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**The Impact of Service Bundling on Consumer
Switching Behaviour: Evidence from UK
Communication Markets**

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April 2014

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Key words Bundling, Consumers, Panel-data, Regulation, Switching, telecommunications

JEL Classification: C3, C5, D1, L5, L8

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This paper empirically analyses the impact of the bundling of four common home communication services with a single supplier on the probability that an individual changes supplier using a survey-elicited dataset of 2,871 individuals. Implementing a random effects probit approach to control for individual heterogeneity, the results strongly show that when individuals bundle their service then they are significantly less likely to change supplier. A second result indicates that service- and supplier-related variables are better predictors of an individual's likelihood of switching than are the characteristics of the individual, suggesting that future research in this area should prioritise their inclusion.

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1 Introduction

A key recent trend in communication markets is the propensity for households and individuals to subscribe to an increasing range of services including broadband internet, subscription-based television services (pay-TV), or landline telephones. Greater deregulation of communications markets, coupled with the increased convergence in technologies, has led individual companies to provide greater numbers of these services. One of the emergent strategies employed by large UK providers of household communications is to offer subscribers a ‘bundle’ of services, often a discount on the equivalent combined selling price. Research by the both UK communications regulator Ofcom, and the FTC in the US has suggested that households which subscribe to a bundle are less likely to switch provider for one or more of these bundled services. One interpretation is that bundling creates ‘switching costs’ for consumers. Where switching costs exist consumers can become locked-in to the choices they make, which subsequently ‘hinders customers from changing suppliers in response to changes in efficiency’ [Farrell and Klemperer, 2007].

While there exists an abundance of empirical work investigating consumer switching behaviour [Giulietti et al., 2005; Wilson and Waddams Price, 2010] the academic literature which explicitly examines the effect of bundling on switching behaviour is limited to a small handful of studies [Prince and Greenstein, 2011; Ranganathan et al., 2006].

This paper adds to this slim literature by empirically analysing consumer switching data to investigate whether the strategy of offering bundles of services is used by integrated communication firms to create switching costs. It utilises a panel-data approach to examine a survey-elicited dataset of 2,871 households’ bundling and switching behaviour. After controlling for a range of variables commonly used in the prevailing literature, the study finds strong evidence that the bundling of individual communications services with a single provider significantly reduces households’ likelihood of switching to a different provider.

The remainder of this paper offers a review of the existing research and an overview of the UK communications market, followed by a discussion on the econometric methodology employed in the study. The paper concludes with a discussion of the results and their implication for policy.

1.1 Bundling and Switching

Product (or service) bundling is one of a series of practices employed by firms which facilitates the sale of a number of goods to a single customer. Bundling is defined by Stremersch and Tellis [2002] as the sale of two products together, where there also exists separate markets for each. This is distinct from other similar practices such as Tying of products which makes the purchase of one good *contingent* on another. It is also

distinct from the extreme example of ‘full line forcing’ which requires customers to purchase an entire range of products - this is more prevalent in intermediate goods markets. Bundling can be used as a competitive tool to assert dominance in one or more markets, or otherwise it can be used to incentivise consumers to alter their purchasing habits.

Consumers face switching costs when they change supplier for a product or service. Switching costs occur because, prior to consumption of a good, a consumer must expend resources in addition to the purchase price. This can be in terms of learning how to use a computer program, research a new brand, or finding a new supplier. In this sense Valletti [2000] defines them as ‘resources, in addition to the purchase price, spent to consume the product when such resources cannot be recovered if the consumer changes supplier’; these additional costs are sunk. Switching costs are particularly prevalent where the relationship between consumer and supplier is characterised by frequent interactions such as repeat purchases. They also occur when the nature of a relationship is long-term such as in fixed-term subscriptions - relevant to the current case. Klemperer [1995] describes the sunk costs inherent in the consumer-supplier relationship as sufficient to cause ‘ex-ante homogeneous products to become, after the purchase of any one of them, ex-post heterogeneous’.

While bundling is a practice which is deliberately employed by firms with limited examples of its natural occurrence, switching costs can occur naturally. Individuals form psychological attachments to particular brands, or otherwise in many products there is an inevitable and unavoidable learning process which requires sunk effort from the consumer. They can, however, be artificially exaggerated or created by firms in order to restrict consumer switching.

Regulatory concern over switching is mainly focussed in the area of consumer protection, both in the US and the UK. There have been recent moves by a number of UK sector regulators to champion policies which would facilitate consumer switching including the endorsement of price comparison websites, production of helpsheets, and introduction of policies to streamline processes. In recent years, typified by Ofcom [2008], there has been greater specific scrutiny of the role of bundling in switching costs, though there is still a shortage of meaningful analysis. The activities of Ofcom in relation to switching and bundling are outlined in discussion of survey data in the next section.

1.2 Existing Research

There exists a substantial theoretical literature which examines either bundling or switching, though less which actually examines the relationship between bundling and switching behaviour. More relevantly to the current paper there is also a substantial empirical literature, though again there is a paucity which actually examines both bundling and switching.

Early works by Klemperer [1984, 1987] observe that switching costs lead to overall higher prices because consumers are less able to switch away in response to negative changes in terms. The motivation for this behaviour is that switching costs make consumers less price sensitive [Klemperer, 1984]. Farrell and Klemperer [2007] define switching costs as being where consumers find it costly to switch from one supplier to another - where consumers can become ‘locked’ into the purchase of a series of products or long-term agreement. The dynamic impact of switching costs is explored by Klemperer [1984], Chen [1997b], and Farrell and Shapiro [1988]; each paper finds an incentive for firms to exploit their present ‘tied’ customer base rather than compete for new customers.

Related to switching costs is the issue of search or ‘shopping’ costs. Farrell and Klemperer [2007] observe that shopping costs can cause individuals to make sub-optimal product choices. Examples of this include deliberate price complexity, or product proliferation where consumers must exert excessive effort in order to identify market information - even regarding their own usage [Miravete, 2009; Narayanan et al., 2007]. Such pricing obfuscation is likely to distort the perceptions of consumers’ likely benefit from switching.

Both Nalebuff [2004] and Whinston [1990] illustrate that bundling can be used by a dominant firm in one market to foreclose another under a range of conditions. Further, Bakos and Brynjolsson [2000] find an effect whereby bundling of large numbers of services (such as aggregation of internet content) can lead to exclusion of standalone suppliers. This results in a best response to a competitor bundling being retaliatory bundling. A similar ‘head-to-head’ result is also reported in Klemperer [1992] though this bundling best-response results in softened, rather than intensified, competition. Both Chen [1997a] and Thanassoulis [2011] find the opposite result to the above where the best-response to a pure-bundling rival is to remain a single-product firm to avoid the increased competitive environment stemming from head-to-head competition.

A section of the literature also focusses on the use of bundles as a means to reduce search costs and facilitate customer acquisition by encouraging consumers to single-home their purchases [Bakos and Brynjolsson, 2000]. This literature does not, however, extend to the dynamic setting characterised by Klemperer [1984] and Chen [1997b] with respect to the switching literature. This present paper aims to offer evidence that would support either a notion that bundling either increases switching costs or otherwise that it facilitates switching.

1.2.1 Empirical Literature

Empirical investigations have yielded a number of variables which have been shown to influence consumer switching behaviour.

Universal across the studies featured in Pomp et al. [2005] is the analysis of demographic variables; these studies inform the inclusion of various variables in this present study. Hausman and Sidak [2004] examines subscription to long-distance calling plans

and finds a positive relationship between price sensitivity (and switching) and both income and education. Royalty and Solomon [1999] find decreased price sensitivity is associated with increased age and wealth.

Pomp et al. [2005] also find firm-specific variables influential - implying that firm behaviour can mediate consumer switching behaviour. Both Chen and Hitt [2002] in their study of online investment brokers, and Carlsson and Löfgren [2004] (concerning airline choices), identify that perceived quality of an individual's own supplier increases the cost of switching. Chen and Hitt [2002] also show that the breadth of services offered by a firm is negatively correlated with switching and a positively correlated with customer acquisition.

A second tranche of studies are based (like the present study) on survey data. Wilson and Waddams Price [2010] find that 77% and 86% of respondents in the two surveys used in their study cite pecuniary motivations as a major incentive for switching. Giulietti et al. [2005] examines retail gas markets and finds monetary savings to be significant, especially where there is little expectation that the individual's incumbent supplier will match the lower price. Waddams Price and Webster [2011] also find a significant relationship between expected saving and switching.

Examining previous studies in home communications products, the US Federal Communications Commission (FCC) conducted survey research in 2010 examining consumer switching behaviour. Amongst the findings the FCC found that the main stated reasons for broadband switching were either to switch to a superior service or alternatively a cheaper service (49% and 47% respectively). Moreover, of those that hadn't switched, 39% stated that having to change a bundle of services was a major reason for this.

There is also a (very) limited experimental literature concerning bundling or switching. Harris and Blair [2006] provides evidence that individuals bundle products to minimise search costs (in accordance with much of the theoretical literature).

The empirical literature which explicitly examines the role of bundling on consumer switching is notably slim. In Ofcom [2008] the UK communications regulator carries out a series of interviews to elicit individuals' views on bundled products. Investigating the differing effects of various configurations of bundled services, Ofcom found an unwillingness to switch away from the supplier and also an unwillingness to unbundle services once bundled. It was also found that those with lower education were less likely to successfully switch owing to the complexity of the switching process, and also that those who worked full-time stated an unwillingness to switch due to the inconvenience. Ofcom [2008] also found an unwillingness from consumers to switch supplier if a they had been with their existing supplier because they felt some degree of loyalty to existing suppliers where a long-term relationship existed¹. Ranganathan et al. [2006] explicitly

¹Ofcom [2008], p. 11.

discusses the role of bundling in mobile telecommunications environment. The authors find that individuals which make more ‘relational investments’ with their provider (including bundling services) are less likely to switch. Finally, Prince and Greenstein [2011] empirically analyses the role of bundling in consumers’ switching decisions by utilising a more conventional survey-elicited panel² approach to examine persistence of subscription to services and particular providers. The authors find that when individuals bundle services they are less likely to discontinue their use of that service (lower attrition rates). Specifically, for those services with declining rates of subscription (pay-TV and landline in this case), the decline was less marked amongst those subscribers which bundled the services with home broadband.

1.3 Contribution

This paper makes a substantial contribution to the understanding of the role of bundling practices and their effect on consumer switching of provider. It is the first paper to empirically test the role of service bundling on the likelihood of switching in UK communication markets and does so while also controlling for heterogeneity amongst the different suppliers and a range of demographic variables.

To the best of the author’s knowledge the only other papers which have empirically approached the role of bundling in consumers’ switching decisions are FCC [2010], Prince and Greenstein [2011] and Ranganathan et al. [2006]; all find that bundling of services with a single provider significantly reduces the likelihood of switching provider. It is against these papers that the results of the current paper are most accurately measured - testing the broad hypotheses that bundling of products reduces the likelihood of switching provider for those products.

Beyond the issue of bundling, this paper presents an important test of the prevailing literature’s assertions concerning demographic determinants of switching. It does this by comparing the performance of demographic-based models against models concerned with supplier- and service-related variables. The strength of the results indicates the importance of supplier and service specific variables and illustrates the flawed nature of attempts to evaluate the determinants of switching using demographic variables alone under the implicit assumption of homogeneous providers. Notwithstanding, this paper controls for demographic elements and shows that, although demographic variables alone are inaccurate predictors of switching behaviour, controlling for individual-specific characteristics in a broader model delivers stronger results than models featuring demographic or service-specific variables alone.

The paper concludes by empirically examining the scope for smaller single-product

²The authors actually use a pseudo-panel constructed using three demographically-similar annual surveys.

providers to compete with larger multi-product firms. This has not previously been addressed in the empirical literature and tests the theoretical hypotheses of Chen [1997a] and Thanassoulis [2011] versus those of Bakos and Brynjolsson [2000] and Klemperer [1992].

