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The drivers of the substitution of individual services for bundled services: The case of Spain

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Abstract

In 2007, Spanish telecoms companies began to offer bundled services. Operators started by offering phone plus broadband and phone plus broadband plus pay television bundles, and in doing so, were able to reduce aggregated prices for consumers. In addition to monetary incentives, this study examines the causes that lead consumers (individuals) and households (as economic agents) to replace individual contracts with bundled contracts including more (or fewer) services from those previously subscribed to individually. A model of demand of access to household and individual services was estimated for three services: landline phone, Internet, and pay television using a representative panel of telecoms consumers in Spain. The results show –in decreasing order- the influence of previous experience with particular services, followed by factors related to usage and factors linked with

[1] The views expressed are entirely those of the authors and do not necessarily represent those of EPE Red.es. The usual caveat applies.

socio-demographic characteristics. Monetary incentives -contrary to common belief- play a significant but minor role.

Keywords: *telecoms bundles, substitution, landline phone, broadband Internet, pay tv, triple play, random effects model*

1. Introduction

Bundled telecommunications services first appeared in Spain in 2007, when the major telecoms operators started offering phone plus broadband and phone plus broadband plus pay television –the so-called “triple play”-, triggering a drop in aggregated prices when compared to prices of individual services. This new offer of bundled telecoms services took place amidst an economic crisis, during which consumers were supposed to become increasingly sensitive to price while displaying greater propensity to switch between operators in search of a more appealing offer.

Bundling is a marketing strategy whereby two or more products and services are grouped into a single package at a fixed price. Introducing a bundle into the market offers consumers a new catalogue of service options at different prices from those individual services previously available (Guiltinan, 1987). The bundling of services has been implemented in very different markets such as tourism, media or retail in addition to telecoms. For instance, Venkatesh and Chatterjee (2006) examined the journalism industry to study the viability of bundling journalism services, prices, and multi-platforms. In general, such strategies induce greater loyalty from clients and help service providers maintain their market positions (Bughin & Mendonça, 2007; Lee, 2009).

In the case of telecoms, an initial noteworthy example of research on bundling is the study by Ben-Akiva and Gershenfeld (1998), who used a discrete choice model to study how phone consumers choose optional elements from a menu. Another example of a discrete choice model is the Portuguese study by Pereira, Ribeiro, and Vareda (2013), who used a logistic model to estimate price elasticity of demand, observing that price is elastic for triple-play products. Papandrea, Stoeckl, and Daly (2003) focused on social well-being and the offer of bundles in the Australian telecoms industry. Tallberg, Hammainen, Toyli, Kamppari, and Kivi (2007) investigated the adoption of mobile data plans in the Finnish market, exploring the regulatory and market complexity associated with bundling this type of service. Yang

and Ng (2010) addressed choices of users in bundling in the wireless telecommunications market. More recently, Schilke and Wirtz (2012) examined what determines consumer decisions to accept a bundled Internet service. Other analyses such as those by Pereira and Vareda (2013) report the effect of bundled products on both regulatory policy and competition. Klein and Jakopin (2014) analysed the usefulness of bundled mobile phone services from the consumer viewpoint, reporting that price is among the most important variables. Finally, Srinuan, Srinuan, and Bohlin (2014) investigated the strategy of bundling products as a way of capturing new customers and retaining existing ones. These two studies distinguish between pure bundling and mixed bundling. The distinction relates to whether the service provider offers only products that are already bundled (pure bundling) or offers products that the consumer can choose individually (mixed bundling). Hui, Yoo, Choudhary, and Tam (2012) used this difference in bundling to estimate heterogeneity between willingness to pay and preference between the two types of bundling. Also on the topic of price, Mithat Üner, Güven, and Tamer Cavusgil (2015) examined the case of the Turkish market with an extensive literature review, concluding that bundling is a form of price discrimination. In the particular case of Spain and according to the National Regulatory Authority the commercialization of bundles has led to changes in the residential landline market. Bundling has increased landline broadband penetration and mitigated the loss of landline customers by landline operators (Comisión Nacional de los Mercados y la Competencia, 2014a).

