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Towards Quadruple-Play Service: Both Individual and Household Level Analyses on Mobile Bundle

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Towards Quadruple-Play Service:
Both Individual and Household Level Analyses on Mobile Bundle

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Abstract

Quadruple-play grows worldwide and shows potential to extend the range of telecommunications service from network to content. Mobile bundle enables multichannel strategy integrating home television and mobile display. Since mobile is a personal service, joining a household bundle with mobile is an individual-level choice. However, literature has concentrated on household-level decisions. This paper focuses on economic factors and mobile engagement of individuals as well as household attributes to fill the gap in the research stream about telecommunications bundle. The balanced panel datasets support fixed effect logit models for both households and individuals. The analysis shows that bundle promotes the adoption of a mobile bundle and prevents churn. The installment is the stronger predictor than mobile subscription fee for the adoption of a mobile bundle. The results from mobile engagement factors lead to further researches on the relationship between engagement and telecommunications service.

Keyword: quadruple-play service, telecommunication bundle, mobile engagement, Korean media panel

1. Introduction

Mobile becomes the core of bundling in the telecommunication industry. Quadruple-play service, which includes mobile into a bundle of fixed telephony, fixed broadband, and pay television, has been offered in several countries such as the United Kingdom, France, the United States, and South Korea. From the estimates of Strategy Analytics, the revenue of quadruple-play will grow three times larger until 2020 in the U.K. market (Strategy Analytics, 2016). And in the U.S., around 10% of households subscribe quadruple-play (Athavaley, 2017). Telecommunications service providers can take advantage more from bundling mobile. First, mobile as an option for a bundle can enhance the loyalty of customers and prevent churn. Second, it multiplies the source of revenue. Since mobile is an individual-level service different from other fixed telecommunications services which are served at household-level, members of a household can join the household bundle with their mobile. Third, it enables telecommunications service providers to expand their content businesses from home to everywhere with portable screens. For example, a video-on-demand streaming service for home television can be offered for mobile with a data plan. As business opportunities of mobile in bundle depend on the choice of individuals, it is necessary to understand individuals' incentives and mobile usage in addition to household characteristics for studying telecommunications service bundle.

Previous literature on bundling in the telecommunications industry has focused on the decision of household. Mixed bundling with price discounts offers convenience and financial benefits for customers (Andrews, Benedicktus, & Brady, 2010; Srinuan, Srinuan, & Bohlin, 2014). But it can increase switching costs, and several studies show the lock-in effect of bundling (Lee, 2017; Prince & Greenstein, 2014). However, there is lack of research about adding mobile in a bundle which is the decision of individuals in a household as the beginning of quadruple-play service. This paper tries to fill the gap by exploring economic factors and mobile engagement which can lead individuals to join bundles of their household with their mobile services as well as the household-level decision of bundling. This paper also considers the behavior of switching through the adoption of the mobile bundle.

The result of balanced panel analyses showed that both household and individuals more likely to adopt mobile bundle and not to switch when they subscribed telecommunications bundle previous year, consistent with the research stream of bundling. The prevention of

switching by the subscription of internet protocol television service reflects that the competitive advantage of mobile operators compared to cable operators. The installment is the stronger predictor than mobile subscription fee about the adoption of a mobile bundle. Although mobile engagement factors show mixed results, it leads to further researches on the relationship between engagement and telecommunications service.

The rest of paper is organized as follows. Section 2 provides research streams of bundling in telecommunications and mobile engagement. Section 3 describes the research model and data. Section 4 provides the results of household and individual analyses, and Section 5 presents discussions and conclusion.