2 The Dataset and the UK Communications Market

In order to analyse firms' bundling strategies and resultant consumer switching behaviour this paper utilises a survey-elicited dataset of 2,871 households designed to examine household subscriptions to, satisfaction with, and switching behaviour surrounding, four common household communication services: subscription-based television (pay-TV); fixed-line broadband; mobile telephone; and landline telephone. The survey was commissioned by (the UK communications regulator) Ofcom and carried out by research firm Saville Rossiter-Base in March 2010 where the participants were chosen as the key decision makers in a household. The sample was selected in order to be geographically representative of the UK, with the majority of the data (2,008 individuals) gathered through face-to-face interviews in the first round, while a second round of interviews took place online (863 individuals). The overall results of the survey, with a large selection of summary statistics, are detailed in Saville-Rossiter-Base [2010].

Survey respondents were asked up to 36 questions concerning services to which their household subscribed and whether they had either switched services from one provider to another in the preceding twelve months. Those individuals which reported that they had switched provider were asked a further 43 questions about their previous supplier, and their experiences and motivations surrounding their switching behaviour. The set of variables for inclusion was constrained by inconsistencies in questions asked concerning their current provider and, if applicable, their provider at time of switching.³ The variables missing from the information on previous provider includes price information, information concerning a discount for subscribing to a service, and measures of service quality. While explicit variables concerning these issues would have been desirable since they are present and significant in much of the previous literature, it is likely that service-specific metrics such as price are fairly uniform across firms, or otherwise (in the case of service-specific quality) correlated with the supplier of the service.

Furthermore there was some censoring of the sample since a small number of the observed switches in the survey occurred because an individual has moved house and the individual's initial provider for a service was not available at the new address. Because these services were involuntarily switched⁴ they are excluded from the analysis. Furthermore, due to the time burden inherent in carrying out a survey, where an individual had switched many services data was only collected for a subset of these switches. For

³In section two respondents were asked a different set of questions to those in section one.

⁴These switches are involuntary because the subscriber may have wished to remain with their previous provider.

these individuals, the excluded services were determined by a process of prioritisation, as per table 1.

Table 1: Survey Priorities

Priority	Action
1	Switched Bundle
2	Switched Pay-TV
3	Switched Broadband
4	Switched Mobile Phone
5	Switched Landline

The above factors result in the total number of 2,871 respondents being reduced to a workable sample of 2,856 while the loss of observations across the separate services are shown in table 2. The term ‘Service history’ implies that the switched service was of sufficiently high priority to provide data on the previous supplier, and ‘Movers without choice’ illustrates those individuals which moved house and were unable to keep their existing supplier.

Table 2: Sample Selection

	Pay-TV	Broadband	Mobile	Landline	Total
Subscribers	1,721	2,052	2,630	2,508	8,911
Non-switchers (a)	1,536	1,550	2,222	2,125	7,433
Switched	185	502	408	383	1,478
Service history (b)	154	489	340	334	1,317
Movers without choice (c)	25	48	11	38	122
Total included (a+b-c)	1,665	1,991	2,551	2,421	8,628
Loss of observations	56	61	79	87	283

Table 2 indicates the number of total subscribers for each of the service lines where an individual may have up to four separate subscriptions and therefore data points regarding switching within the dataset. Because the excluded individual-service data points all concerned incidents of switching their exclusion is, on estimation, likely to bias the baseline likelihood of switching downward, if this is the case then this will be reflected in a more negative constant. Furthermore, the exclusion of observations based upon the

prioritisation of services employed during data collection could lead to concern that the excluded observations are correlated with particular services; a simple probit analysis of instances of excluded observations against service-type indicates that this is not the case.

The distribution of switching between individuals is shown below in table 3.

Table 3: Number of Services Switched by Household

Number of Services Switched	Frequency	Proportion
0	1,921	67%
1	565	20%
2	265	9%
3	97	3%
4	23	1%
Total	2,871	100%

The table indicates that the majority of the survey respondents (67%) did not switch provider for any of their subscriptions. For those households which did switch a service the majority only switched a single service, with only 1% of the total reponse stating that they switched provider for all four services in the preceding twelve months.

2.1 Choice of Supplier and Bundling

The survey asked respondents to indicate which of 36 providers⁵ they used for each of the four household communication services to which they subscribed. The responses to the survey indicated that there are only a handful of large communication companies with significant market shares in one or more of the individual communication markets. In addition to these few firms there are a number of smaller operators (these firms are likely to have emerged as a result of the regulatory intervention that has reduced barriers to entry). There is also a periphery of other firms to which very few respondents subscribed.

Table 4 shows the share of subscribers for each of the services as accounted for by the largest 15 firms.

Table 4 shows that some firms have dominant positions in some markets. For instance, Sky has a particularly high market share in pay-TV whereas BT's landline market

⁵There were 35 closed-form options in addition to an open 'Other Supplier' category.

Table 4: Survey respondents subscriptions by service provider (March 2010)

Firm	Pay-TV		Broadband		Mobile		Landline	
	Subs	%	Subs	%	Subs	%	Subs	%
AOL	3	0.17	103	5.02	1	0.04	30	1.2
BT	68	3.95	487	23.73	19	0.72	1262	50.32
Kingston	0	0	10	0.49	0	0	15	0.6
O2	0	0	88	4.29	696	26.46	7	0.28
Orange	2	0.12	81	3.95	566	21.52	19	0.76
Pipex	0	0	19	0.93	0	0	11	0.44
PlusNet	1	0.06	44	2.14	0	0	8	0.32
Post Office	2	0.12	10	0.49	3	0.11	38	1.52
Sky	1140	66.24	255	12.43	5	0.19	199	7.93
Talk-Talk	7	0.41	254	12.38	13	0.49	288	11.48
'3' Mobile	1	0.06	7	0.34	168	6.39	0	0
Tiscali	3	0.17	76	3.7	2	0.08	35	1.4
T-Mobile	2	0.12	3	0.15	324	12.32	2	0.08
Virgin	458	26.61	508	24.76	176	6.69	493	19.66
Vodafone	2	0.12	3	0.15	503	19.13	3	0.12
Others	32	1.85	104	5.05	154	5.86	98	3.89
Total	1721		2052		2630		2508	

share is over 50% but their share of subscribers of pay-TV is much lower at 3.95%. The relative strengths of the firms can be understood as being the result of some inherent market advantage, or specialisation that each firm possesses which gives the relevant firm a relative superiority in the provision of some services. In the current case of UK communication markets these advantages in the provision of some services are largely the result of some historical firm significance. This may be the status of being an ex-nationalised incumbent (which creates an intangible psychological association between the firm and delivery of a particular service), or otherwise from being a technological pathfinder and investing early in fledgeling technology in the case of Sky leading to a tangible technological advantage. There may also be significant regulatory considerations or barriers to entry in the provision of some services such as mobile telecommunication where there exists strict licensing conditions, or pay-TV which might require significant infrastructure.

Since this study is focussed on the impact of bundling on switching behaviour it is also relevant to examine the types of bundles to which households declared they subscribe through each firm. Table 5 shows all possible bundle combinations, based upon the four individual services, and the number of subscribers to each bundle type. Given

the particular survey design, subscription to a bundle of services with one firm precluded subscription to another bundle with the same, or different, supplier (a household could only have one bundle). The definition of bundling here is based upon that used in the survey; where an individual receives multiple services from a single provider, and receives a single bill. Each service is represented by a letter (pay-TV = T, broadband = B, mobile telephone = M, landline = L) and thus, for example, the bundle TBL represents one containing pay-TV, broadband, and landline.

Table 5 indicates that, similarly to the case of particular services, different firms place different focus on product bundling. These differences are also likely to be inherent to the relative strengths and specialities of the main providers (i.e. Virgin Media specialise in the delivery of all household services - except mobile phone - through a single fibre-optic cable connection).

In the later econometric analysis the identity of the provider of services is considered. In order to simplify the exercise six discrete categorical variables are included reflecting subscriptions to the major multi-product service providers (BT, Sky, Virgin Media, and Talk-Talk), a single category for subscription to either of the specialist mobile phone operators (Orange, O2, Three Mobile, T-Mobile, and Vodafone), and a single category for all other providers.

In addition to the identity of the service provider, variables are also included for the duration of any subscription and, given the objectives of the paper, whether a service to which a household subscribes is part of a bundle. Full details of the service-specific variables are found in appendix A.

2.2 Demographic Variables

There are a number of demographic variables which have been identified in the existing empirical switching literature as having a statistically significant impact on individuals' switching behaviour. Questions relating to demographic factors were also included in the 2010 Ofcom survey. The collection of the data by Saville Rossiter-Base was carried out such that participants were chosen to be representative sample based upon three criteria: age; gender; and socio-economic group. Furthermore, the respondents were geographically distributed between sampling units based upon UK census Output Areas, ensuring that the demographic profile of the sample is representative of the UK population. Finally, the sample was selected such that a minimum quota of subscribers to each service was satisfied to allow meaningful analysis of the data.

The analysis includes variables relating to household income, the presence of children in the household, employment status of the household decision maker, the gender of the household decision maker, age, and education. Because of the closed-form nature of the questions in the survey mean that all the variables are included in categorical form. Full details of the demographic variables can also be found in appendix A

Table 5: Number of survey respondents by bundle type (March 2010)

Firm	Bundle Type											Total
	ALL	TBM	TBL	TML	BML	TB	TM	TL	BM	BL	ML	
AOL	-	-	-	-	-	-	-	-	-	20	-	20
BT	1	-	33	1	4	1	-	6	-	299	-	345
Kingston	-	-	-	-	-	-	-	-	-	-	-	0
O2	-	-	-	-	-	-	-	-	9	1	-	10
Orange	-	-	-	-	7	-	-	-	6	7	1	21
Pipex	-	-	-	-	-	-	-	-	-	7	-	7
Plusnet	-	-	-	-	-	-	-	-	-	8	-	8
Post Office	-	-	-	-	-	-	-	-	-	8	-	8
Sky	2	-	150	1	-	84	-	24	-	1	-	262
Talk-Talk	-	-	6	-	3	-	-	-	-	192	-	201
Three Mobile	-	-	-	-	-	-	-	-	1	-	-	1
Tiscali	-	-	2	-	-	-	-	-	-	29	-	31
T-Mobile	-	-	-	-	-	-	-	-	-	1	1	2
Virgin Media	27	1	308	1	2	25	-	49	-	64	1	478
Vodafone	-	-	1	-	-	-	-	-	-	1	-	2
Others	-	-	1	-	3	-	1	-	1	22	-	28
Total	30	1	501	3	19	110	1	79	17	660	3	1424

3 Econometric Framework, Methodology, and Specifications

This paper analyses the impact of the ‘bundling’ of communication services with a single supplier on the likelihood of an individual switching supplier and focusses primarily on those variables concerning the supplier at time of switching. Specifically, by controlling for a range of variables which are likely to be influential, it is possible to isolate the pure effect of bundling on the subsequent likelihood of switching.

From the findings in the previous literature the propensity to switch provider is likely to be some function (S) of a both the characteristics of the service, and also of the individual:

$$\text{Switching propensity} = S(\text{Service, Bundled, Duration, Supplier, Income, Employment, Children, Education, Gender, Age})$$

Where ‘Service’ represents which of the four services in the study is under consideration, ‘Bundled’ concerns whether this service is part of a bundle, ‘Duration’ represents the length of time that the individual has subscribed to the service, and ‘Number of services’ is the number of services to which the individual subscribes with the same supplier.

The previous sections indicated that it is not sufficient to examine bundling as being independent of providers or service, because the bundling rate across firms or services is fundamentally different. By interacting bundling with service or supplier it is possible to actively account for these heterogeneities. Similarly, by interacting service and supplier the model takes into account the observation that switching rates for each service are different depending upon the supplier. The remainder of the determinants of switching are a range of demographic control variables.