However, in spite of the above literature, no study exists on the factors that influence the decision of consumers to switch from individual to bundle services and which is the relative importance of each of these factors, including in particular the relevance of the price of the bundle. Therefore, with this research question as the main objective, this paper analysis the period from 2010 to 2012 when telecoms operators in Spain had launched bundled services and their effects on the market were obvious. In particular, the paper examines factors that drive both the consumer (as an

individual) and the household (as an economic agent) to replace individual contracts with bundled contracts offering a different number of services from those previously subscribed to individually. To do so, a model of demand of access to household and individual services was estimated for three services: landline phone, Internet, and pay television.

The article has five sections. Section 2 presents the data and descriptive analysis of the variables. Section 3 describes the method applied in the empirical study. Section 4 presents and discusses findings through an interpretation of the models in the study, and section 5 presents conclusions and discusses them in relation to existing literature.

2. The data: Descriptive statistics for selected variables

The paper uses data from a panel focused on the usage of ICTs in Spanish households and compiled by the National Observatory for Telecommunication and Information Society (ONTSI) and the National Markets and Competition Commission (CNMC) for the years 2010, 2011, and 2012. This paper combines data from two different collection methods. The first method consists of biannual surveys on household ICTs usage and attitudes towards new technologies. The second method is the monthly collection –harvesting- of telecommunication services bills: landline phone, mobile phone, pay television, and Internet.

By collecting data for the same sample of households over time, a panel data design provides a longitudinal vision of the information, which gives a richness to the analysis that cross-sectional data are unable to provide. To maintain the quality of the data collected and to avoid panel 'fatigue', panel methodology suggests rotating households within the sample. In the panel used, the entire annual rotation is 20–25%. In addition to the rotation, some households voluntarily abandon the study or send incomplete or non-valid information and must therefore be excluded from the analysis. Hence, the panel used in this study was 'imbalanced', meaning that not all

information from all households for the whole period was fully available. Thus, for each of the 4,880 households in the database, information was available for an average of 21 months from the 36 months that formed the study's time horizon (2010–2012). The final database used in the current study comprised 99,551 monthly household records and 36 variables. Table 1 displays the variables used in the model.

*****************Table 1 goes here*********************************

To analyse household ITC service bundling, the following variables were considered as potentially influential: availability of the different types of ICT services, total expenditure, socio-demographic variables, and certain variables regarding the particularities of households' Internet usage. All variables were categorical, except expenditure on ICT services, which was quantitative. Socio-demographic variables with more than two response categories were transformed into dummy variables, which permitted the inclusion of characteristics of the cross-sectional units. The quantitative variable expenditure (expend) and all categorical variables were factors (i.e., exogenous variables in the model), except 'bundled', which was endogenous. Table 2 displays descriptive statistics for the quantitative variable ('expend'), and Table 3 shows the main statistics for the categorical variables.

*****************Table 2 goes here*********************************

*****************Table 3 goes here*********************************

All socio-demographic variables and Internet usage variables were biannual variables collected via questionnaire. Data for variables gathered from bills (i.e., household expenditure and ICT services available to the household) were monthly. To ensure the database contained monthly values for all variables, the same value for the biannual variables was imputed and maintained across each six-month period. During the period under study, operators bundled services only for landline phone, Internet, and pay television, so expenditure on these three services constituted the total household expenditure (bundled or individual), and mobile phone expenditure was not included –the so-called quadruple play.

The overall available sample contained 99,551 observations and showed that 50.87% of these indicated subscriptions to some bundled ICT service. Data by household revealed that 47.79% of households had been subscribed to bundled telecommunications services at some point during the period 2010–2012. On average, these households had service bundles for 83.48% of the time – about 30 of the 36 months covered by the study. The probability that a household which did not use bundled services subscribed to some bundled services the following month –the transition probability month over month- was 2.42% in average, whereas the probability that a household with some bundled services cancelled its bundled contract the following month was 1.51%. Also the penetration of bundled household ICT services increased in 5 percentage points between 2010 and 2012. Most bundles consisted of landline phone and Internet – around 30% of households. The next most common service bundle included landline phone, Internet, and pay television – 8% of households used such services. The combined penetration of the other two bundles (i.e., landline phone/pay television and Internet/pay television) accounted for less than 2% of households.