2. Literature review

2.1. Bundling

Bundling can work as a price discrimination strategy by discount (Liao & Tauman, 2002), an entry-deterrent strategy for incumbents by foreclosure (Nalebuff, 2004), and a lock-in strategy by increasing switching costs (Choi & Stefanadis, 2001). From the supply side of the broadcasting and telecommunications market, bundling prevents consumers from switching service provider. Prince and Greenstein (2014) observe the lock-in effect of bundling on each telephone, broadcasting, and broadband service providers during the period of economic recession. Burnett (2014) finds that mobile in a bundle is negatively associated with switching, but its marginal effect is less than that of broadband. Lee (2017) also provides the evidence of churn prevention controlling the preference for service providers. Then, what makes people subscribe to services in a bundle? From the demand side, saving costs such as price discount (Srinuan et al., 2014) and managing a single bill (Andrews et al., 2010) drives consumers to adopt telecommunications bundle (M.-K. Kim, Park, Lee, & Park, 2017). M.-K. Kim et al. (2017) note that as the number of bundled services increases, people perceive not only more benefits but also more risks about lock-in costs. And it shows that people who did not subscribe bundles tend to concern more about service quality and functions. Srinuan et al. (2014) find that household income and service provider are determinants of bundle subscription as well as price discount, while Mithat Ünner, Güven, and Tamer Cavusgil (2015) show that younger age and higher education are significant while household income is not. Mikkonen, Niskanen,

Pynnönen, and Hallikas (2015) indicate that bundle functions and emotional factors like satisfaction and convenience are important to purchase a bundle.

In summary, previous literature draws the consistent result about the lock-in effect of bundling, and an economic incentive is essential to attract customers into bundled services while socio-demographic factors provide mixed results. However, most of them rely on household level variables. Furthermore, they consider mobile service as the same as household level services and rarely deal with strategies to improve the value of bundle by mobile. Although both the adoption of a mobile bundle and business opportunities from bundling mobile are primarily from individual choice, there is lack of researches of the area.

2.2. Mobile engagement

Engagement is widely accepted in various field to describe users' attention and affection with products and services through technology. It is similar to flow in terms of the state of immersion, but it does not require challenge and intrinsic motivation (O'Brien, 2016). Although there is no general agreement about definition and operationalization of engagement across all area, the definition from O'Brien and Toms (2008) is the first step to apply the concept of engagement for each domain: "a quality of user experience characterized by attributes of challenge, positive affect, durability, aesthetic and sensory appeal, attention, feedback, variety/novelty, interactivity, and perceived user control"(p. 938). Engagement can be driven by motivations, contextual factors, and technological features, and it drives service satisfaction, loyalty, and purchase (Cheung, Shen, Lee, & Chan, 2015; Gummerus, Coulter, Liljander, Weman, & Pihlström, 2012; Y. H. Kim, Kim, & Wachter, 2013).

Mobile engagement is the state of being involved with attention, intrinsic interest, and positive affection supported by experiencing features of mobile. The unique characteristic of mobile engagement is derived by the ubiquity of mobile technology. Mobile enables users to engage services anytime and anywhere they want. Therefore, users can get benefits from seamless experience by satisfying their social, hedonic, or utilitarian needs which lead them to engage (Y. H. Kim et al., 2013). Both mobile device and telecommunications service encourage the experience and following mobile engagement. Data transmission quality drives users' adoption of new mobile device and service, and it also associates with the consumption of multimedia contents (Teng, Lu, & Yu, 2009).

However, there are only few literature deals with mobile engagement (Carrino, Caon, Khaled, & Mugellini, 2017). And to the best of our knowledge, there is no research about the relationship between mobile engagement and the purchase of telecommunications services while previous literature of engagement describes the positive correlation between engagement and purchase. This paper focuses on the effect of the aggregated technological feature supporting mobile engagement on the bundling of telecommunications service.

3. Methodology

3.1. Data

This paper analyzes the Korean media panel data from 2012 to 2017 collected by a government institute for policy, Korean Information Society Development Institute. In Korean telecommunications market, three communications service providers (i.e. mobile operators) and three regional-based system operators (i.e. cable operators) compete for triple-play services with discounts since 2007. System operators offer traditional landline, internet, and cable television while communications service providers offer voice over internet protocol, internet, and internet protocol television. Although communications service providers have advantages of providing quadruple-play services with mobile, system operators also offer the bundling of mobile through mobile virtual network operators or partnership with incumbent mobile operators. The mobile telecommunications market is almost mature as seen in the statistics from Gallup Korea (2017) which shows that 93.4% of adults used smartphones. So the players focus market strategies like price discrimination, data plan, and promotion rather than make differences on transmission quality. The media panel provides the subscription status of telecommunications and broadcasting services, ownership and usage of devices, and demographics of both households and individuals. Moreover, it includes three-day diary data about place, device, and behavior of using media during the period of observation.