3.1 Econometric Methodology

In order to understand the individual’s decision to switch provider a modified random utility framework (as per Greene [2012]) is employed. Defining U_{ik}^0 as the utility individual i gains from their existing subscription to the service k with their current supplier, and U_{ik}^1 the expected utility they could gain from subscription through an alternative supplier.

$$U_{ik}^0 = (\mathbf{x}_{ik}^0)' \beta^0 + \mathbf{z}'_i \gamma^0 + \varepsilon_{ik}^0 \quad (1)$$

$$U_{ik}^1 = (\mathbf{x}_{ik}^1)' \beta^1 + \mathbf{z}'_i \gamma^1 + \varepsilon_{ik}^1 \quad (2)$$

From equation (1), the individual's utility from their existing subscription (U_{ik}^0) is expressed as a function of the vector of characteristics of their existing product denoted \mathbf{x}_{ik}^0 the profile of the subscriber, thus the inclusion of a vector of individual demographic characteristics (\mathbf{z}_i). Utility from a service will also be subject to some random error term ε_{ik}^0 . Equation (2) indicates a similar arrangement for utility with a new supplier of the same service (indicated by U_{ik}^1) and so features the characteristics of the new supplier.⁶

An individual (i) who wishes to change supplier for a service (k) also faces a switching cost (W) linked to the characteristics of the new and old service. This accounts for efforts the new supplier makes to alleviate problems the individual may face in switching⁷, or the old supplier's efforts to restrict the switching process. Switching costs are also affected by the characteristics of the individual such as their cognitive capacity to understand switching processes.

$$W_{ik}^{0 \rightarrow 1} = (\mathbf{x}_{ik}^0)' \beta^{W0} + (\mathbf{x}_{ik}^1)' \beta^{W1} + \mathbf{z}'_i \gamma^W + \varepsilon_{ik}^W \quad (3)$$

A consumer is assumed to switch if they receive positive net-utility following that switch, defining net utility from switching as N_{ik} , where $W_{ik}^{0 \rightarrow 1}$ represents the switching cost associated with the switch from provider 0 to provider 1:

$$(\text{Net utility})_{ik}^{0 \rightarrow 1} = U_{ik}^1 - U_{ik}^0 - W_{ik}^{0 \rightarrow 1} \quad (4)$$

If the net utility from switching is greater than zero, then the individual will switch.⁸ Thus the probability of a switch is the probability that $(\text{Net utility})_{ik}^{0 \rightarrow 1} > 0$; from the above, this is where $U_{ik}^1 > (U_{ik}^0 + W_{ik}^{0 \rightarrow 1})$:

$$\text{Prob}[Switch_{ik} = 1 | \mathbf{x}_{ik}^0, \mathbf{x}_{ik}^1, \mathbf{z}_{ik}] = \text{Prob}[U_{ik}^1 > (U_{ik}^0 + W_{ik}^{0 \rightarrow 1})] \quad (5)$$

$$= \text{Prob}[\left((\mathbf{x}_{ik}^1)' \beta^1 + \mathbf{z}'_i \gamma^1 + \varepsilon_{ik}^1 \right) - \left((\mathbf{x}_{ik}^0)' \beta^0 + \mathbf{z}'_i \gamma^0 + \varepsilon_{ik}^0 \right) - \left((\mathbf{x}_{ik}^0)' \beta^{W0} + (\mathbf{x}_{ik}^1)' \beta^{W1} + \mathbf{z}'_i \gamma^W + \varepsilon_{ik}^W \right) > 0 | \mathbf{x}_{ik}^0, \mathbf{x}_{ik}^1, \mathbf{z}_{ik}]$$

$$= \text{Prob}[\left((\mathbf{x}_{ik}^1)' (\beta^1 - \beta^{W1}) - (\mathbf{x}_{ik}^0)' (\beta^0 - \beta^{W0}) + \mathbf{z}'_i (\gamma^1 - \gamma^0 - \gamma^W) + (\varepsilon_{ik}^1 - \varepsilon_{ik}^0 - \varepsilon_{ik}^W) \right) > 0 | \mathbf{x}_{ik}^0, \mathbf{x}_{ik}^1, \mathbf{z}_{ik}]$$

$$= \text{Prob}[\left((\mathbf{x}_{ik}^*)' \beta^* + \mathbf{z}'_i \gamma^* + \varepsilon_{ik}^* \right) > 0 | \mathbf{x}_{ik}^*, \mathbf{z}_{ik}] \quad (6)$$

⁶Note that the demographic vector \mathbf{z}_i remains constant since these are individual-specific characteristics and do not vary with service.

⁷This is typical of bank accounts where the receiving bank will offer to transfer over standing orders and direct debit instructions.

⁸A switch occurs in equation (5) where $Switch_{ik} = 1$, otherwise $Switch_{ik} = 0$

Where the term \mathbf{x}_{ik}^* in equation 6 represents the appended vectors \mathbf{x}_{ik}^1 and \mathbf{x}_{ik}^0 , the vector of relevant β terms has been similarly appended and are represented by β^* . The term γ^* represents the net effect of the γ terms on the service-invariant individual characteristics (\mathbf{z}_{ik}), expressed as $\gamma^1 - \gamma^0 - \gamma^W$. The random error terms have been similarly consolidated (ε_{ik}^*).

3.2 Random Effects Probit Estimation

Because the individual of equation (6) is making their switching based upon an unobserved utility function then the true decision making process (based upon the net utility calculation) cannot be estimated. Although equation (4), which is based upon the true utility function, may contain every possible characteristic of individual, we have a limited set of observed variables chosen to be relevant and measurable. As a result it is possible to estimate the decision by individual i to switch service k as some latent variable S_{ik} - a function of the observed characteristics included in the vectors \mathbf{z} (observed individual-specific variables) and \mathbf{x} - the vector of *all available* service-specific variables. The terms γ and the β are the respective coefficients for the vectors of variables. The standard latent variable model is laid out in equation (7).

$$S_{ik} = \mathbf{x}'_{ik}\beta + \mathbf{z}'_i\gamma + \varepsilon_{ik} \quad (7)$$

The participants of the survey were asked their switching decisions over a range of services to which they subscribed so, because this analysis examines the switching decision on a per-service level, for each individual there exists up to four (representing the four services in the study) binary switching decisions in the data. While the standard latent variable model of equation (7) is acceptable under the assumption of independence between different dependent variables (a pooled model); in the current case this would require complete independence between the decisions of an individual. Because the model above estimates a single set of coefficients relating to the likelihood of switching a given service, independence would require that the error terms relating to the each individuals multiple service-specific switching decisions be independent. In the present case this is unlikely, specifically for services k and l , and individuals i and j :

$$Cov[\varepsilon_{ik}, \varepsilon_{il}] \neq 0 \text{ and...}$$

$$Cov[\varepsilon_{ik}, \varepsilon_{jk}] = 0$$

This would imply that there is some exogenous deterministic element (in this case the individual's identity) which leads to correlation between the likelihood of switching that individual's different services, but is uncorrelated between individuals. The existence of intra-individual correlation in their decisions means that the analysis is approached as one would approach panel data; with multiple observation points for each individual. The standard latent variable model is adapted as a random effects model where the estimated coefficients are fixed for each service, supplier, and demographic characteristic, but a random individual-specific error is added to all data points pertaining to a given individual:

$$S_{ik} = \mathbf{x}'_{ik}\beta + \mathbf{z}'_i\gamma + e_{ik} \text{ where } e_{ik} = u_i + \varepsilon_{ik} \quad (8)$$

Where the total error term e_{ik} is made up of the *random* component ε_{ik} and the *individual* component u_i . This extra error term allows for some undefinable individual difference in the probability of switching that cannot be accounted for by that individual's observable characteristics; it may be related to background or personal experience which cannot be readily quantified.

Equation (8) is identical in form to the net utility calculation in equation (6) but can be calculated as it is constructed using observable characteristics of the service (\mathbf{x}_{ik}) and individual (\mathbf{z}_i). Thus, much like the net utility calculation of (6) the decision to switch is implicitly illustrated by the condition:

$$\text{Switch}_{ik} = \left\{ \begin{array}{l} 1 \text{ if } S_{ik} \geq 0 \\ 0 \text{ if } S_{ik} < 0 \end{array} \right\} \quad (9)$$

Thus, from (8) and (9), and assuming the error terms to be distributed according to $u_i \sim N[0, \sigma_u^2]$ and $\varepsilon_{ik} \sim N[0, 1]$. The probability that the individual switches is:

$$\text{Prob}[S_{ik} \geq 0] = \text{Prob}[\mathbf{x}'_{ik}\beta + \mathbf{z}'_i\gamma + u_i > \varepsilon_{ik}] \quad (10)$$

In imposing the standard normal distribution on the error term ε_{ik} the *probit* model is being used. The addition of the individual-specific error component, u_i , implies that we are adapting it to be a *random effects* model. Because of the particular distribution of ε_{ik} , the standard normal distribution function is used in calculating the probability of switching ($S_{ik} > 0$):

$$\text{Prob}[\text{Switch}_{ik} = 1] = \int_{-\infty}^{\mathbf{x}'_{ik}\beta + \mathbf{z}'_i\gamma + u_i} \phi(S_{ik}) dS_{ik} = \Phi(\mathbf{x}'_{ik}\beta + \mathbf{z}'_i\gamma + u_i) \quad (11)$$

Where ϕ is the standard normal distribution and Φ the cumulative density function for the normal distribution; where $\Phi(S_{ik} > 0) > 0.5$, creating a positive probability of switching. Like the basic probit, this probability of switching is still determined by the cumulative density function of the standard normal (as determined by the distribution of ε_{ik}), but the function of the latent variable is now augmented by the individual-specific error component, u_i , which is normally distributed according to $u_i \sim [0, \sigma_u^2]$. Like the basic probit, the coefficients in this model are calculated using maximum likelihood estimation.

There are a number of other econometric methodologies that could alternatively have been employed (including pooling the data or clustering of standard errors). The results section tests appropriateness of the random effects probit against these alternatives.

3.3 Final Model Specifications

This paper follows two main avenues of investigation. It investigates the relative performance of a model primarily constructed using demographic variables against one which is instead constructed using service-specific variables. It also investigates the role of

service bundling on individuals' switching decisions under the broad hypothesis that the bundling of services reduces the likelihood of an individual switching. To achieve these aims three model specifications are employed featuring, respectively, demographic variables (with controls for service as per the prevailing literature), subscription-specific variables only, and a combined model. For all the following models details of the variables can be found in appendix A.

To determine the relative effectiveness of demographic- versus service-specific variables the performance of the three models is compared so as to determine which is most appropriate in terms of recognising the impact of different variables on individuals' probability of switching provider. This is achieved by using conventional methods such as pseudo- R^2 statistics, and Akaike's Information Criterion (AIC) – a common goodness of fit measure which guards against over-fitting.

To test the impact of bundling more common tests of significance are employed relating to the bundling variable.

3.3.1 Specification One - Demographic model:

The demographic-only model is based upon those variables which have been consistently significant or included in the prevailing switching literature. The model also controls for the market in which the switching is taking place. This is vital and common to many studies of switching since the underlying rate of switching varies between markets and, as such, would lead to inaccurate estimates of coefficients if not controlled for. The implicit assumption in testing only demographics here is that all suppliers are homogeneous and that, accordingly, the likelihood of switching-to or -from is identical for each supplier.

The demographics-focussed random effects Probit model is laid out below:

$$\begin{aligned}
S_{ik} = & \alpha + \left(\beta_{TV,0} \underset{[0,1]}{TV}_{ik} + \beta_{BB,0} \underset{[0,1]}{BB}_{ik} + \beta_{Mob,0} \underset{[0,1]}{Mob}_{ik} + \beta_{LL,0} \underset{[0,1]}{LL}_{ik} \right) \\
& + \sum_{\gamma_1}^{\gamma_7} \underset{[0,1]}{INCOME}_i^* + \gamma_8 \underset{[0,1]}{Children}_i + \sum_{\gamma_9}^{\gamma_{15}} \underset{[0,1]}{EMPLOYMENT}_i^* + \\
& + \gamma_{16} \underset{[0,1]}{Gender}_i + \sum_{\gamma_{17}}^{\gamma_{22}} \underset{[0,1]}{EDUCATION}_i^* + \sum_{\gamma_{23}}^{\gamma_{30}} \underset{[0,1]}{AGE}_i^* + u_i + \varepsilon_{ik}
\end{aligned}$$

The variables INCOME*, EMPLOYMENT*, EDUCATION* and AGE* represent a categorical series of dummy variables. For each individual, i , the constituent dummies within each category are mutually exclusive. Similarly, because there are multiple data points for each individual,⁹ and each market is examined separately, the particular ser-

⁹Where the 'individual' represents a household

vice (k)¹⁰ is mutually exclusive.