*****************Figure 1 goes here***********************************

Also a descriptive analysis of the households with bundled ICT services versus those without bundled ICT services was performed, yielding some significant differences, later to be validated with results obtained in the econometric model. Descriptively, households with bundled services had a greater average expenditure on ICT services. In terms of availability of landline phone, mobile phone, Internet, and pay television, there was generally a greater presence of these services in households with bundled services. This phenomenon was mostly true in the case of Internet services. There were also differences in Internet usage between the two types of households. Households with bundled ICT services consumed more streaming contents and used social networks and network gaming more frequently. In general, households with bundled services used the Internet more intensively. Regarding the socio-demographic structure, households with bundled services were larger (three or four members) than households without bundles (generally formed of one or two people). Considering only households with children aged 6–15 years, there were more households with bundles than without. Indeed, households without bundled services generally did not contain children. Residents of households without bundled services tended to be older: the head of the family was usually 65 or older, whereas in households with bundling, the head of the family was usually between 35 and 49. Regarding social class, households with ICT services tended to be middle/upper class, whereas households without bundling tended to be middle/lower class.

3. Methodology

As the endogenous variable (bundled) was a categorical variable with just two categories (household with bundling or household without bundling), a logistic regression model with panel data was used. As described in the main panel data literature (Arellano & Bover, 1990; Baltagi, 2005), using panel data makes possible to control for unobservable heterogeneity in households, as long as these differences were relatively constant over time. In addition, household panel data provides more

information, more variability, less collinearity between variables, more degrees of freedom, and greater efficiency.

The consideration of individual effects in panel data provides two alternatives for the analysis: fixed effects and random effects. The random effects model was chosen because it enabled the inclusion of exogenous variables that were practically invariant over time (e.g., socio-demographic variables) and allows the estimation of their influence. Fixed effects models do not allow the inclusion of time-invariant exogenous variables. In addition, the random effects model made it possible to work with the whole sample of households, whereas the fixed effects model would have underestimated the information provided by the households with constant endogenous variables (i.e., households that remained either with or without bundling throughout the entire study period).

In the random effects model the estimator is consistent (not unbiased) when, in the following model,

$$y_{it} = \beta_0 + \beta_1 x_{it1} + \cdots + \beta_k x_{itk} + a_i + u_{it}$$

the unobservable effect a_i is thought not to correlate with the exogenous variables, such that:

$$Cov\,(x_{itj}, a_i) = 0, t = 1,2,\ldots,T; j = 1,2,\ldots,k$$

The specific individual effects are those that affect, unequally, the time-invariant cross-sectional units and the decisions these units can make. If such effects were present and were not taken into account in the model, the problem of omission of variables would arise, and the estimators would be biased.

In the logistic regressions with panel data, the models estimated the probability that a household i has bundled services in month t according to the following model:

$$P(y_{it} = 1) = \Lambda\,(\beta_{i0} + \beta_{i1} x_{it1} + \cdots + \beta_{ik} x_{itk}) = \frac{\exp(\beta_{i0} + \beta_{i1} x_{it1} + \cdots + \beta_{ik} x_{itk})}{1 + \exp(\beta_{i0} + \beta_{i1} x_{it1} + \cdots + \beta_{ik} x_{itk})}$$

where y_{it} is the endogenous variable (i.e., bundled), which indicates whether or not household i has bundled services in month t; x_{it1} to x_{itk} are exogenous variables; β_{i0} to β_{ik} are coefficients to be estimated; and Λ is the logistic function.

