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**Panel Data Analysis of the Factors of
Mobile Broadband Adoption in Major Six Countries:
Focusing on Smartphone**

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Definition of Mobile Broadband

Mobile Broadband = 3G + 4G



Black Berry

~~2G~~, 3G, 4G



Gala-kei (Japan)

~~2G~~, 3G

Smartphone



Android

3G, 4G



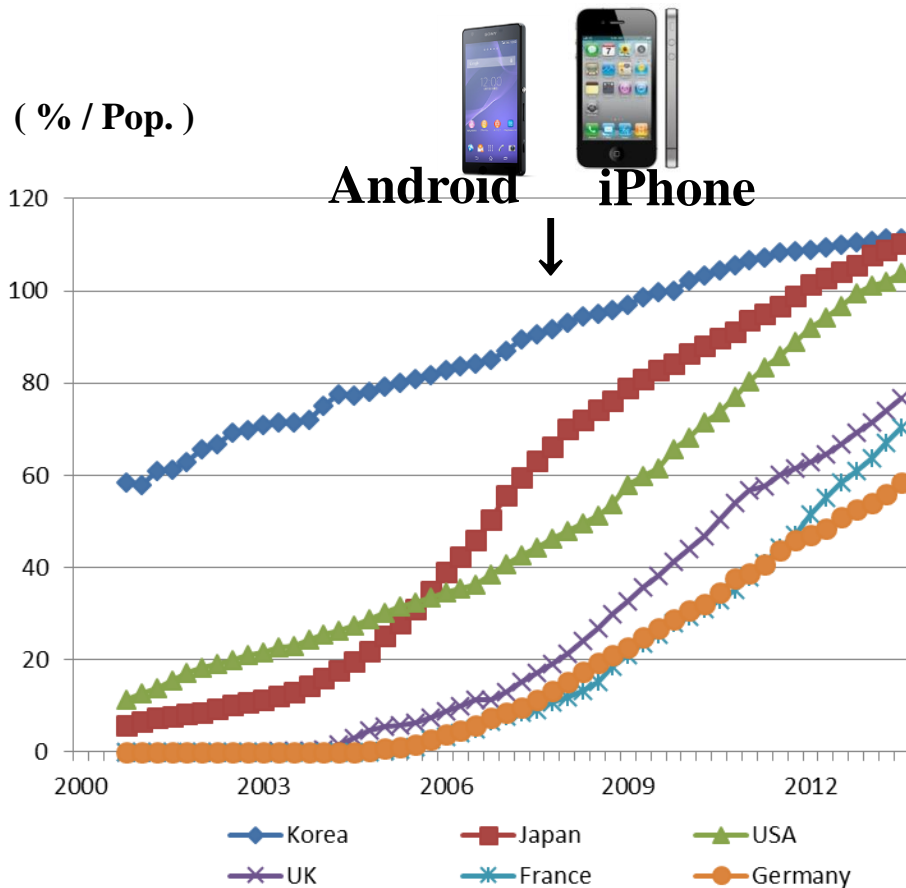
iPhone

3G, 4G

Research Theme

Adoption Ratio of Mobile Broadband

*Selected Six Countries.



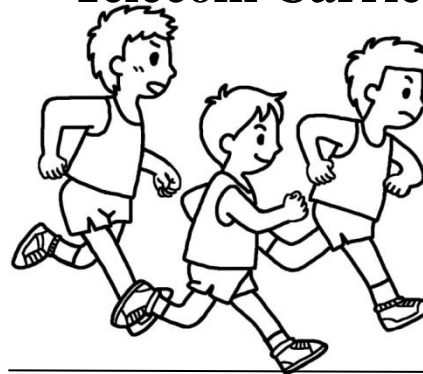
Factors

Smartphone

Android

iPhone

Competition of
Telecom Carriers



FTTx Adoption Ratio
(Fiber Line Broadband)

Effect

?