For the household-level analysis, 3,549 households constructed a balanced dataset. The size of a family was varied from single-person household to nine members. Only 3.3% of households had at least one child under age 6. Most households lived in an urban area (86%). While 40% of households lived in a single-family house, the other 60% lived an apartment, studio, townhouse, etc. The half of the household earned more than \$3000 on average in a

month (see Table 1).

[Table 1 about here]

For individual-level analysis, 3,204 individuals from 1,438 households constructed a balanced dataset. The sample size of the individual-level set was decreased from the household set since it included the member of households which contained all members in the balanced sample. Female was slightly more than the half (56%), and one-quarter of the sample was younger than forty. The portion of the married group was 55%, and 57% of the sample was at least high school graduate. The two-member family was the largest group (33%) followed by the four-member family (28%). About four-fifths of the individuals (82%) resided in the urban area. 47% of the sample lived in a single-family house. The medium value of average monthly household income was located in the range between \$2000 and \$2999 (see Table 2)

[Table 2 about here]

3.2. Model

This paper investigates factors affecting the adoption of mobile in a bundle and following churn behavior. Since mobile is a personal device, the analyses comprise both households and individuals. A binary choice model is adequate for the binary dependent variables, the adoption and the switch. And a fixed-effects model enables to control time-invariant heterogeneity in a panel dataset. Therefore, conditional fixed-effects panel logit regression is applied to the research model for avoiding the incidental parameter problem following nonlinear regression (Chamberlain, 1980). It analyzes samples which have changes in dependent variables.

[Figure 1 about here]

Dependent variable. The first dependent variable is the adoption of mobile in a bundle. In the household level analysis, the adoption is defined as whether a household includes at least one mobile in a telecommunication bundle regardless of the previous status of bundle or components of the bundle. In the individual level analysis, the adoption is defined as whether an individual joins her mobile in the bundle of her family. The individual dataset includes the members of households which have all family member in the panel to identify each member's status of mobile subscription and mobile service provider. The second dependent variable is

the switch of a service provider. In the household level analysis, the switch is defined as the switch of internet service provider following Lee (2017). In the individual level analysis, the switch is defined as the switch of a mobile service provider to observe how the benefits of bundling lead to switch or to stay.

Household independent variables. One-year previous status of bundling is the independent variable of the household-level analysis. As control variables, the previous subscription of telecommunication services - internet, fixed-line telephony, internet telephony, cable television, satellite television, and internet protocol television – are included. The ownership of device indicates whether the household has television, desktop, laptop, tablet, and game console which allow the consumption of audiovisual contents. Demographic variables consist of the size, the average monthly income, the area of residence, the type of housing, and the existence of child under age 6 of a household.

Individual independent variables. In addition to the one-year previous status of a household bundle, economic factors and mobile engagement variables are the focus of the individual-level analysis. Economic factors include the average monthly mobile subscription fee and the installment of a mobile device. People can make contracts with mobile service providers for not switching about 2-3 years, and get discounts on mobile devices by paying installments every month. Over the period of the agreement, they should pay the penalty if they change providers. The installment variable indicates the monthly payment of installment to a mobile service provider delivering a household bundle. Discounts for bundles are appealing for those who pay the higher subscription fee and installment.

Several studies investigate operationalization of engagement as well as self-reports to find a behavioral manifestation of user engagement for quantifying users' impression and attention (van Doorn et al., 2010). For instance, engagement is measured as interactions (i.e., comment, share, recommendation) and aggregated consumption (i.e., the number of access, the total time of play) (Dobrian et al., 2013; Ksiazek, Peer, & Lessard, 2014; Yu, Jung, Kim, & Jung, 2018). Different from the web environment, mobile allows the assumption of single user and actual consumption of contents since mobile display turns off when the user does not focus. Therefore, the frequency of screen view can be an acceptable measure (Carrino et al., 2017). In addition, users can download and purchase mobile applications. It indicates that they are ready to explore purchased applications and intend to spend more time to satisfy their needs

(Hsu & Lin, 2016), further, to engage. Thus, the number of purchased mobile applications and the frequency of mobile use are the metrics of mobile engagement in this study. The frequency of mobile use is the sum of the number of screen views from the three-day diary data.