The modelling strategy was to generate different models by separating the main groups of variables and study them one at a time. A final model containing all significant variables from the initial models was then built. Thus, five logistic regression models were specified and estimated:

- Model 1. Random effects model with endogenous variable (bundled) explained by services: landline phone (fixed), Internet (internet), pay television (tv), and total expenditure (expend) as a quantitative variable.
- Model 2. Random effects model with the endogenous variable (bundled) explained by Internet usage: use yesterday (int_use), usage increase (incr_use), whether the household has had the Internet for at least three years (old_3), network gaming (net_games), streaming contents (streaming), calls via Skype (net_calls), social networks (net_social), downloads (downloads), and total expenditure (expend).
- Model 3. Random effects model with the endogenous variable (bundled) explained by services plus the set of socio-demographic variables: household size (hh_size1 to hh_size5), size of population area (habitat1 to habitat5), presence of children (children1 to children3), social class (social1 to social4), and total expenditure (expend) as a quantitative variable.
- Model 4. Random effects model with the endogenous variable (bundled) explained by services plus usage variables. The model also included total expenditure (expend) as a quantitative variable.
- Model 5. Random effects model with the endogenous variable (bundled) explained by the exogenous services, usage, and socio-demographic variables that were significant in models 1–3, in addition to including total expenditure (expend) as a quantitative variable.

4. Results and discussion

Table 4 shows the results obtained in the estimation of the five random effects models, presenting the estimated coefficients, standard errors, and levels of significance of the estimates. According to the Wald test, the coefficients –jointly considered– of each of the models were significantly different from zero. Initial analysis implies the five models are useful for exploring the availability of bundled household ICT services (bundled) using the exogenous variables under study.

*****************Table 4 goes here********************************

As observed in Table 4, model 1 of random effects on the endogenous variable (bundled) revealed significant effects at the 1% level for all exogenous service variables, except the variable indicating whether the household had pay television. Internet as a service increased the probability of bundling quite remarkably, whereas the influence of the landline phone service was relatively similar but in the opposite direction -reducing the probability of bundling. This result points to bundles being built around Internet and not from landline phone or pay television. Despite being significant at the 1% level, the total expenditure variable exerted much less influence that this other factors.

In model 2, usage variables were analysed. The variable with the largest coefficient was ‘int_use’ which again implies that there exists a remarkable relationship between Internet usage and bundling. Other variables that were significant at the 1% level were calls made via Skype, the use of network gaming, volume of downloads and use of social networks by one member of the household in the last three months, with the latter being notoriously more relevant. Therefore, it is not only usage but strong usage of Internet -with a social network lean- a powerful predictor of adopting

bundled services. Total expenditure remained significant but again with much less influence on the bundle adoption.

Model 3 yielded results for the socio-demographic variables. These exogenous variables revealed significant differences according to only some of the variables. Size of the household affected negatively the intention to bundle from the reference value of a single person. Interestingly the drop is about the double or more when two persons inhabit the household than when there are more than two persons. he The presence of children younger than five years influenced bundling negatively from the reference value of no children at the household. Beyond this age, the presence of children in the household is not decisive when switching from individual services to bundled services. All social classes were significant, with negative inclination to bundling with regard to the upper class taken as reference. Here the lowest social class had approximately three times less chances of bundling than the middle class. Furthermore, the size of the population area had no significant effect in this model because the estimated coefficients were non-significant. Total expenditure remained both significant and well below the effect of significant socio-demographic factors.

Model 4 combines the presence of services and usage. The part on services is rather similar to model 2 with the interesting addition of the presence of a pay television service represented as a hindrance to bundling, albeit with a significance of 5%. Usage variables in general exerted a smaller influence in model 4 (i.e., combined with services) than they did in model 2. Use yesterday remained the usage variable with the greatest effect. Again the usage variable with the next greatest effect was social networks. Therefore, these results suggest that services prevail over uses when consumers are deciding whether to subscribe to bundled services.