?

?

?

Previous Studies

No related previous studies which estimated the factors of mobile broadband adoption in multiple countries by Panel Data Analysis, focusing on smartphones and competition.

(Ref.)

Gerpott, Thomas, and Weichert [2013] studies the characteristics and intensity of mobile internet use among consumers with different types of advanced handsets considering iPhone and Android in Germany.

Akematsu, Shinohara, and Tsuji [2012] analyzes the diffusion factors promoting the Japanese 3G mobile phone

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Hypotheses

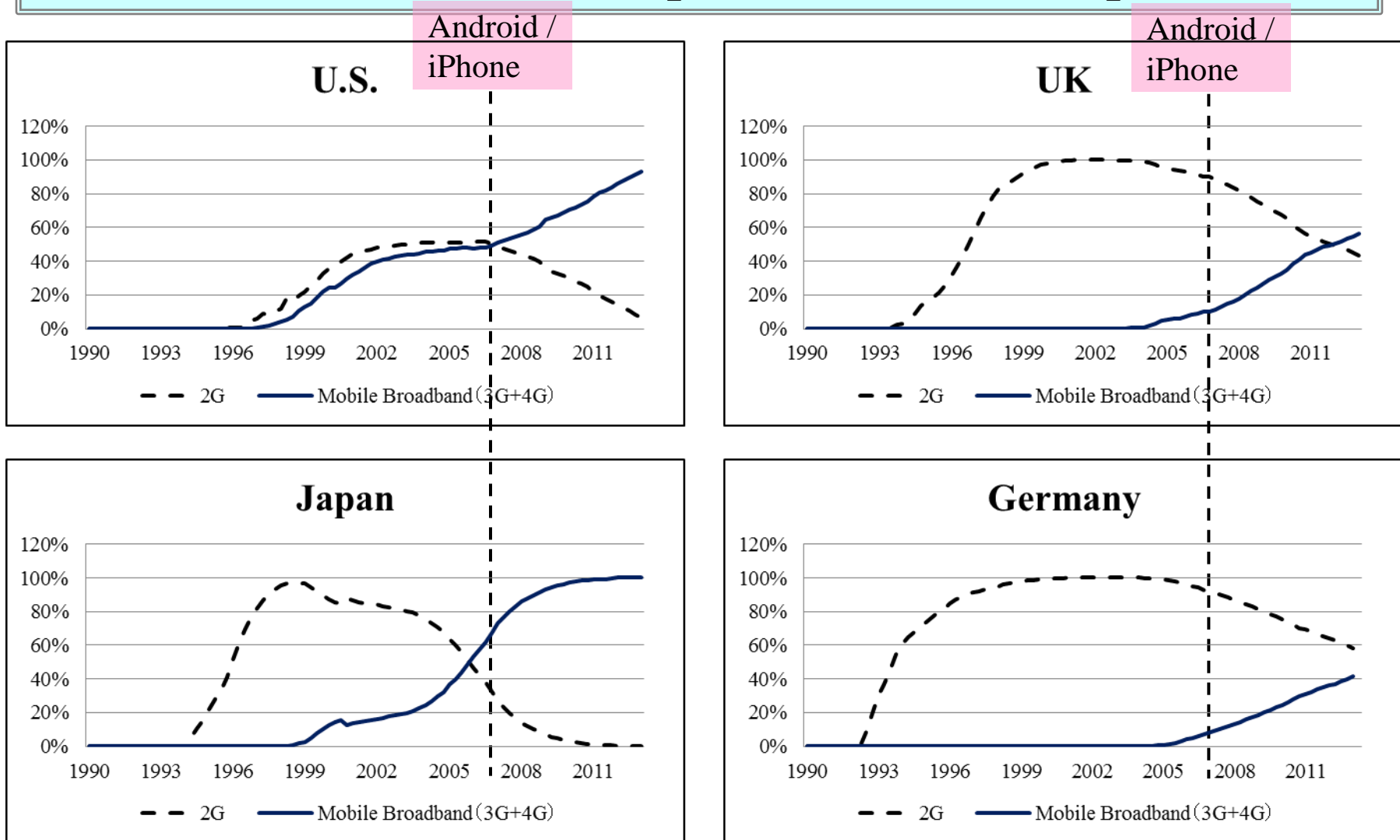
H1: Smartphone Affects Mobile Broadband adoption

