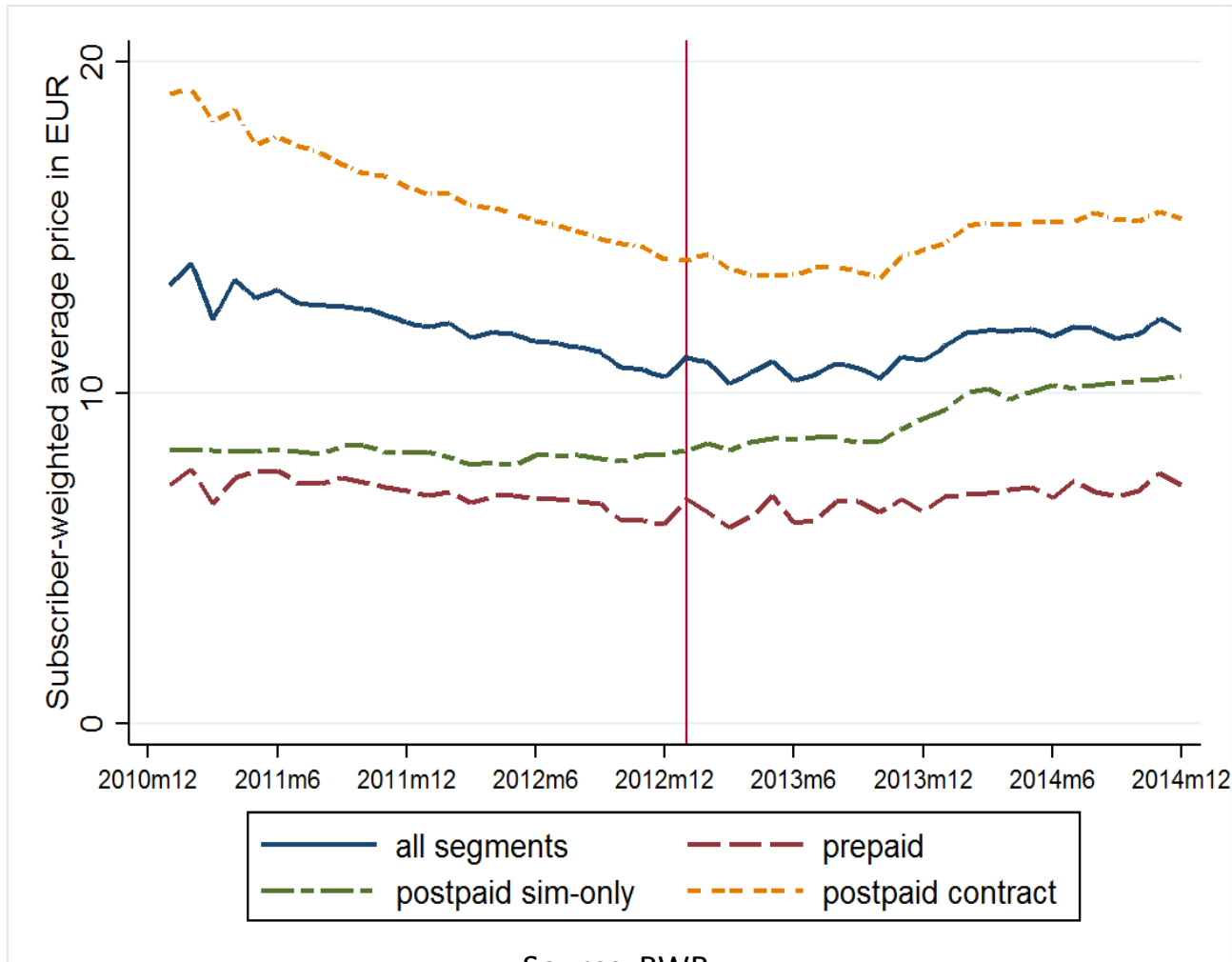
Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. †Preferred model. Monthly dummies included. FD IV estimation using Stata xtivreg2 package (Schaffer, 2015)