Model 5 yielded results for all variables that were significant in the analysis and excluded non-relevant variables. Within this overarching model the service variables were decisive when bundling, in particular the presence of the Internet is the dominant factor. And again, as shown in models 2 and 3, use of the Internet

yesterday has a strong positive effect with the use of social networks as the next most important factor is the use of social networks. Streaming and VoIP calls were are also significant, implying that services which are complementary to the Internet – which at the time of data collection (2010–2012) were still in development – contribute to bundling. Unlike in model 3, in model 5 the type of population area of urban centres and provincial capitals exerted a significant positive influence on bundling. The presence of children is a moderately negative determinant of bundling. Similarly, as model 3 displayed already, the presence of more than one member in the household affects bundling negatively, although households with more than two members have a greater probability of bundling than those with just two. Also this last model confirms that all five estimated random effects models show the limited influence of the variable expenditure: it is significant and positive in all cases, but the estimates confirm that the effect of monetary incentives is small for consumers who subscribe to bundles.

5. Conclusions

Technological progress and changes in consumer habits have led to new marketing strategies such as bundling telecommunications services that were previously offered individually (Pereira & Vareda, 2013). Finding which factors are decisive when consumers switch from individual services to bundled services was the fundamental objective of this study. Using a random effects model, this study examined representative panel data for Spanish households between 2010 and 2012.

The five models studied (i.e., services, usage, services and socio-demographic, services and usage, and all significant variables) indicate that the most relevant factor for bundling is the availability of Internet as a stand-alone service. On the contrary the presence of a landline phone service has a negative influence, and the presence of a pay television service has only a potentially small negative influence. Reading these results together, it is the Internet consumers who understand the benefits of bundling voice and television around this component following a logic

where the former is the key component and the other two can be considered as add-ons.

(…)

The next most important factors are factors related to usage of Internet. The intensity of usage is the most relevant variable when seeking factors that affect bundling, a finding that is consistent with recent studies (Calzada & Martinez-Santos, 2014), which also report a strong positive relationship between usage intensity and bundling. At a more granular scale, the most relevant usages of Internet for bundling are social networks and voice services. Both are communication-type of services and contribute to the previously mentioned rationale of bundling from the core service of Internet and considering the other services as add-ons, which at some point could possibly be substituted by Internet itself. The negative contribution of streaming is intriguing in some of the models and calls for additional research.

(…)

Regarding socio-demographic characteristics, the size of the household has a negative influence on bundling. However this influence decreases considerably with the increase in the number of members reaching a minimum in between three and four members, precisely the average size of a household in Spain. The presence of older children or no children at all also contributes positively to the adoption of bundling, a possible indication of the lack of interest in bundles when families are raising small children. Social status has a considerable influence the higher the class the higher the possibilities for bundling. Finally living in a big city also affects positively the adoption of bundles.

(…)

Finally, the variable expenditure, which captures the effect of price as an incentive to bundle, is has a very small comparative influence on the process of bundling. This

finding reflects a previous statement from the CNMC documenting the strong propensity of Spanish households to subscribe to all communication services – both landline and mobile – from the same operator, despite a lack of incentives for doing so (CMT Comisión del Mercado de Telecomunicaciones, 2013).

(…)

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Figure 1. Changes in use of bundled services in Spanish households