H2: Competition affect Mobile Broadband adoption

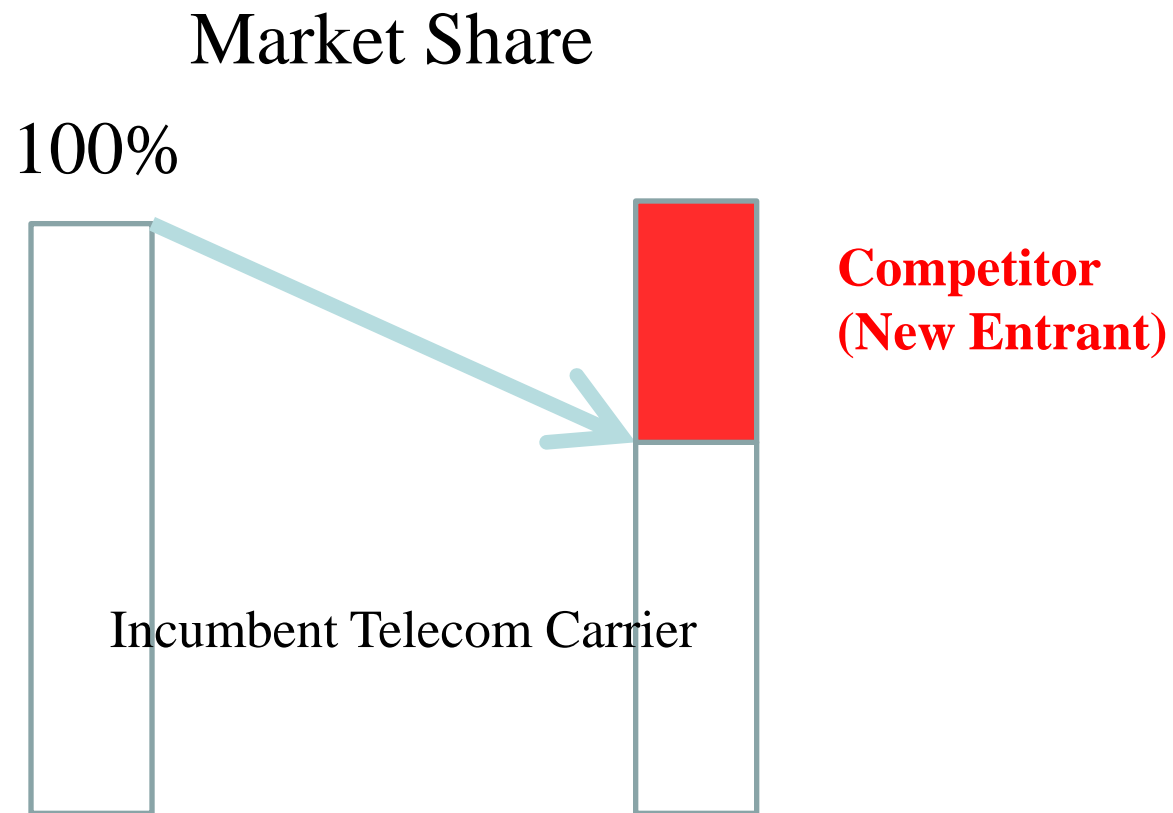
H3: FTTx Adoption Affects Mobile Broadband adoption

[H1: Smartphone Affects Mobile Broadband adoption]

Mobile Broadband Adoption Ratio & Smartphone



[H2: Competition affect Mobile Broadband adoption]
Introduction of Competition by Policy



[H3: FTTx Adoption Affects Mobile Broadband adoption]

Supply Side

Base station of
mobile broadband



Fiber optics are installed as backhauls among *base stations*, especially in the case of high speed Mobile Broadband.