3.3.2 Specification Two - Service-specific model:

The service-specific model only includes variables relevant to the service to which an individual subscribes and disregards the demographic profile of the individual. This specification is a marked departure from much of the prevailing literature since the implicit homogeneity of the suppliers is removed.

Different advantages in the provision of certain services and strategies concerning bundling of products mean that the likelihood of switching provider is likely to vary significantly depending on the identity of the incumbent supplier and the service, this necessitates a large number of variable interactions.

Regression (12), below, sets out the service-specific model specification: Much like the demographic-focussed model, the above model is constructed using a large number of mutually exclusive dummy variables. This means that when the characteristics of an individual's subscription are specified the model reduces to a much more manageable estimation.

¹⁰Service being pay-TV, broadband, mobile phone, or landline telephone.

$$\begin{aligned}
S_{ik} = & \alpha + \tag{12} \\
& +TV_{ik} \left(\beta_{TV,0} + \sum_{\beta_{TV,1}}^{\beta_{TV,6}} \text{SUPPLIER}_{ik}^* + \beta_{TV,7} \text{Bundled}_{ik} + \sum_{\beta_{TV,8}}^{\beta_{TV,13}} \text{DURATION}_{ik}^* \right) + \\
& +BB_{ik} \left(\beta_{BB,0} + \sum_{\beta_{BB,1}}^{\beta_{BB,6}} \text{SUPPLIER}_{ik}^* + \beta_{BB,7} \text{Bundled}_{ik} + \sum_{\beta_{BB,8}}^{\beta_{BB,13}} \text{DURATION}_{ik}^* \right) + \\
& +Mob_{ik} \left(\beta_{Mob,0} + \sum_{\beta_{Mob,1}}^{\beta_{Mob,6}} \text{SUPPLIER}_{ik}^* + \beta_{Mob,7} \text{Bundled}_{ik} + \sum_{\beta_{Mob,8}}^{\beta_{Mob,13}} \text{DURATION}_{ik}^* \right) + \\
& +LL_{ik} \left(\beta_{LL,0} + \sum_{\beta_{LL,1}}^{\beta_{LL,6}} \text{SUPPLIER}_{ik}^* + \beta_{LL,7} \text{Bundled}_{ik} + \sum_{\beta_{LL,8}}^{\beta_{LL,13}} \text{DURATION}_{ik}^* \right) + \\
& +BT_{ik} \left(\beta_{BT,14} + \beta_{BT,15} \text{Bundled}_{ik} + \sum_{\beta_{BT,16}}^{\beta_{BT,21}} \text{DURATION}_{ik}^* \right) + \\
& +Sky_{ik} \left(\beta_{Sky,14} + \beta_{Sky,15} \text{Bundled}_{ik} + \sum_{\beta_{Sky,16}}^{\beta_{Sky,21}} \text{DURATION}_{ik}^* \right) + \\
& +Talk_{ik} \left(\beta_{Talk,14} + \beta_{Talk,15} \text{Bundled}_{ik} + \sum_{\beta_{Talk,16}}^{\beta_{Talk,21}} \text{DURATION}_{ik}^* \right) + \\
& +Virg_{ik} \left(\beta_{Virg,14} + \beta_{Virg,15} \text{Bundled}_{ik} + \sum_{\beta_{Virg,16}}^{\beta_{Virg,21}} \text{DURATION}_{ik}^* \right) + \\
& +MobFirm_{ik} \left(\beta_{MobF,14} + \beta_{MobF,15} \text{Bundled}_{ik} + \sum_{\beta_{MobF,16}}^{\beta_{MobF,21}} \text{DURATION}_{ik}^* \right) + \\
& +Other_{ik} \left(\beta_{Oth,14} + \beta_{Oth,15} \text{Bundled}_{ik} + \sum_{\beta_{Oth,16}}^{\beta_{Oth,21}} \text{DURATION}_{ik}^* \right) + \\
& +\text{Bundled}_{ik} \left(\beta_{22} + \sum_{\beta_{23}}^{\beta_{28}} \text{DURATION}_{ik}^* \right) + \sum_{\beta_{29}}^{\beta_{34}} \text{DURATION}_{ik}^* + u_i + \varepsilon_{ik}
\end{aligned}$$

3.3.3 Specification Three - Unified Model:

The third model specification combines the previous specifications one and two and is designed to measure the impact of the different service-specific factors while controlling for the demographic profile of the subscriber. The notation remains the same though now the β coefficients and γ coefficients (referring to, respectively, service and demographic variables) are present in the same model. Because the model still utilises large numbers of mutually exclusive categorical dummy-variables it similarly reduces according to the characteristics of the individual-service (ik) combination. The specification of the unified model is outlined below: Because, both in this specification and the previous, all of the service-specific variables are included in an interacted form the interpretation of their estimated coefficients is neither straightforward not intuitive. This is because the impact of a change in one variable will be dependent upon the other variables with which it is interacted. In order to understanding the impact of the different service-specific variables two approaches are taken in addition to reporting the raw coefficients. The first approach is to report marginal effects for relevant variables holding others constant. The second approach is to calculate the expected values of the dependent variable S_{ik} under different combinations of service-specific dependent variables.

$$\begin{aligned}
S_{ik} = & \alpha + \tag{13} \\
& +TV_{ik} \left(\beta_{TV,0} + \sum_{\beta_{TV,1}}^{\beta_{TV,6}} \text{SUPPLIER}_{ik}^* + \beta_{TV,7} \text{Bundled}_{ik} + \sum_{\beta_{TV,8}}^{\beta_{TV,13}} \text{DURATION}_{ik}^* \right) + \\
& +BB_{ik} \left(\beta_{BB,0} + \sum_{\beta_{BB,1}}^{\beta_{BB,6}} \text{SUPPLIER}_{ik}^* + \beta_{BB,7} \text{Bundled}_{ik} + \sum_{\beta_{BB,8}}^{\beta_{BB,13}} \text{DURATION}_{ik}^* \right) + \\
& +Mob_{ik} \left(\beta_{Mob,0} + \sum_{\beta_{Mob,1}}^{\beta_{Mob,6}} \text{SUPPLIER}_{ik}^* + \beta_{Mob,7} \text{Bundled}_{ik} + \sum_{\beta_{Mob,8}}^{\beta_{Mob,13}} \text{DURATION}_{ik}^* \right) + \\
& +LL_{ik} \left(\beta_{LL,0} + \sum_{\beta_{LL,1}}^{\beta_{LL,6}} \text{SUPPLIER}_{ik}^* + \beta_{LL,7} \text{Bundled}_{ik} + \sum_{\beta_{LL,8}}^{\beta_{LL,13}} \text{DURATION}_{ik}^* \right) + \\
& +BT_{ik} \left(\beta_{BT,14} + \beta_{BT,15} \text{Bundled}_{ik} + \sum_{\beta_{BT,16}}^{\beta_{BT,21}} \text{DURATION}_{ik}^* \right) + \\
& +Sky_{ik} \left(\beta_{Sky,14} + \beta_{Sky,15} \text{Bundled}_{ik} + \sum_{\beta_{Sky,16}}^{\beta_{Sky,21}} \text{DURATION}_{ik}^* \right) + \\
& +Talk_{ik} \left(\beta_{Talk,14} + \beta_{Talk,15} \text{Bundled}_{ik} + \sum_{\beta_{Talk,16}}^{\beta_{Talk,21}} \text{DURATION}_{ik}^* \right) + \\
& +Virg_{ik} \left(\beta_{Virg,14} + \beta_{Virg,15} \text{Bundled}_{ik} + \sum_{\beta_{Virg,16}}^{\beta_{Virg,21}} \text{DURATION}_{ik}^* \right) + \\
& +MobFirm_{ik} \left(\beta_{MobF,14} + \beta_{MobF,15} \text{Bundled}_{ik} + \sum_{\beta_{MobF,16}}^{\beta_{MobF,21}} \text{DURATION}_{ik}^* \right) + \\
& +Other_{ik} \left(\beta_{Oth,14} + \beta_{Oth,15} \text{Bundled}_{ik} + \sum_{\beta_{Oth,16}}^{\beta_{Oth,21}} \text{DURATION}_{ik}^* \right) + \\
& +\text{Bundled}_{ik} \left(\beta_{22} + \sum_{\beta_{23}}^{\beta_{28}} \text{DURATION}_{ik}^* \right) + \sum_{\beta_{29}}^{\beta_{34}} \text{DURATION}_{ik}^* + \\
& + \sum_{\gamma_1}^{\gamma_7} \text{INCOME}_i^* + \gamma_8 \text{Children}_i + \sum_{\gamma_9}^{\gamma_{15}} \text{EMPLOYMENT}_i^* + \\
& + \gamma_{16} \text{Gender}_i + \sum_{\gamma_{17}}^{\gamma_{21}} \text{EDUCATION}_i^* + \sum_{\gamma_{22}}^{\gamma_{29}} \text{AGE}_i^* + u_i + \varepsilon_{ik}
\end{aligned}$$

4 Results and Discussion

This section summarises the findings of the empirical investigation and consists of three main sections. The first section offers a brief description of the results and comments upon the significance of the coefficients in the model. In this section the fitted values of S_{ik} are also reported for the different configurations of service and provider. The second section determines whether the service-specific model outperforms the demographic approach as indicated by goodness of fit measures of the three specifications. The third section specifically discusses the impact of bundling of services on the likelihood of switching.

The full results table is included in appendix B.

4.1 Demographic Specifications

Table 6 indicates the estimated coefficients for those variables relating to demographic variables under specification one and specification three (demographic variables are not included in specification two) of the switching model. Because of the number of interaction variables involved in the estimation 6 is limited only to the specifications which feature demographics but omits the service-specific variables from specification three. Appendix B features the full results table for all models including specification two.

The first observation from table 6 is that, where an estimated coefficient is found to be significant in specification one, the level of this significance generally either decreases or disappears when the service-specific variables are included in specification three. The second observation is that most of the demographic variables seem to fit with a-priori expectations, as informed by the literature. The following sections address the results with respect to expectations.

The estimated coefficients relating to **services** are shown relative to the **pay-TV** base category. The results from specification one indicate that **broadband** is most likely to be switched and this concurs with the characterisation of broadband markets as competitive, unsettled markets with high levels of entry, exit, and consolidation; also with high levels of switching. That **landline** services appear to be those that are second-least likely to be switched may be unsurprising given that for smaller suppliers of broadband there remains a requirement that an individual also subscribes to landline through a more conventional supplier - resulting in lower switching rates than otherwise, absent this constraint. Because the service variables are interacted with other variables in specification three, the results for this specification are not reported.