Cost estimation

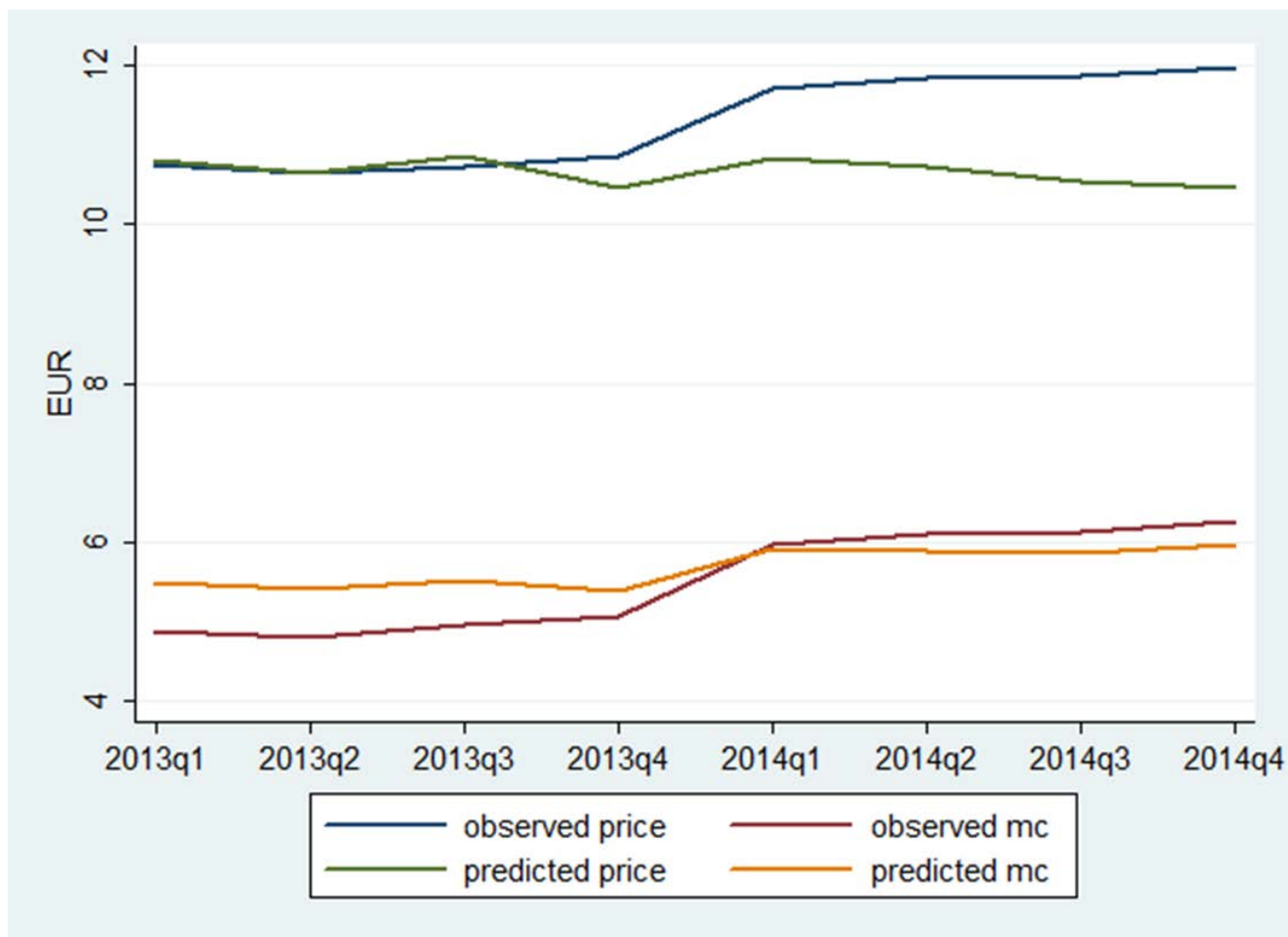
model	(I)		(II)		(III)	
	logarithmic		quadratic		linear	
	time trend		time trend		time trend	
dependent variable	marginal costs		marginal costs		marginal costs	
avg. voice (min)	0.0058***	(-0.0014)	0.0068***	(-0.0015)	0.0062***	(-0.0014)
avg. sms (#)	-0.0023	(-0.0017)	-0.0027	(-0.0017)	-0.0029*	(-0.0017)
avg. data (MB)	0.0024***	(-0.0004)	0.0024***	(-0.0004)	0.0025***	(-0.0004)
sim-only	0.6300**	(-0.2660)	0.6510**	(-0.2770)	0.6350**	(-0.2860)
no. subscribers	2.30E-06	(0.0000)	4.90E-06	(0.0000)	2.60E-06	(0.0000)
no. new subscribers	-0.0002**	(-0.0001)	-0.0002**	(-0.0001)	-0.0002**	(-0.0001)
post-merger	-1.1910***	(-0.0911)	-1.4460***	(-0.0984)	-0.8330***	(-0.0954)
post-auction	0.0270	(-0.0738)	0.4550***	(-0.0646)	0.5960***	(0.0872)
logarithmic trend	-0.7620***	(-0.0843)				
quadratic trend			-0.0008***	(-0.0001)		
linear trend					-0.0709***	(-0.0077)
constant	10.6400***	(-0.4640)	8.7970***	(-0.4180)	9.6720***	(-0.4220)
R ²	0.15		0.15		0.16	
F	21.98		20.31		20.65	
observations	30,250		30,250		30,250	
clusters (tarrifs)	898		898		898	

Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Monthly dummies and tariff fixed effects included.

Prices over time: regular customers



Merger effects: prices and MC over time



Source: BWB.