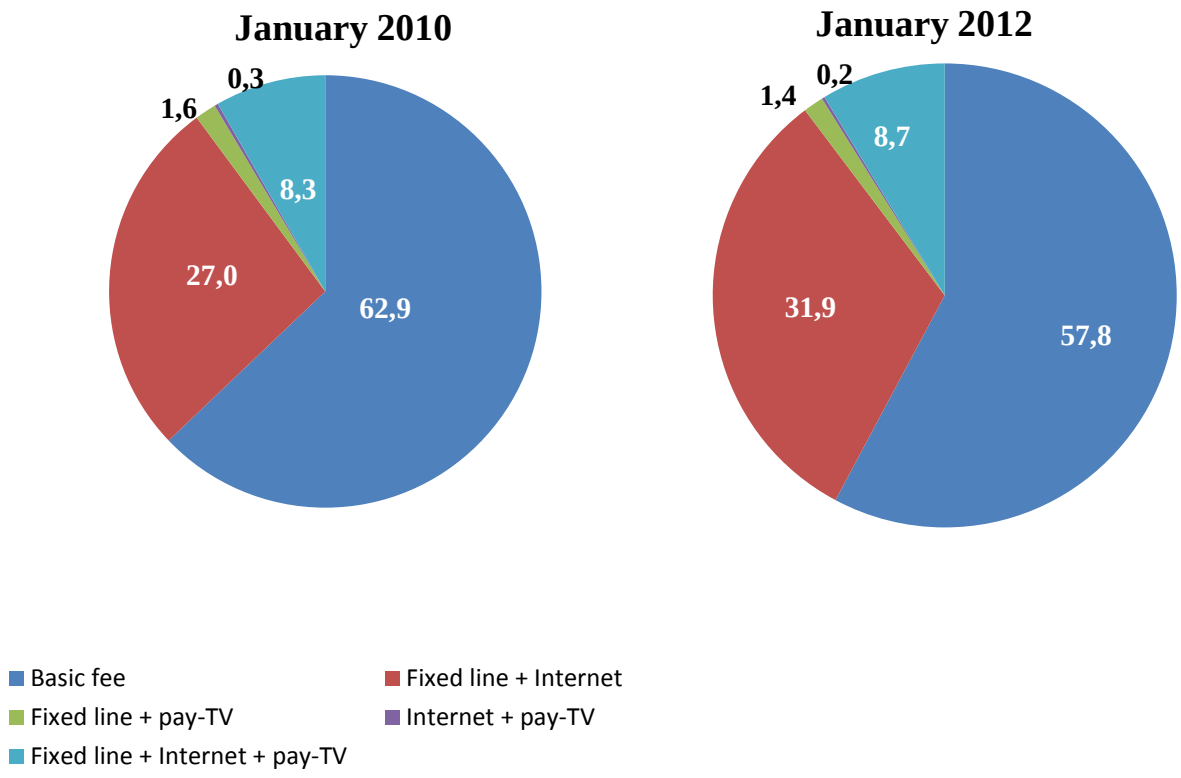

Table 1. Variables used in the analysis.

Variable	Description	Data Source
bundled	Adoption of bundled services at home	Bill
expend	Total household expenditure in fixed telephony, Internet and Pay TV	Bill
fixed	Adoption of fixed telephony at home	Bill
internet	Adoption of Internet at home	Bill
tv	Adoption of pay TV at home	Bill
mobile	Adoption of mobile phone at home	Bill
smartphone	Adoption of smartphone at home	Questionnaire
int_use	Any household member used the Internet yesterday	Questionnaire
incr_use	Any household member used the Internet more than the previous year	Questionnaire
old_3	Any household member have an Internet use experience over three years	Questionnaire
net_games	Any household member networked played in the last three months	Questionnaire
net_calls	Any household member called by Internet in the last three months	Questionnaire
streaming	Any member of the household consumed streaming content in the last three months	Questionnaire
net_social	Any household member used social networking in the last three months	Questionnaire
downloads	Any household member made Internet downloads in the past three months	Questionnaire
hh_size1 … hh_size5	Household size: 1 member; 2 members; 3 members; 4 members; 5 or more members	Questionnaire
habitat1 … habitat5	Population area size: less than 10,000 inhabitants; 10 to 20,000; 20 to 50,000; 50 to 100,000; more than 100,000 inhabitants and provincial capitals	Questionnaire
children1 … children3	Children at home: no children; with children aged 0-5 years; with children aged 6-15 years	Questionnaire
old_hwife1 … old_hwife4	Housewife Age: under 35 years; between 35 and 49 years; between 50 and 64 years; 65 and over	Questionnaire
social1 … social4	Social class: high + average high; mean; lower middle; down	Questionnaire

Table 2. Main statistics of variable expenditure.