Control variables consist of the years of current mobile device use, the ownership of smartphone device, the previous subscription of telecommunication services, device usage, and demographics. The subscription variable is the same as the household-level analysis. Device usage shows whether an individual is the most frequent user of household devices such as television, desktop, laptop, tablet, and game console. Demographic variables are age, marital status, the level of education, the average monthly income of the household, the area of residence, and the type of housing.

4. Result

In the household dataset, 21% of the sample adopted at least one mobile in their telecommunications service bundle. Only 5% switched their internet service providers during the period of observation. 40% of the sample have experienced bundling. Almost hundred percent of households owned at least one television, and the most of them (95%) subscribed broadcasting services such as cable TV, satellite TV, or internet protocol TV (see Table 3).

[Table 3 about here]

In the individual dataset, 11% of sample adopted mobile bundle of their households. 2% switched their mobile service providers during the period. The unit of mobile subscription fee was \$10, from under \$10 to over \$100. The average installment of the whole sample was about \$1.88, but excluding those who did not contract for installment, the average was about \$17. People who had purchased mobile apps pay about \$1 on average. The least frequent mobile user viewed mobile screen five times during the three-day period of recording, while the most frequent user viewed 214 times. Almost the half of the sample was the most frequent user of television in their household.

[Table 4 about here]

The size of the analyzed sample was smaller than the balanced sample because the panel fixed logit examines samples which have variations in binary dependent variables. The

household analysis showed that the subscription of bundle in previous year increased the probability of the adoption of mobile bundle ($\beta = 0.190$, $p < 0.01$) and decreased the probability of switching internet service providers ($\beta = -0.985$, $p < 0.001$). The past subscription of landline, internet protocol telephony, cable television, and satellite television could not prevent churn behavior, but the internet protocol television service had the negative influence on switching ($\beta = -0.410$, $p < 0.05$) (see Table 5).

[Table 5 about here]

The individual analysis showed that the subscription of bundled services in household past year led to the bundling of individuals' mobile services ($\beta = 0.281$, $p < 0.01$). Mobile subscription fee was not statistically significant on the analyses, but installment had the positive relationship with the adoption ($\beta = 0.0932$, $p < 0.001$). The number of apps purchased decreased the probability of adoption while the highest two quartiles had the positive association compared to the lowest quartile ($\beta = 0.402$, $p < 0.05$; $\beta = 0.435$, $p < 0.01$). The years of mobile device use also increased the probability of joining bundle ($\beta = 0.181$, $p < 0.001$). The experience of bundling prevented from switching mobile service provider while an individual adopted mobile bundle ($\beta = -0.446$, $p < 0.05$). The amount of installment had the positive association with switching ($\beta = 0.0709$, $p < 0.001$). The highest two quartile had the positive correlation compared to the lowest quartile ($\beta = 0.714$, $p < 0.01$; $\beta = 0.702$, $p < 0.05$) like the result from the adoption (see Table 6).

[Table 6 about here]

5. Discussion and conclusion

Quadruple-play service is still growing in big markets such as the U.K., France, and the U.S. Including mobile in existing triple-play service suggests new strategies of contents distribution and changes both the telecommunications industry and the media industry shown in the merger of AT&T and Time Warner. As well as households' decisions, this paper focused on the individual-level decision of mobile bundle adoption since mobile is a personal device.

In the household-level analysis, households which subscribed a telecommunications bundle in the past year were more likely to adopt mobile and less likely to switch internet

service provider. The result is consistent with Burnett (2014) and Lee (2017). Internet protocol television was the only service which prevented switching among previously subscribed services. It indicates that incumbent mobile operators still have a competitive advantage although cable operators also support mobile bundle. However, voice over internet protocol could not hinder switching implying home phone had been weakened by the propagation of mobile regardless of service provider. Households having desktop tended to switch their internet provider more. It seems that using desktop reminds and evaluates the quality of internet. The level of income has no significant effect on household-level decision of mobile bundle in this study.