The results concerning **income** indicate that there may be a non-linear relationship between income level and the likelihood of switching. Specifically, those households in the middle income categories with incomes between £17,500 and £49,999 are more likely

Table 6: Estimated Coefficients for Demographic Variables

Variable	Category	Symbol	Specification One		Specification Three	
			Coeff	SE	Coeff	SE
Service	Pay-TV	$\beta_{TV,0}$	(omitted)		-	-
	Broadband	$\beta_{BB,0}$	0.806***	(0.067)	-	-
	Mobile	$\beta_{Mob,0}$	0.432***	(0.066)	-	-
	Landline	$\beta_{LL,0}$	0.374***	(0.067)	-	-
Income	Under 11,500	γ_1	(omitted)		(omitted)	
	11,500-17,499	γ_2	0.161	(0.113)	0.163	(0.122)
	17,500-29,999	γ_3	0.276***	(0.103)	0.240**	(0.111)
	30,000-49,999	γ_4	0.225**	(0.106)	0.2*	(0.114)
	50,000 and over	γ_5	0.117	(0.123)	0.027	(0.133)
	Don't know INCO	γ_6	-0.008	(0.119)	0.049	(0.129)
	Refused	γ_7	-0.371***	(0.103)	-0.341***	(0.111)
Children	Yes	γ_8	-0.148**	(0.063)	-0.137**	(0.068)
Employment	Full-time	γ_9	(omitted)		(omitted)	
	Part-time	γ_{10}	0.062	(0.079)	0.045	(0.086)
	Looking	γ_{11}	0.156	(0.157)	0.051	(0.169)
	Full-time Education	γ_{12}	-0.109	(0.172)	-0.135	(0.187)
	Retired	γ_{13}	0.071	(0.105)	0.077	(0.112)
	Not-working	γ_{14}	-0.04	(0.087)	-0.062	(0.094)
	Refused	γ_{15}	-0.141	(0.337)	-0.191	(0.367)
Gender	Male	γ_{16}	-0.065	(0.054)	-0.092	(0.059)
Age left education	Aged under 17	γ_{17}	(omitted)		(omitted)	
	Aged 17-18	γ_{18}	0.115	(0.071)	0.143*	(0.077)
	Aged 19-20	γ_{19}	0.254***	(0.094)	0.251**	(0.102)
	Aged 21 and over	γ_{20}	0.173**	(0.07)	0.123	(0.076)
	Don't know	γ_{21}	-0.12	(0.269)	-0.018	(0.293)
	Refused	γ_{22}	0.507	(0.431)	0.818*	(0.469)
Age	Aged under 18	γ_{23}	-0.458	(0.293)	-0.508	(0.315)
	Aged 18-24	γ_{24}	(omitted)		(omitted)	
	Aged 25-34	γ_{25}	0.061	(0.118)	0.037	(0.128)
	Aged 35-44	γ_{26}	-0.095	(0.122)	-0.089	(0.133)
	Aged 45-54	γ_{27}	-0.073	(0.121)	-0.018	(0.132)
	Aged 55-64	γ_{28}	-0.155	(0.13)	-0.143	(0.142)
	Aged 65-74	γ_{29}	-0.222	(0.153)	-0.265	(0.165)
	Aged 75 and over	γ_{30}	-0.674***	(0.213)	-0.74***	(0.229)
	Constant	α	-1.798***	(0.159)	-0.869*	(0.507)

Standard errors in parentheses

* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

to switch than those in the lowest income categories (under £17,500) or those with higher income (£50,000 and over), but the positive impact on the likelihood of switching peaks in the category £17,500-£29,999. When service-variables are included in specification three the significance level of the estimated income coefficients diminishes. The significance of the coefficient relating to the ‘refused’ category suggests that there may be some unobserved characteristic that is common to individuals which refuse to divulge information concerning their income.

As predicted in Waddams Price and Webster [2011], the presence of **children** in the household has a significantly negative (at 5%) impact on the probability of switching (which diminishes to a 10% l.o.s. with the inclusion of service-specific variables). The predictions of the literature are that those individuals who work full-time are less likely to switch; the results above, however, indicate that there is no significant differences in the probability of switching between any of the **employment** categories. There are few instances where **gender** has proven to be significant in determining the likelihood of consumer switching, though Ranganathan et al. [2006] find men to be significantly more likely to switch their mobile service provider. This weakly suggests that γ_{16} will be positive and significant, though the results in the present investigation do not support this prediction.

The **education** coefficients under both specifications one and three suggest a non-linear relationship between education and switching likelihood owing to the sign and significance of the middle categories. **Age** has been indicated as being significant with a variety of relationships; significant differences between the coefficients γ_{22} to γ_{29} would indicate that some ages groups are more or less likely to switch. This would support hypotheses such as lower likelihood from switching with increased age [Royalty and Solomon, 1999] or non-linear relationships [Waddams Price and Webster, 2011]. The present investigation, however, indicates that the only significant coefficient is for those individuals aged 75 and over which is significantly negative under both specifications one and three, indicating that individuals in the oldest age category are least likely to switch provider.

4.2 Service-specific Variables

Specifications two and three include variables which specifically concern the services to which individuals subscribe. In specification two these variables alone are included, while in specification three the demographic variables are also included. Appendix B features the full results table for all three specifications.

The impact of duration is explored for different suppliers, holding service and bundling status constant. The opposite difference in switching likelihood for the full range of supplier-service combinations is examined - holding duration constant. In order to make comparisons a median individual is introduced based upon the most common demo-

graphic characteristics in order to hold demographic characteristics constant.

In order to circumvent the issues associated with reporting the impact of variables in the presence of interaction terms the estimated coefficients from specifications two and three are used to generate expected values of S_{ik} . These can be used to show the difference in switching likelihood for different combinations of values. The full tables of expected values of S_{ik} for each service-supplier-duration-bundled combination are reported in appendix C while the results concerning the significance of bundling are discussed later in this section.

A **median individual** is introduced which allows the analysis of service variables while holding demographics constant. This is possible because there are no interactions between service and individual variables. The features of the median individual are those characteristics that are most prevalent in each category of demographic variables. The median individual is a female who is aged between 25 and 34 and has no children. Furthermore, she left full time education aged 16 or under, works full-time, and has a household income of £30,000-£49,999.

4.2.1 Duration

The duration of a subscribers' relationship with suppliers affects the likelihood of switching in two ways; if the duration of a relationship is very short (under six months) then it is likely that this will significantly reduce the likelihood of switching provider owing to the prevalence of minimum-term subscription contracts. Similarly, if an individual has been with a provider for a long period of time, then this too reduces the likelihood of switching since it indicates that an individual is either fundamentally unlikely to switch services, or otherwise satisfied with their service.

Table 7 reports the expected values of S_{ik} for unbundled broadband subscribers, using the estimated coefficients from specification three. Broadband was chosen because switching rates are relatively high for this service. In order to isolate the effect of duration, the service and bundling status are being held constant, while the results are reported for each firm. Furthermore, because this table reports the expected values of S_{ik} , the magnitude and sign indicates the absolute probability of switching for each combination of variables. Where a result is reported as significant, then it is estimated to be significantly different from zero.

The results concerning duration show that when the length of an individual's relationship with their supplier is short (6 months and under) this has a strongly negative effect of on the probability of switching provider. This is signified by the more negative expected values of S_{ik} for the categories representing '6 months and under' and '7 to 12 months'. The expected values for the next two duration categories indicate that switching is most likely for broadband services held between one and four years; individuals

Table 7: Expected values of S_{ik} for broadband duration categories

	BT	Sky	Talk-Talk	Virgin	Mobile Operator	Other
6 months and under	-1.008 *** (0.38)	-0.506 (0.432)	-0.024 (0.465)	-1.491 *** (0.459)	-3.501 *** (0.714)	-1.628 *** (0.45)
7 to 12 months	-0.812 *** (0.287)	-0.589 * (0.349)	-0.365 (0.393)	-0.401 (0.322)	-0.222 (0.309)	0.2 (0.259)
13 to 24 months	-0.187 (0.198)	0.467 * (0.249)	-0.165 (0.266)	0.072 (0.23)	-0.233 (0.227)	0.079 (0.178)
25 to 48 months	0.287 (0.189)	0.538 * (0.296)	0.014 (0.283)	0.428 * (0.248)	0.264 (0.235)	0.186 (0.172)
Over 48 months	-0.192 (0.185)	0.227 (0.269)	-0.509 * (0.294)	-0.738 *** (0.232)	-0.454 * (0.238)	-0.389 ** (0.166)
Don't know	-0.708 * (0.393)	0.061 (0.57)	-5.831 (355.187)	-0.094 (0.441)	-1.359 * (0.732)	-0.226 (0.326)

Standard errors in parentheses
* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

which have subscribed to their broadband service for over four years are less likely to switch.

The results for unbundled landline subscribers exhibits a broadly similar pattern where individuals who have subscribed for only a short period, or otherwise a long period, are significantly less likely to switch and the likelihood of switching is greatest in the middle periods. The landline results, shown in table 8, are particularly vivid for those individuals who subscribe through BT where the relationship between duration and switching likelihood is particularly strong.

4.2.2 Service and Supplier

The impact on switching likelihood of different service-supplier combinations can be observed in a similar fashion to that which used to examine the impact of duration using the median individual where relevant. Tables 9 and 10 show the expected values of S_{ik} for the different permutations, both for specifications two and three (with and without demographic variables). In order to show the information the duration has been held constant at '13 to 24 months'; tables 8 and 7 offer an indication of the relative impact of altering the duration.

Table 9 confirms the observation made in, amongst others, Ofcom [2008] that the likelihood of switching varies between service, with pay-TV being the least likely to

Table 8: Expected values of S_{ik} for landline duration categories

	BT	Sky	Talk-Talk	Virgin	Mobile Operator	Other
6 months and under	-1.994 *** (0.338)	-1.057 ** (0.452)	-0.529 (0.47)	-1.842 *** (0.513)	-3.782 *** (0.852)	-2.174 *** (0.515)
7 to 12 months	-1.766 *** (0.274)	-1.109 *** (0.377)	-0.838 ** (0.377)	-0.721 ** (0.343)	-0.471 (0.515)	-0.314 (0.286)
13 to 24 months	-1.197 *** (0.196)	-0.109 (0.275)	-0.694 *** (0.262)	-0.303 (0.279)	-0.538 (0.486)	-0.492 ** (0.215)
25 to 48 months	-0.572 *** (0.178)	0.113 (0.315)	-0.365 (0.261)	0.204 (0.271)	0.109 (0.485)	-0.234 (0.208)
Over 48 months	-1.139 *** (0.135)	-0.286 (0.289)	-0.975 *** (0.273)	-1.05 *** (0.245)	-0.696 (0.472)	-0.896 *** (0.211)
Don't know	-2.012 *** (0.388)	-0.809 (0.539)	-6.655 (355.187)	-0.765 * (0.457)	-1.959 ** (0.852)	-1.092 *** (0.387)

Standard errors in parentheses

* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

be switched and broadband most likely. While a strong pattern concerning supplier is not immediately apparent in table 9 the results do suggest that switching a service is least likely where the incumbent provider of that service is the dominant provider or specialises in provision of the service. This is evidenced in the case of BT with landline services, Sky with pay-TV, or mobile firms with mobile phone services.

This dominant firm effect may be explained by a number of factors. It is possible that these firms' dominance is because they provide a product of higher quality, in which case it would be expected that subscribers are less likely to switch away from them, even if a lower price is offered by a rival, lower quality, supplier. Alternatively, this quality difference may not be related to actual quality, but may instead be linked to perceived quality and psychological prominence of the leading brand, such that there exists a 'fear' of moving to an alternative provider. A third effect which may reduce switching from prime providers is that there may be other issues relating to network effects (or similar) in the subscription to certain subscribers. This can be through either direct effects through offers like 'free calls to fellow BT landline subscribers', or otherwise indirect effects such as TV channels which are not related to the production activities of Sky, but which are exclusively available to subscribers to Sky's pay-TV service.