Statistics	**Variable: expenditure**
N (number of observations)	76,862
Mean (€, without taxes)	44.04
Standard deviation (€, without taxes)	22.67
Minimum (€, without taxes)	0
Maximum (€, without taxes)	399.14
Quarter 1 (€, without taxes)	29.9
Quarter 2 (€, without taxes)	40.61
Quarter 3 (€, without taxes)	55.27

Table 3. Main statistics of categorical variables

Variable	Observations	Frequency	Variable	Observations	Frequency
bundled	99,551	50.9%	streaming	75,271	24.0%
fixed	77,104	98.0%	habitat1	76,717	22.1%
internet	77,104	68.2%	habitat2	76,717	10.8%
tv	77,104	24.4%	habitat3	76,717	12.3%
mobile	31,504	79.8%	habitat4	76,717	6.1%
smartphone	89,960	20.5%	habitat5	76,717	48.8%
net_use	89,960	59.6%	children1	76,717	73.2%
incr_use	89,960	37.3%	children2	76,717	6.4%
old_3	89,960	63.2%	children3	76,717	20.3%
net_games	89,960	24.4%	old_hwife1	76,717	2.2%
net_calls	89,960	10.7%	old_hwife2	76,717	37.7%
net_social	89,960	34.9%	old_hwife3	76,717	32.0%
downloads	89,960	37.6%	old_hwife4	76,717	28.0%
hh_size1	76,717	14.3%	social1	76,717	26.6%
hh_size2	76,717	30.4%	social2	76,717	45.1%
hh_size3	76,717	22.4%	social3	76,717	21.8%
hh_size4	76,717	23.4%	social4	76,717	6.5%
hh_size5	76,717	9.5%			

Table 4. Logistic random effects regression models (bundled exogenous variable)

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
EXPEND	0.069***	0.079***	0.066***	0.07***	0.071***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
FIXED	-16.41***		-18.43***	-17.67	-18.32
	(0.73)		(0.716)	(1.199)	(0.993)
INTERNET	20.93***		22.13***	22.65	22.16
	(0.389)		(0.612)	(0.555)	(0.519)
TV	0.041		-0.098	-0.674	
	(0.252)		(0.297)	(0.34)	
INCR_USE		0.487***		0.129	
		(0.112)		(0.144)	
INT_USE		2.609***		1.413	1.39
		(0.133)		(0.18)	(0.179)
OLD_3		0.332**			
		(0.133)			
NET_CALLS		0.477***		0.369	0.396
		(0.166)		(0.185)	(0.187)
NET_GAMES		0.720***		0.222	
		(0.149)		(0.177)	
STREAMING		0.140		-0.311	-0.338
		(0.126)		(0.144)	(0.146)
NET_SOCIAL		1.332***		1.094	1.156
		(0.126)		(0.157)	(0.157)
DOWNLOADS		0.420***	0.589***	0.085	0.269
		(0.126)	(0.127)	(0.163)	(0.164)
HABITAT1			-0.297		
			(0.755)		
HABITAT2			0.669		
			(0.799)		
HABITAT3			-0.640		
			(0.795)		
HABITAT5			0.739		1.439
			(0.728)		(0.285)
CHILDREN2			-1.704***		-1.185
			(0.429)		(0.466)
CHILDREN3			-0.392		-0.908
			(0.310)		(0.34)
HH_SIZE2			-3.416***		-2.345
			(0.422)		(0.32)
HH_SIZE3			-1.270***		-1.013
			(0.471)		(0.301)
HH_SIZE4			-0.817*		
			(0.495)		
HH_SIZE5			-1.293**		-1.153
			(0.563)		(0.405)
SOCIAL2			-1.109***		
			(0.288)		
SOCIAL3			-1.941***		
			(0.323)		
SOCIAL4			-4.725***		
			(0.617)		
_CONS	2.551***	-0.72***	6.782***	2.082**	3.469***
	(0.62)	(0.145)	(0.935)	(0.965)	(0.858)
N	76,862	56,627	66,953	56,627	56,349
HOUSEHOLD (GROUPS)	3,390	2,964	3,118	2,964	2,952
WALD	4,435***	1,960***	2,879***	3,742***	3,116***

Notes: Robust std. error given in parentheses. * Significant at 10%, ** significant at 5% and *** significant at 1%.