The effect of bundling on individuals' choice was consistent with the effect on households' choice, promoting the adoption of a mobile bundle and preventing the switch of mobile provider. The only significant economic factor was installment while monthly subscription fee and household income had no effect. It shows that fixed expenses are not strong motivators to adopt discounts by bundle dominating perceived costs or risks. The installment is an additional expense to buy a mobile device; therefore it seems that individuals try to get discounts on the exceptional cost. It also indicates that the adoption of new device encourages individuals to deliberate the costs and benefits from their mobile operators. The analysis provided mixed results from the variables of mobile engagement. The more frequent mobile users were more likely to adopt mobile bundle and to switch mobile service provider compared to the least frequent users. It implies that individuals who want to engage anywhere and anytime are sensitive to promotions and perceived benefits from communications service providers which support their mobile experience. In contrast, individuals who purchased more apps were less likely to adopt mobile bundle. It seems that they seek more functionality than those who did not pay for apps, so there can be a correlation between app purchase and the role of mobile. People tend to rely on mobile in the absence of other household services, and it can be reflected in the purchase of apps. Since telecommunications bundles provide more discounts as the number of services increased, app purchasers may have fewer incentives to tie their mobile in a bundle. The device usage variables in a household have no significant effect reflecting the simultaneous use of mobile. Among demographic variables, age, education, and marital status are insignificant while those who do not live in single-family household an urban area are more likely to adopt mobile bundle. Household income has a positive effect on both

adoption and switching even though the highest income group who may be less sensitive to economic incentive does not affect.

This paper contributes to the academic stream on bundling of telecommunications services highlighting mobile as a personal service. Demonstrating the lock-in effect of bundling and economic incentive from literature, we find the influence of mobile engagement for service providers which take into account the expandability toward contents distribution. We hope that our illustration helps practitioners to design market strategies in the era of quadruple-play service.

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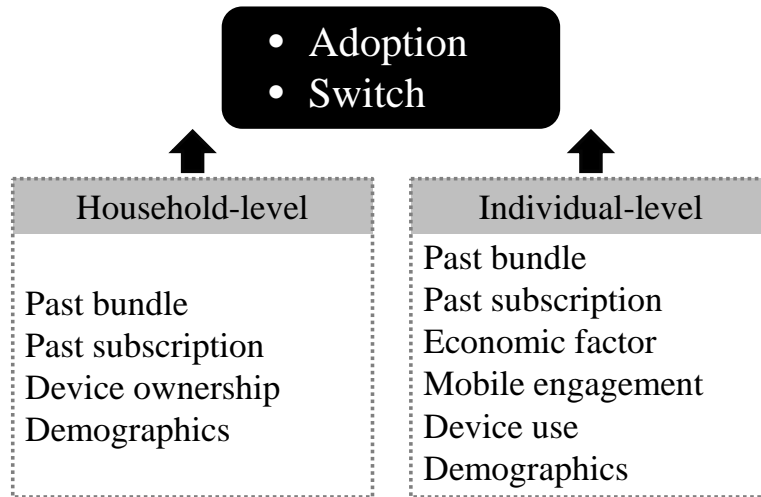


Figure 1. Research model

Table 1. Sample demographics – household (2017)

Variable	Description	Frequency	Percent
Size	1	581	16.37
	2	907	25.56
	3	673	18.96
	4	1,020	28.74
	5	313	8.82
	6	42	1.18
	7	10	0.28
	8	2	0.06
	9	1	0.03
Child under 6	1	118	3.32
	0	3,431	96.68
City	Urban	3,060	86.22
	Rural	489	13.78
Housing type	House	1,393	39.25
	Others (apartment, ...)	2,156	60.75
Average monthly income (household)	\$1000 and below	667	18.79
	\$1000~\$1999	507	14.29
	\$2000~\$2999	568	16
	\$3000~\$3999	739	20.82
	\$4000~\$4999	508	14.31
	\$5000 and above	560	15.78
	Total		3,549

Table 2. Sample demographics – individual (2017)

Variable	Description	Frequency	Percent
Gender	Male	1,414	44.13
	Female	1,790	55.87
Age	10~19	355	11.08
	20~29	311	9.71
	30~39	180	5.62
	40~49	457	14.26
	50~59	554	17.29
	60~69	461	14.39
	70 and above	886	27.65
Marital	Single	899	28.06

status	Married	1,776	55.43
	Others (divorced, ...)	529	16.51
Education level	Primary	898	28.03
	Secondary	454	14.17
	High	988	30.84
	Undergraduate	829	25.87
	Graduate	35	1.09
Size	1	457	14.26
	2	1,052	32.83
	3	540	16.85
	4	908	28.34
	5	205	6.4
	6	42	1.31
City	Urban	2,622	81.84
	Rural	582	18.16
Housing type	House	1,505	46.97
	Others (apartment, ...)	1,699	53.03
Average monthly income (household)	\$1000 and below	627	19.57
	\$1000~\$1999	515	16.07
	\$2000~\$2999	515	16.07
	\$3000~\$3999	600	18.73
	\$4000~\$4999	423	13.2
	\$5000 and above	524	16.35
	Total	3,204	100