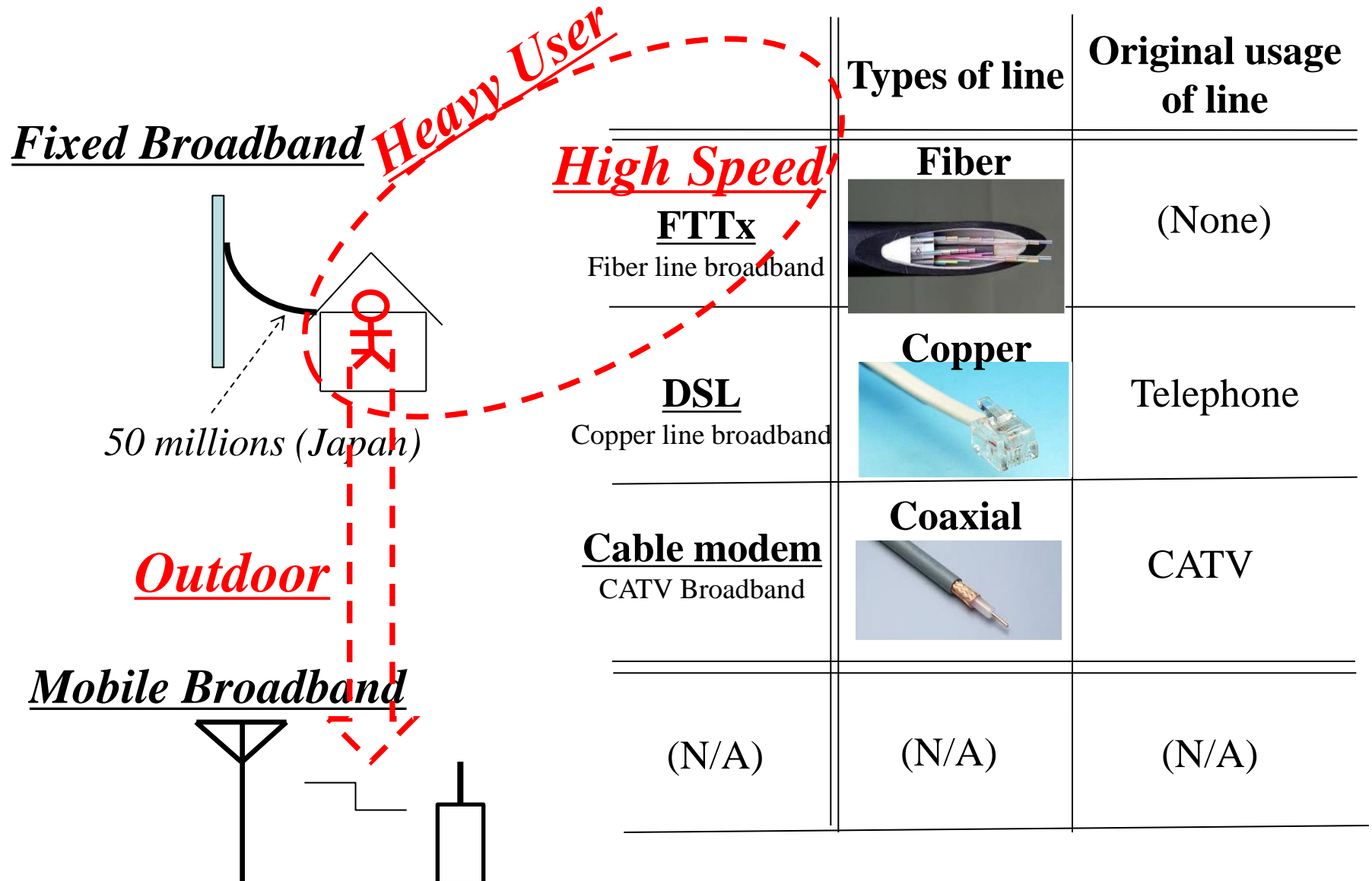
Installed fiber optics can be used both (i) backhauls among base stations, and (ii) FTTx.