Although the bundling of services has a dedicated section, the impact that bundling has on individuals' likelihood of switching provider can be seen in table 10. Where previously only selected services (those in which suppliers specialised) were significantly unlikely to be switched, when firms bundle their products the likelihood of an individual

Table 9: Expected values of S_{ik} for Unbundled service-supplier combinations

	Specification Two		Specification Three		Mobile Operator	Other	BT	Sky	Talk-Talk	Virgin	Mobile Operator	Other
	Talk-Talk	Virgin	Talk-Talk	Virgin								
Pay-TV	-0.589 ** (0.267)	-1.802 *** (0.184)	-0.171 (0.612)	-0.787 *** (0.247)	-0.346 (1.024)	-0.101 (0.284)	-0.356 (0.29)	-1.596 *** (0.211)	0.124 (0.63)	-0.547 ** (0.272)	-0.185 (1.029)	0.074 (0.305)
Broadband	-0.399 ** (0.166)	0.258 (0.227)	-0.451 * (0.238)	-0.187 (0.202)	-0.481 ** (0.2)	-0.153 (0.14)	-0.187 (0.198)	0.467 * (0.249)	-0.165 (0.266)	0.072 (0.23)	-0.233 (0.227)	0.079 (0.178)
Mobile	-0.391 (0.384)	0.598 (0.719)	-0.399 (0.638)	-0.487 ** (0.224)	-1.099 *** (0.086)	-0.742 *** (0.211)	-0.092 (0.4)	0.844 (0.734)	-0.173 (0.664)	-0.189 (0.252)	-0.823 *** (0.137)	-0.431 * (0.243)
Landline	-1.427 *** (0.166)	-0.349 (0.254)	-1.023 *** (0.233)	-0.602 ** (0.255)	-0.739 (0.472)	-0.797 *** (0.184)	-1.197 *** (0.196)	-0.109 (0.275)	-0.694 *** (0.262)	-0.303 (0.279)	-0.538 (0.486)	-0.492 ** (0.215)

Standard errors in parentheses
* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

Table 10: Expected values of S_{ik} for Bundled Service-Supplier Combinations

	Specification Two		Specification Three		Mobile Operator	Other	BT	Sky	Specification Two		Specification Three		Mobile Operator	Other
	BT	Sky	Talk-Talk	Virgin					Talk-Talk	Virgin	Talk-Talk	Virgin		
Pay-TV	-0.742 *** (0.265)	-2.33 *** (0.228)	-0.799 (0.568)	-2.176 *** (0.261)	-0.33 (0.997)	-0.065 (0.372)	-0.481 * (0.289)	-2.084 *** (0.248)	-0.531 (0.585)	-1.909 *** (0.284)	-0.24 (0.999)	0.104 (0.389)		
Broadband	-1.826 *** (0.178)	-1.545 *** (0.196)	-2.353 *** (0.261)	-2.85 *** (0.249)	-1.74 *** (0.419)	-1.391 *** (0.214)	-1.592 *** (0.209)	-1.301 *** (0.219)	-2.1 *** (0.284)	-2.57 *** (0.27)	-1.568 *** (0.436)	-1.171 *** (0.241)		
Mobile	-0.901 * (0.485)	-0.288 (0.755)	-1.384 * (0.713)	-2.233 *** (0.433)	-1.441 *** (0.461)	-1.063 ** (0.453)	-0.597 (0.501)	-0.024 (0.779)	-1.208 (0.749)	-1.93 *** (0.452)	-1.257 *** (0.478)	-0.781 * (0.474)		
Landline	-2.135 *** (0.184)	-1.433 *** (0.212)	-2.207 *** (0.258)	-2.546 *** (0.254)	-1.28 ** (0.515)	-1.316 *** (0.22)	-1.909 *** (0.213)	-1.184 *** (0.236)	-1.936 *** (0.282)	-2.252 *** (0.277)	-1.18 ** (0.533)	-1.049 *** (0.247)		

Standard errors in parentheses
* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

switching provider decreases. This is particularly apparent with Virgin, a firm which specialises in the bundling of services, such that where previously only pay-TV was significantly unlikely to be switched at a 5% level. Under bundling all of its services become significantly unlikely to be switched.

4.3 Testing the Random Effects Methodology

Because all three model specification employ a random effects methodology it is necessary to test the condition that $\rho \neq 0$ and that there exists an exogenous deterministic variable which leads to inter-individual heterogeneity; in this case it is the identity of each respondent. As discussed in section 3.2 a likelihood-ratio test is employed; the results of which are indicated in table 11.

Table 11: Likelihood Ratio Scores for Random Effects Probit

	Specification		
	(1)	(2)	(3)
<i>LogLikelihood</i> ₀	-3304.43	-2957.38	-2899.73
<i>LogLikelihood</i> ₁	-3202.75	-2860.89	-2806.28
<i>LR</i>	203.37***	192.98***	186.90***

Standard errors in parentheses
 * ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

The likelihood ratio statistics for all specifications are significant at less than 1% indicating that, indeed, $\rho \neq 0$ and as such a non-zero proportion of the total variance of the model is provided by the individual heterogeneity associated with the different individuals. This indicates that under each of the econometric specifications the random effects methodology is superior to either pooling the data or clustering the standard errors.¹¹

4.4 Comparing Model Specifications

The present investigation set out to determine the effectiveness of service- and supplier-specific variables in explaining switching behaviour against models which heavily focus upon demographic factors. Specification one was designed to be similar in form to prevailing switching papers which take account of demographic-specific differences in switching propensity. Specification two contains only service-specific factors and is

¹¹Both a pooled model and clustered standard errors results in the same log likelihood statistic.

included as a stylised test of the demographic model against service-specific variables. Specification three contains both.

Table 12: Goodness of Fit (AIC and $AICc$)

Specification	Included variables	Obs.	Log-Likelihood	Df	AIC	AICc
1	Demographic	8628	-3202.75	31	6467.50	6467.733
2	Service	8628	-2860.89	84	5889.79	5891.46
3	Both	8628	-2806.28	110	5832.56	5835.43

Akaike’s Information Criterion is employed to compare the performance of the different specifications, with the results shown in table 12 where a smaller value of AIC indicates a better fitting model. Because small samples relative to the number of explanatory variables can result in a bias in the AIC statistic, the statistics for the second-order information criterion $AICc$ are also reported, though their similarity to the headline AIC statistics suggests that there is no danger of a bias¹².

Comparing the AIC statistics reveals that specifications two and three outperform specification one; this is especially notable given that specification two features no demographic variables.

Result 1 *Models featuring service- and supplier-specific variables outperform those which are constructed mainly using demographic variables, however controlling for these variables in a service-specific model results in a better fit than service variables alone.*

4.5 The Impact of Bundling

The impact of bundling of services with a single provider on the likelihood of an individual switching supplier is the second key area of investigation. If bundling of services creates switching costs which serve to restrict consumer switching then there are implications concerning the ability of the handful of large multi-product incumbent firms to foreclose markets. While this may not lead to complete monopolisation of markets, it would serve to increase the concentration amongst a small number of firms.

¹² $AICc$ converges to AIC as the sample size tends toward infinity and the number of explanatory variables tends to one.

Table 13: Marginal Impact of Bundling on S_{ik}

	BT	Sky	Talk-Talk	Virgin	Mobile Operator	Other
Pay-TV	-0.125 (0.242)	-0.488 ** (0.214)	-0.655 ** (0.303)	-1.362 *** (0.246)	-0.055 (0.447)	0.029 (0.272)
Broadband	-1.405 *** (0.182)	-1.768 *** (0.225)	-1.935 *** (0.249)	-2.642 *** (0.227)	-1.335 *** (0.412)	-1.25 *** (0.211)
Mobile	-0.504 (0.397)	-0.867 ** (0.416)	-1.034 ** (0.433)	-1.741 *** (0.4)	-0.434 (0.462)	-0.35 (0.413)
Landline	-0.712 *** (0.179)	-1.075 *** (0.234)	-1.242 *** (0.246)	-1.949 *** (0.232)	-0.642 (0.422)	-0.558 ** (0.219)

Standard errors in parentheses

* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

Tables 9 and 10 show the impact that service bundling has on the likelihood of switching. When services are bundled the probability of switching those services decreases significantly. The difference between the unbundled and bundled fitted values of S_{ik} represents the marginal effect of bundling a service, expressed as $\frac{\partial S_{ik}}{\partial \text{Bundled}_{ik}}$.

Utilising specification three, the marginal effect of bundling is also shown in table 13 where duration is being held constant at '12 to 24 months'.¹³ The results indicate that, at a highly significant level (1% in most cases) the probability of switching a service, which is a function of S_{ik} , is significantly decreased for almost all services from almost all providers when that service is bundled with at least one other.

Result 2 *When individuals subscribe to services as part of a bundle with other services from a single supplier, they are significantly less likely to switch provider for that service.*

The above headline result holds for almost all services with a few exceptions. Pay-TV is not significant for all providers, implying that if an individual subscribes to pay-TV through a provider other than Virgin, Sky, or Talk-Talk, then their probability of switching provider is the same irrespective of whether they bundle the service. The lack of significance of bundling for mobile telephony also implies that subscribing to other services through a mobile provider has no significant effect on the likelihood of switching provider for the mobile service. Consulting table 9 however indicates that the likelihood

¹³Again, because of the interaction terms, the data and results are effectively three-dimensional. Thus it is necessary to control for one dimension.

of switching is significantly negative whether bundled or not.

5 Conclusion

This paper has made a significant contribution in the understanding of the role of bundling in switching decisions. Through an empirical investigation this paper has produced two key results concerning empirical specification and the role of bundling of services in affecting the switching decisions of consumers.

Result 1 *Models featuring service- and supplier-specific variables outperform those which are constructed mainly using demographic variables, however controlling for these variables in a service-specific model results in a better fit than service variables alone.*

Result 2 *When individuals subscribe to services as part of a bundle with other services from a single supplier, they are significantly less likely to switch provider for that service.*

The second result has particular significance in its potential to guide regulators' policy decisions. In comparing tables 9 and 10 two significant empirical facts are illustrated: they readily show that the likelihood of someone switching a service provided by a small firm (from the 'other' category) is almost always higher than the equivalent from a large supplier; they also show that this effect is magnified if the large operator is able to bundle and the small firm not.

In order to alleviate this second effect it must be the case that all firms have the ability to offer multiple services and specifically they must be able to overcome both the barriers to entry which prevent firms from entering some markets, particularly pay-TV or mobile telecommunications; both of which are relatively concentrated markets.

Recent technological advances have made the broadcast of subscription television easier through delivery methods such as online streaming of content. Despite this, the incumbent TV operators have further advantages in their provision through the content that is typically only available to subscribers to the major operators. Although regulatory policy in the UK requires that Sky offer mandated access to its premium content, the psychological association between the broadcast and broadcaster cannot readily be overcome.

Although this study has shown that bundling of services reduces switching, a key variable which was not included (owing to the design of the survey from which the data was gathered) was price or discount. The pecuniary incentives associated with switching services cannot be underestimated. It is well established that bundled products are frequently sold at a discount to the sum of the equivalent standalone products; in this respect the welfare reducing effects stemming from the increased switching costs of

bundling may be outweighed by the positive welfare gains that stem from lower prices. Though this argument rests heavily on the notion that the firms which offer bundles do not artificially increase the standalone prices in order to exaggerate the belief that a bundle offers better value. Similarly, measures of quality and satisfaction would provide additional insight into ‘push factors’ which drive individuals to seek out new suppliers.

Despite these data shortcomings this paper has produced a set of robust findings concerning the impact of bundling on switching, indicating that consumers are significantly less likely to switch provider of a bundled service. It has also shown that there is definite heterogeneity between firms and services in the likelihood of switching, indicating that the assumption of homogeneity in this respect is flawed. In relation to this last point, this paper has shown that models containing provider-specific variables outperform those that don’t.

A Appendix: Data Summary Tables

The following tables summarise the data collected by the 2010 Ofcom survey. Each table indicates the name of the variable used in the reporting of the results and model specifications. In each table the symbol representing the coefficient for each variable (or interaction) is also shown to assist with cross referencing the data with the results.

Service Indicator Variables

Because each dependent variable data point in the analysis pertains to a specific service, dummy variables are included to indicate which¹⁴. The dummy variables are intuitively titled **PayTV**, **Broadband**, **Mobile** and **Landline**. The service variables are included as standalone dummy variables but they are also included in an interacted form with variables concerning the supplier¹⁵, the variable indicating that a service is bundled, and also a variable representing the number of services to which an individual subscribes through the supplier of their given service. The table below indicates the coefficients which are relevant to the above standalone variables and also the interactions.