Table 3. Descriptive statistics - household

Variable	Obs.	Mean	Std. dev.	Min	Max
adopt_H	17,745	0.21	0.41	0	1
switch_H	17,745	0.05	0.23	0	1
bundle	17,745	0.41	0.49	0	1
subs_internet	17,745	0.68	0.47	0	1
subs_landline	17,745	0.63	0.48	0	1
subs_voip	17,745	0.19	0.39	0	1
subs_cable	17,745	0.70	0.46	0	1
subs_satellite	17,745	0.05	0.22	0	1
subs_ip tv	17,745	0.20	0.40	0	1
devox_tv	17,745	0.99	0.10	0	1
devox_pc	17,745	0.62	0.49	0	1

devox_laptop	17,745	0.24	0.42	0	1
devox_tablet	17,745	0.05	0.22	0	1
devox_game	17,745	0.07	0.25	0	1
H_size	17,745	2.96	1.30	1	9
child	17,745	0.07	0.25	0	1
city	17,745	0.85	0.35	0	1
house	17,745	0.39	0.49	0	1
income	17,745	3.34	1.68	1	6

Table 4. Descriptive statistics - individual

Variable	Obs.	Mean	Std. dev.	Min	Max
adopt_P	16,020	0.11	0.31	0	1
switch_P	16,020	0.02	0.15	0	1
bundle	16,020	0.39	0.49	0	1
subs_internet	16,020	0.64	0.48	0	1
subs_landline	16,020	0.69	0.46	0	1
subs_voip	16,020	0.18	0.39	0	1
subs_cable	16,020	0.75	0.44	0	1
subs_satellite	16,020	0.05	0.23	0	1
subs_ipTV	16,020	0.15	0.36	0	1
smartphone	16,020	0.60	0.49	0	1
phone_year	16,020	1.76	1.66	0	16
fee_mob	16,020	4.36	2.16	1	11
installment	16,020	1.88	5.98	0	100
app_pay	16,020	0.07	0.50	0	15
mob_freq	16,020	64.14	89.85	5	214
devuse_tv	16,020	0.48	0.50	0	1
devuse_pc	16,020	0.21	0.40	0	1
devuse_laptop	16,020	0.07	0.26	0	1
devuse_tablet	16,020	0.01	0.12	0	1
devuse_game	16,020	0.01	0.10	0	1
city	16,020	0.82	0.39	0	1
house	16,020	0.46	0.50	0	1
income	16,020	3.27	1.70	1	6
age	16,020	5.56	2.09	1	8
school	16,020	3.50	1.18	2	6
marital	16,020	1.92	0.73	1	4

Table 5. Full result – household

Variables	Adopt_H	Switch_H
L.bundle	0.190** (0.0711)	-0.985*** (0.102)
L.subs_internet	0.181 (0.168)	-0.564** (0.204)
L.subs_landline	0.171 (0.0971)	0.400** (0.136)
L.subs_voip	0.121 (0.0990)	0.423** (0.146)
L.subs_cable	-0.0626 (0.112)	0.329* (0.167)
L.subs_satellite	-0.0618 (0.231)	0.0199 (0.352)
L.subs_ipstv	0.0254 (0.125)	-0.410* (0.186)
devox_tv	-0.318 (0.407)	0.365 (0.578)
devox_pc	0.480*** (0.136)	0.584** (0.201)
devox_lap	0.504*** (0.109)	0.309 (0.158)
devox_tab	0.116 (0.133)	-0.0167 (0.197)
devox_gm	-0.205 (0.144)	0.0681 (0.210)
size	0.284** (0.0981)	0.292* (0.147)
child	-0.645*** (0.151)	-0.196 (0.196)
city	-0.304 (0.206)	-0.552 (0.309)
house	0.0125 (0.152)	0.0753 (0.213)
2.income	0.202 (0.267)	0.207 (0.384)
3.income	0.274 (0.287)	0.303 (0.418)
4.income	0.240	0.222