Ref.

Up to 200 Thousands Base stations in each Telecom Carrier in Japan.

[H3: FTTx Adoption Affects Mobile Broadband adoption]

Demand Side



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The Model for Estimation

$$\begin{aligned} Subscriber_{it} = & \alpha_1 Subscriber_{it-1} + \alpha_2 Price(Voice)_{it} + \alpha_3 Price(Data)/Speed_{it} + \alpha_4 Income_{it} \\ & + \alpha_5 HHI_{it} + \alpha_6 FTTx_{it} + \sum_j \alpha_7^j Factor_{it}^j + \alpha_8 Z, \end{aligned}$$

where

$Subscriber_{it}$: denotes the mobile broadband adoption ratio in country i at t
(quarter in 2000 to 2012)

$Subscriber_{it-1}$ one period lag for examining network effect

$Price(Voice)_{it}$: monthly charge of voice services calculated by (Voice ARPU)/MOU

$Price(Data)/Speed_{it}$: Monthly Price of data normalized by speed for country i

$Income$: GDP per capita

HHI_{it} : the Herfindahl-Hirschman Index of mobile broadband market

$FTTx_{it}$: FTTx adoption ratio

$Factor_{it}$: Dummy variables of Android, iPhone, FMC, Frequency Auction.

Summary of Statistics

Variables	No. of Obser.	Mean	Std. Dev.	Max	Min
Mobile Broadband Adoption Ratio (one lag, Log)	249	3.216682	1.540417	4.696976	-4.78088
Price (Voice, Log)	312	-1.82361	0.614531	-0.5773	-3.04236
Price/Speed (Data, Log)	256	0.654528	1.61142	6.083785	-2.5008
Income (GDP/Capita, Log)	312	10.3582	2300295	10.85863	9.69237
HHI (Log)	249	8.278625	0.361672	9.21034	7.641016
FTTx (Adoption Ratio, Log)	197	3943072	2.68979	4.192044	-8.28205
Android	312	0.298077	0.458148	1	0
iPhone	312	0.375	0.484901	1	0
FMC	312	0.048077	0.048077	1	0
Frequency Auction	312	0.519231	0.500433	1	0

(Source) : National Regulatory Authorities, International Organizations.

Result of Estimation

Dependent variable: mobile broadband subscribers (Log)		
Mobile Broadband Adoption Ratio (one lag, Log)	0.769 *** (0.00789)	
Price (Voice, Log)	-0.0736 *** (0.0244)	
Price/Speed (Data, Log)	-0.0000145 (0.00474)	
Income (GDP/Capita, Log)	0.0505 (0.0927)	
HHI (Log)	-0.305 *** (0.0265)	
FTTx (Adoption Ratio, Log)	0.0273 *** (0.00682)	
Android (Dummy)	0.032 *** (0.0113)	
iPhone (Dummy)	0.00485 (0.0115)	
FMC (Dummy)	-0.0518 *** (0.0195)	
Frequency Auction (Dummy)	-0.0193 (0.0160)	
Constant	2.739 *** (0.911)	
Observations	190	