Service Variables

Service	Variable name	Standalone co-efficient	Number of subscribers	Supplier	Interacted with:	
					Bundled	Duration
Pay-TV	TV	$\beta_{TV,0}$	1,665	$\beta_{TV,1} \rightarrow \beta_{TV,6}$	$\beta_{TV,7}$	$\beta_{TV,8} \rightarrow \beta_{TV,13}$
Broadband	BB	$\beta_{BB,0}$	1,991	$\beta_{BB,1} \rightarrow \beta_{BB,6}$	$\beta_{BB,7}$	$\beta_{BB,8} \rightarrow \beta_{BB,13}$
Mobile	Mob	$\beta_{Mob,0}$	2,551	$\beta_{Mob,1} \rightarrow \beta_{Mob,6}$	$\beta_{Mob,7}$	$\beta_{Mob,8} \rightarrow \beta_{Mob,13}$
Landline	LL	$\beta_{LL,0}$	2,421	$\beta_{LL,1} \rightarrow \beta_{LL,6}$	$\beta_{LL,7}$	$\beta_{LL,8} \rightarrow \beta_{LL,13}$

Provider Indicator Variables

In the econometric analysis, for each data point regarding switching, a dummy variable is used to indicate the relevant provider for the service. The below table indicates the variable names for each provider category and also the coefficients representing the standalone supplier variable and also those variables with which it is interacted in the model specifications of section 3.3. As per the previous table the relevant symbol for each variable is also shown. The frequency of subscription to each supplier in the final dataset (after the restrictions of table 2, page 8, were applied) is also displayed.

¹⁴This is identical to the ‘market’ variable used in Waddams Price and Webster [2011]

¹⁵Where multiple coefficients are listed as referring to supplier they always correspond, in ascending order, to the six suppliers BT, SKY, Talk-Talk, Virgin, Mobile, Others.

Provider Categories

Provider	Variable name	Standalone coefficient	Number of subscribers	Interacted with:	
				Bundled	Duration
British Telecom	BT	$\beta_{BT,14}$	1,895	$\beta_{BT,15}$	$\beta_{BT,16} \rightarrow \beta_{BT,21}$
Sky	Sky	$\beta_{Sky,14}$	1,530	$\beta_{Sky,15}$	$\beta_{Sky,16} \rightarrow \beta_{Sky,21}$
Talk-Talk	Talk	$\beta_{Talk,14}$	478	$\beta_{Talk,15}$	$\beta_{Talk,16} \rightarrow \beta_{Talk,21}$
Virgin	Virg	$\beta_{Virg,14}$	1,483	$\beta_{Virg,15}$	$\beta_{Virg,16} \rightarrow \beta_{Virg,21}$
Mobile Firm	Mobfirm	$\beta_{MobF,14}$	2,386	$\beta_{MobF,15}$	$\beta_{Mob,16} \rightarrow \beta_{Mob,21}$
Other	Other	$\beta_{Oth,14}$	856	$\beta_{Oth,15}$	$\beta_{Oth,16} \rightarrow \beta_{Oth,21}$

Bundle Status

This binary variable is core to the investigation and is equal to 1 where the particular service is subscribed-to as part of a bundle of other services from a single supplier, otherwise it is zero. The significance of the estimated coefficient attached to the ‘bundle’ variable will indicate whether bundling of services has a significant effect on the likelihood of switching supplier, though this will be mediated by the significance of the interaction variables containing the ‘bundled’ variable.

The prioritisation of the certain switching behaviour in the dataset may lead to a priori expectation that non-bundled products would be more likely to be excluded leading to bias in the dataset,robustness checks indicate that this is not the case.

Bundling by Service Type

Bundle status	Variable name	Coefficient	Bundlers by service type:				Interacted with: Duration
			Pay-TV	Broadband	Mobile	Landline	
Yes=1	Bundled	β_{22}	628	1,126	55	1,094	$\beta_{23} \rightarrow \beta_{28}$
No=0	-	-	1,037	865	2,496	1,327	-

Duration

The duration of an individual’s subscription to a service with a given supplier is included as discrete duration categories. In the results, a relatively smaller coefficients relating to longer duration categories would signify a negative relationship between duration of subscription and probability of switching. Relatively larger and positive coefficients attached to longer duration would indicate a positive relationship. Again, the table below

reports the respective coefficients for each category and also the frequency of the categories in the dataset by service type.

Duration of Subscription by Service Type

Duration	Variable name	Coefficient	Duration by service type:			
			Pay-TV	Broadband	Mobile	Landline
6 months or under	DUR Sub-6m	β_{29}	102	109	85	123
7 to 12 months	DUR 6m-1yr	β_{30}	130	156	163	164
13 to 24 months	DUR 1yr-2yr	β_{31}	293	555	511	464
25 to 48 months	DUR 2yr-4yr	β_{32}	295	451	451	392
Over 48 months	DUR over-4yr	β_{33}	780	654	1,227	1,182
Don't know	DUR Don't know	β_{34}	65	66	114	91

Household Income

Household income is included as a series of income categories in the survey. A positive relationship between income and switching-likelihood would result in a larger estimated coefficient attached to those dummy variables for higher income categories, a negative relationship would result in larger coefficients attached to those dummies for lower income.

Household Income Categories

Household income level	Variable name	Coefficient	Frequency
Under £11,500	INCOME sub-11500	γ_1	396
£11,500-£17,499	INCOME 11500-17499	γ_2	298
£17,500-£29,999	INCOME 17500-29999	γ_3	480
£30,000-£49,999	INCOME 30000-49999	γ_4	463
£50,000 and over	INCOME 50000+	γ_5	250
Don't know	INCOME Don't know	γ_6	269
Refused	INCOME Refused	γ_7	700

Children

The analysis contains a dummy variable equal to 1 if there are children in the household.

Children in Household

Children?	Variable name	Coefficient	Frequency
Yes=1	Children	γ_8	947
No=0	-	-	1,909

Employment Status

The employment status dummy variables represent the different options in the survey. If individuals who work full-time are (for example) less likely to switch relative to those that work part-time then it would be expected that the estimated coefficient relating to full-time employment (γ_9) would be more negative than that for the part-time dummy.

Employment status

Employment status	Variable name	Coefficient	Frequency
Full-time (30+ hours per week)	EMPLOY Full-time	γ_9	1,110
Part-time (under 30 hours per week)	EMPLOY Part-time	γ_{10}	412
Looking for work	EMPLOY Looking	γ_{11}	91
Full-time education	EMPLOY Education	γ_{12}	108
Retired	EMPLOY Retired	γ_{13}	690
Not working	EMPLOY Not	γ_{14}	430
Refused	EMPLOY Refused	γ_{15}	15

Gender

Gender is represented in the study by a dummy variable equal to 1 if the respondent is male. The survey data suggests that slightly more household decision makers are women:

Gender of Respondents

Gender	Variable name	Coefficient	Frequency
Female=0	-	-	1,474
Male=1	Gender	γ_{16}	1,382

Education

Respondents were asked at what age they finished (or expected to finish) full-time education according to discrete categories which were designed to roughly proxy the educational achievement level of the individual. Under-17 would be the lowest level of academic achievement (known as O-level or GCSE dependent upon the age of the respondent), 17-18 would represent additional academic achievement (A-level) or some basic vocational training, 19-20 may indicate more advanced vocational training, while aged over 21 would indicate a university qualification. If education and switching behaviour are positively correlated then it would be expected that those coefficients relating to a later education leaving age would be significant and more positive relative to those for individuals who left education earlier.

Age at Finishing Education

Age left education	Variable name	Coefficient	Frequency
Aged under 17	EDU under-17	γ_{17}	1,152
Aged 17-18	EDU 17-18	γ_{18}	605
Aged 19-20	EDU 19-20	γ_{19}	249
Aged 21 and over	EDU 21+	γ_{20}	805
Don't know	EDU Don't know	γ_{21}	35
Refused	EDU Refused	γ_{22}	10

Age

In the survey data the age of respondents was recorded in discrete categories. Respondents were chosen in order to be a representative sample of the UK population.

Age of Respondents

Age	Variable name	Coefficient	Frequency
Aged under 18	AGE under-18	γ_{23}	35
Aged 18-24	AGE 18-24	γ_{24}	222
Aged 25-34	AGE 25-34	γ_{25}	562
Aged 35-44	AGE 35-44	γ_{26}	535
Aged 45-54	AGE 45-54	γ_{27}	491
Aged 55-64	AGE 55-64	γ_{28}	465
Aged 65-74	AGE 65-74	γ_{29}	383
Aged 75 and over	AGE 75+	γ_{30}	163

B Appendix: Switching Random Effects Probit Results

Variable	Symbol	Specification One Coeff	SE	Specification Two Coeff	SE	Specification Three Coeff	SE
TV	$\beta_{TV,0}$	omitted		omitted		omitted	
BB	$\beta_{BB,0}$	0.806***	(0.067)	-0.308	(0.438)	-0.376	(0.439)
Mob	$\beta_{Mob,0}$	0.432***	(0.066)	1.803**	(0.723)	1.739**	(0.73)
LL	$\beta_{LL,0}$	0.374***	(0.067)	-1.289***	(0.462)	-1.362***	(0.463)
BT × TV	$\beta_{TV,1}$	-	-	omitted		omitted	
BT × BB	$\beta_{BB,1}$	-	-	omitted		omitted	
BT × Mob	$\beta_{Mob,1}$	-	-	omitted		omitted	
BT × LL	$\beta_{LL,1}$	-	-	omitted		omitted	
Sky × TV	$\beta_{TV,2}$	-	-	omitted		omitted	
Sky × BB	$\beta_{BB,2}$	-	-	1.87***	(0.266)	1.894***	(0.269)
Sky × Mob	$\beta_{Mob,2}$	-	-	2.201***	(0.79)	2.176***	(0.799)
Sky × LL	$\beta_{LL,2}$	-	-	2.291***	(0.278)	2.328***	(0.281)
Talk × TV	$\beta_{TV,3}$	-	-	omitted		omitted	
Talk × BB	$\beta_{BB,3}$	-	-	-0.47	(0.625)	-0.458	(0.633)
Talk × Mob	$\beta_{Mob,3}$	-	-	-0.427	(0.929)	-0.561	(0.949)
Talk × LL	$\beta_{LL,3}$	-	-	-0.015	(0.625)	0.023	(0.634)
Virg × TV	$\beta_{TV,4}$	-	-	omitted		omitted	
Virg × BB	$\beta_{BB,4}$	-	-	0.41	(0.269)	0.451*	(0.272)
Virg × Mob	$\beta_{Mob,4}$	-	-	0.102	(0.444)	0.095	(0.446)
Virg × LL	$\beta_{LL,4}$	-	-	1.023***	(0.271)	1.085***	(0.274)
Mobfirm × TV	$\beta_{TV,5}$	-	-	omitted		omitted	
Mobfirm × BB	$\beta_{BB,5}$	-	-	-0.325	(1.025)	-0.216	(1.025)
Mobfirm × Mob	$\beta_{Mob,5}$	-	-	-0.952	(1.084)	-0.901	(1.084)
Mobfirm × LL	$\beta_{LL,5}$	-	-	0.444	(1.072)	0.489	(1.073)
Other × LL	$\beta_{TV,6}$	-	-	omitted		omitted	
Other × BB	$\beta_{BB,6}$	-	-	-0.242	(0.331)	-0.164	(0.333)
Other × Mob	$\beta_{Mob,6}$	-	-	-0.84*	(0.495)	-0.768	(0.497)
Other × LL	$\beta_{LL,6}$	-	-	0.142	(0.341)	0.276	(0.343)
Bundled × TV	$\beta_{TV,7}$	-	-	omitted		omitted	
Bundled × BB	$\beta_{BB,7}$	-	-	-1.275***	(0.197)	-1.28***	(0.198)
Bundled × Mob	$\beta_{Mob,7}$	-	-	-0.357	(0.392)	-0.379	(0.399)
Bundled × LL	$\beta_{LL,7}$	-	-	-0.556***	(0.202)	-0.587***	(0.204)
DUR Sub-6m × TV	$\beta_{TV,8}$	-	-	omitted		omitted	
DUR Sub-6m × BB	$\beta_{BB,8}$	-	-	omitted		omitted	
DUR Sub-6m × Mob	$\beta_{Mob,8}$	-	-	omitted		omitted	
DUR Sub-6m × LL	$\beta_{LL,8}$	-	-	omitted		omitted	
DUR 6m-1yr × TV	$\beta_{TV,9}$	-	-	omitted		omitted	
DUR 6m-1yr × BB	$\beta_{BB,9}$	-	-	0.361	(0.466)	0.402	(0.466)
DUR 6m-1yr × Mob	$\beta_{Mob,9}$	-	-	-2.177***	(0.679)	-2.077***	(0.688)
DUR 6m-1yr × LL	$\beta_{LL,9}$	-	-	0.405	(0.496)	0.434	(0.497)
DUR 1yr-2yr × TV	$\beta_{TV,10}$	-	-	omitted		omitted	
DUR 1yr-2yr × BB	$\beta_{BB,10}$	-	-	0.498	(0.413)	0.545	(0.414)
DUR 1yr-2yr × Mob	$\beta_{Mob,10}$	-	-	-1.604***	(0.625)	-1.475**	(0.633)
DUR 1yr-2yr × LL	$\beta_{LL,10}$	-	-	0.452	(0.446)	0.521	(0.446)
DUR 2yr-4yr × TV	$\beta_{TV,11}$	-	-	omitted		omitted	
DUR 2yr-4yr × BB	$\beta_{BB,11}$	-	-	0.667	(0.425)	0.653	(0.425)
DUR 2yr-4yr × Mob	$\beta_{Mob,11}$	-	-	-1.85***	(0.637)	-1.796***	(0.645)
DUR 2yr-4yr × LL	$\beta_{LL,11}$	-	-	0.773*	(0.455)	0.78*	(0.456)
DUR over-4yr × TV	$\beta_{TV,13}$	-	-	omitted		omitted	
DUR over-4yr × BB	$\beta_{BB,13}$	-	-	0.705*	(0.412)	0.778*	(0.412)
DUR over-4yr × Mob	$\beta_{Mob,13}$	-	-	-1.779***	(0.628)	-1.65***	(0.637)
DUR over-4yr × LL	$\beta_{LL,13}$	-	-	0.722	(0.442)	0.817*	(0.442)
DUR Don't know × TV	$\beta_{TV,14}$	-	-	omitted		omitted	
DUR Don't know × BB	$\beta_{BB,14}$	-	-	1.246**	(0.559)	1.313**	(0.561)
DUR Don't know × Mob	$\beta_{Mob,14}$	-	-	-1.627*	(0.856)	-1.562*	(0.869)
DUR Don't know × LL	$\beta_{LL,14}$	-	-	0.923	(0.596)	0.994*	(0.597)
Bundled × BT	$\beta_{BT,15}$	-	-	omitted		omitted	
Bundled × Sky	$\beta_{Sky,15}$	-	-	-0.376*	(0.218)	-0.363*	(0.22)
Bundled × Talk	$\beta_{Talk,15}$	-	-	-0.475**	(0.239)	-0.53**	(0.242)
Bundled × Virg	$\beta_{Virg,15}$	-	-	-1.236***	(0.204)	-1.237***	(0.206)
Bundled × Mobfirm	$\beta_{MobF,15}$	-	-	0.168	(0.414)	0.07	(0.418)
Bundled × Other	$\beta_{Oth,15}$	-	-	0.189	(0.208)	0.155	(0.211)
DUR Sub-6m × BT	$\beta_{BT,16}$	-	-	omitted		omitted	
DUR Sub-6m × Sky	$\beta_{Sky,16}$	-	-	omitted		omitted	
DUR Sub-6m × Talk	$\beta_{Talk,16}$	-	-	omitted		omitted	
DUR Sub-6m × Virg	$\beta_{Virg,16}$	-	-	omitted		omitted	