	(0.292)	(0.431)
5.income	0.379	0.606
	(0.301)	(0.442)
6.income	0.420	0.288
	(0.310)	(0.453)
2014.year	0.277***	0.305**
	(0.0795)	(0.113)
2015.year	0.479***	0.336**
	(0.0817)	(0.119)
2016.year	0.406***	0.414**
	(0.0855)	(0.127)
2017.year	1.104***	0.773***
	(0.0870)	(0.123)
Observations	7,490	4,315
Number of hid	1,498	863
r2_p	0.0661	0.0792
ll_0	-2916	-1459
ll	-2723	-1343

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 6. Full result – individual

Variables	Adopt_P	Switch_P
L.bundle	0.281**	-0.446*
	(0.102)	(0.188)
L.subs_internet	0.758**	0.815
	(0.268)	(0.482)
L.subs_landline	0.224	0.420
	(0.140)	(0.269)
L.subs_voip	0.0454	0.610*
	(0.135)	(0.276)
L.subs_cable	0.252	-0.398
	(0.177)	(0.325)
L.subs_satellite	0.951*	-1.210
	(0.388)	(0.826)
L.subs_ip tv	0.0344	-0.442
	(0.211)	(0.374)
smartp	0.340	0.213

	(0.179)	(0.327)
phone_yr	0.181***	-0.0143
	(0.0339)	(0.0585)
fee_mob	-0.0303	0.0482
	(0.0317)	(0.0546)
installment4	0.0932***	0.0709***
	(0.00511)	(0.00894)
app_pay2	-0.184*	0.0503
	(0.0844)	(0.125)
10.mob_fcat2	0.281	0.417
	(0.150)	(0.251)
17.mob_fcat2	0.402*	0.714**
	(0.158)	(0.270)
214.mob_fcat2	0.435**	0.702*
	(0.163)	(0.278)
dev_tv	0.00141	0.0323
	(0.108)	(0.210)
dev_pc	-0.102	-0.110
	(0.112)	(0.204)
dev_lap	-0.165	0.0648
	(0.164)	(0.321)
dev_tab	0.0766	-0.178
	(0.295)	(0.514)
dev_gm	-0.0748	0.776
	(0.360)	(0.673)
city	-0.613*	-1.220**
	(0.268)	(0.451)
house	0.471*	0.302
	(0.198)	(0.338)
2.income	1.042*	1.502
	(0.478)	(0.826)
3.income	1.047*	2.284*
	(0.529)	(0.918)
4.income	1.243*	2.023*
	(0.537)	(0.930)
5.income	1.044	1.984*
	(0.545)	(0.945)
6.income	0.721	1.776
	(0.561)	(0.972)
2.age	0.0578	-0.312

	(0.469)	(0.566)
3.age	0.0937	-0.387
	(0.584)	(0.809)
4.age	0.810	0.569
	(0.805)	(1.258)
5.age	0.687	1.183
	(0.877)	(1.391)
6.age	0.320	1.486
	(0.930)	(1.518)
7.age	0.153	1.072
	(1.033)	(1.747)
8.age	-0.809	0.183
	(1.167)	(1.999)
3.school	0.253	0.0567
	(0.262)	(0.419)
4.school	0.163	0.562
	(0.357)	(0.590)
5.school	-0.436	-0.569
	(0.491)	(0.874)
6.school	0.0896	1.219
	(1.044)	(1.717)
2.mar	0.886	13.53
	(0.658)	(586.5)
3.mar	1.549	-8.208
	(1.224)	(1,788)
4.mar	0.717	2.833
	(0.888)	(1.547)
2014.year	0.237*	0.817***
	(0.114)	(0.206)
2015.year	0.290*	0.438
	(0.123)	(0.236)
2016.year	-0.0361	0.418
	(0.133)	(0.251)
2017.year	0.579***	0.431
	(0.139)	(0.269)
Observations	4,685	1,725
Number of pid	937	345
r2_p	0.171	0.148
ll_0	-1774	-573.3

ll	-1472	-488.5
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Standard errors in parentheses		

*** p<0.001, ** p<0.01, * p<0.05