H2: Competition affect

Mobile Broadband adoption

H3: FTTx Adoption

Affects Mobile Broadband adoption

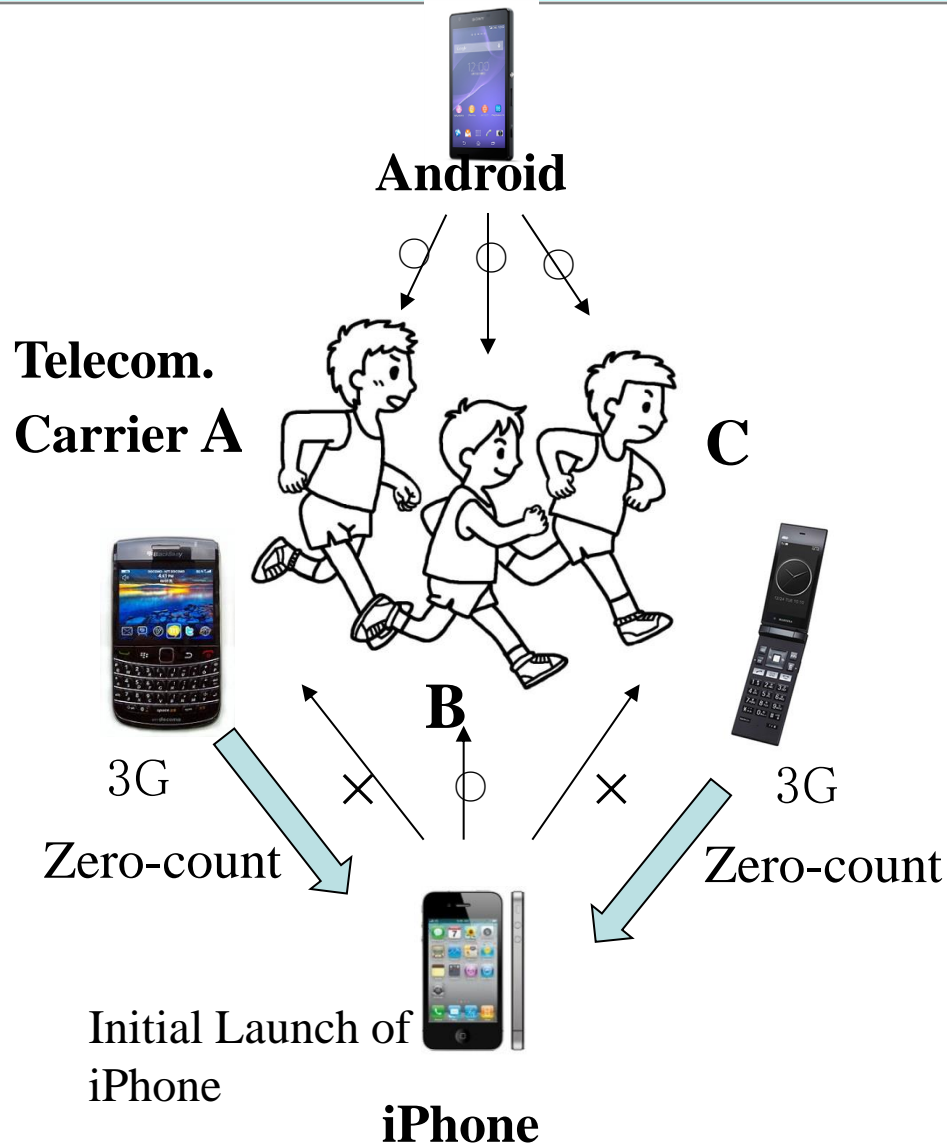
H1: Smartphone Affects

Mobile Broadband adoption

Note: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Discussion



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Hypotheses Verified

H1: Smartphone affects mobile broadband adoption

⇒ *Android: Verified.*

iPhone: (Insignificant)

H2: Competition affect mobile broadband adoption

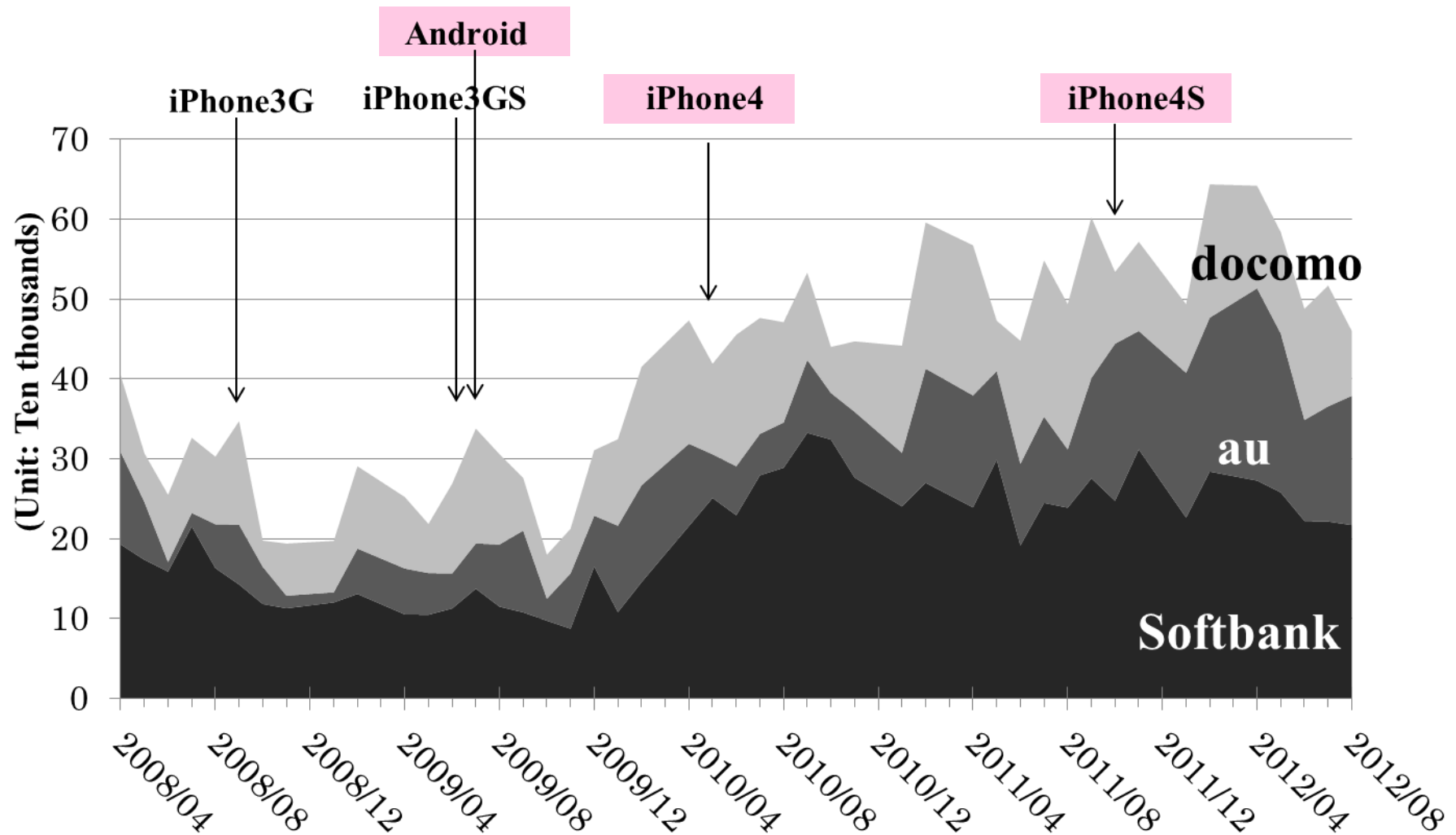
⇒ *Verified.*

H3: FTTx adoption affects mobile broadband adoption

⇒ *Verified.*

Reserved

Significant Events in Monthly Changes in Japanese Mobile Phone Subscribers



Source: Telecommunications Carriers Association