Continued on next page

Table 14 – continued from previous page

Variable	Symbol	Specification One		Specification Two		Specification Three	
		Coeff	SE	Coeff	SE	Coeff	SE
DUR Sub-6m × Mobfirm	$\beta_{MobF,16}$	-	-	omitted	-	omitted	-
DUR Sub-6m × Other	$\beta_{Oth,16}$	-	-	omitted	-	omitted	-
DUR 6m-1yr × BT	$\beta_{BT,17}$	-	-	omitted	-	omitted	-
DUR 6m-1yr × Sky	$\beta_{Sky,17}$	-	-	-0.253	(0.532)	-0.28	(0.533)
DUR 6m-1yr × Talk	$\beta_{Talk,17}$	-	-	-0.415	(0.601)	-0.537	(0.604)
DUR 6m-1yr × Virg	$\beta_{Virg,17}$	-	-	0.984*	(0.572)	0.893	(0.573)
DUR 6m-1yr × Mobfirm	$\beta_{MobF,17}$	-	-	3.191***	(0.791)	3.083***	(0.799)
DUR 6m-1yr × Other	$\beta_{Oth,17}$	-	-	1.563***	(0.576)	1.632***	(0.582)
DUR 1yr-2yr × BT	$\beta_{BT,18}$	-	-	omitted	-	omitted	-
DUR 1yr-2yr × Sky	$\beta_{Sky,18}$	-	-	0.129	(0.465)	0.151	(0.466)
DUR 1yr-2yr × Talk	$\beta_{Talk,18}$	-	-	-0.888*	(0.517)	-0.962*	(0.52)
DUR 1yr-2yr × Virg	$\beta_{Virg,18}$	-	-	0.7	(0.524)	0.741	(0.525)
DUR 1yr-2yr × Mobfirm	$\beta_{MobF,18}$	-	-	2.536***	(0.742)	2.447***	(0.751)
DUR 1yr-2yr × Other	$\beta_{OthT,18}$	-	-	0.84	(0.527)	0.886*	(0.534)
DUR 2yr-4yr × BT	$\beta_{BT,19}$	-	-	omitted	-	omitted	-
DUR 2yr-4yr × Sky	$\beta_{Sky,19}$	-	-	-0.231	(0.479)	-0.252	(0.48)
DUR 2yr-4yr × Talk	$\beta_{Talk,19}$	-	-	-1.176**	(0.521)	-1.258**	(0.524)
DUR 2yr-4yr × Virg	$\beta_{Virg,19}$	-	-	0.609	(0.525)	0.623	(0.526)
DUR 2yr-4yr × Mobfirm	$\beta_{MobF,19}$	-	-	2.56***	(0.745)	2.469***	(0.753)
DUR 2yr-4yr × Other	$\beta_{Oth,19}$	-	-	0.51	(0.527)	0.518	(0.533)
DUR over-4yr × BT	$\beta_{BT,20}$	-	-	omitted	-	omitted	-
DUR over-4yr × Sky	$\beta_{Sky,20}$	-	-	-0.112*	(0.461)	-0.084	(0.461)
DUR over-4yr × Talk	$\beta_{Talk,20}$	-	-	-1.181**	(0.519)	-1.301**	(0.521)
DUR over-4yr × Virg	$\beta_{Virg,20}$	-	-	-0.02	(0.511)	-0.063	(0.512)
DUR over-4yr × Mobfirm	$\beta_{MobF,20}$	-	-	2.41***	(0.739)	2.231***	(0.747)
DUR over-4yr × Other	$\beta_{Oth,20}$	-	-	0.457	(0.52)	0.423	(0.525)
DUR Don't know × BT	$\beta_{BT,21}$	-	-	omitted	-	omitted	-
DUR Don't know × Sky	$\beta_{Sky,21}$	-	-	0.229	(0.698)	0.266	(0.707)
DUR Don't know × Talk	$\beta_{Talk,21}$	-	-	-6.349	(541.401)	-6.107	(355.187)
DUR Don't know × Virg	$\beta_{Virg,21}$	-	-	0.976	(0.649)	1.096*	(0.654)
DUR Don't know × Mobfirm	$\beta_{MobF,21}$	-	-	1.831*	(1.027)	1.841*	(1.04)
DUR Don't know × Other	$\beta_{Oth,21}$	-	-	1.034	(0.65)	1.101*	(0.656)
Bundled	β_{22}	-	-	0.262	(0.374)	0.344	(0.377)
Bundled × DUR Sub-6m	β_{23}	-	-	omitted	-	omitted	-
Bundled × DUR 6m-1yr	β_{24}	-	-	0.099	(0.393)	0.08	(0.396)
Bundled × DUR 1yr-2yr	β_{25}	-	-	-0.414	(0.345)	-0.469	(0.348)
Bundled × DUR 2yr-4yr	β_{26}	-	-	-0.526	(0.35)	-0.538	(0.352)
Bundled × DUR over-4yr	β_{27}	-	-	0.508	(0.339)	0.434	(0.342)
Bundled × DUR Don't know	β_{28}	-	-	1.09**	(0.492)	1.107**	(0.498)
DUR Sub-6m	β_{29}	-	-	omitted	-	omitted	-
DUR 6m-1yr	β_{30}	-	-	-0.16	(0.525)	-0.206	(0.528)
DUR 1yr-2yr	β_{31}	-	-	0.334	(0.473)	0.277	(0.475)
DUR 2yr-4yr	β_{32}	-	-	0.634	(0.483)	0.642	(0.484)
DUR over-4yr	β_{33}	-	-	0.005	(0.466)	0.038	(0.468)
DUR Don't know	β_{34}	-	-	-0.983	(0.656)	-1.013	(0.66)
INCOME sub-11500	γ_1	omitted	-	-	-	omitted	-
INCOME 11500-17499	γ_2	0.161	(0.113)	-	-	0.163	(0.122)
INCOME 17500-29999	γ_3	0.276***	(0.103)	-	-	0.24**	(0.111)
INCOME 30000-49999	γ_4	0.225**	(0.106)	-	-	0.2*	(0.114)
INCOME 50000+	γ_5	0.117	(0.123)	-	-	0.027	(0.133)
INCOME Don't know	γ_6	-0.008	(0.119)	-	-	0.049	(0.129)
INCOME Refused	γ_7	-0.371***	(0.103)	-	-	-0.341***	(0.111)
Children	γ_8	-0.148**	(0.063)	-	-	-0.137**	(0.068)
EMPLOY Full-time	γ_9	omitted	-	-	-	omitted	-
EMPLOY Part-time	γ_{10}	0.062	(0.079)	-	-	0.045	(0.086)
EMPLOY Looking	γ_{11}	0.156	(0.157)	-	-	0.051	(0.169)
EMPLOY Education	γ_{12}	-0.109	(0.172)	-	-	-0.135	(0.187)
EMPLOY Retired	γ_{13}	0.071	(0.105)	-	-	0.077	(0.112)
EMPLOY Not	γ_{14}	-0.04	(0.087)	-	-	-0.062	(0.094)
EMPLOY Refused	γ_{15}	-0.141	(0.337)	-	-	-0.191	(0.367)
Gender	γ_{16}	-0.065	(0.054)	-	-	-0.092	(0.059)
EDU under-17	γ_{17}	omitted	-	-	-	omitted	-
EDU 17-18	γ_{18}	0.115	(0.071)	-	-	0.143*	(0.077)
EDU 19-20	γ_{19}	0.254***	(0.094)	-	-	0.251**	(0.102)
EDU 21+	γ_{20}	0.173**	(0.07)	-	-	0.123	(0.076)
EDU Don't know	γ_{21}	-0.12	(0.269)	-	-	-0.018	(0.293)
EDU Refused	γ_{22}	0.507	(0.431)	-	-	0.818*	(0.469)
AGE under-18	γ_{23}	-0.458	(0.293)	-	-	-0.508	(0.315)
AGE 18-24	γ_{24}	omitted	-	-	-	omitted	-
AGE 25-34	γ_{25}	0.061	(0.118)	-	-	0.037	(0.128)

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Table 14 – continued from previous page

Variable	Symbol	Specification One		Specification Two		Specification Three	
		Coeff	SE	Coeff	SE	Coeff	SE
AGE 35-44	γ_{26}	-0.095	(0.122)	-	-	-0.09	(0.133)
AGE 45-54	γ_{27}	-0.073	(0.121)	-	-	-0.018	(0.132)
AGE 55-64	γ_{28}	-0.155	(0.13)	-	-	-0.143	(0.142)
AGE 65-74	γ_{29}	-0.222	(0.153)	-	-	-0.265	(0.165)
AGE 75+	γ_{30}	-0.674***	(0.213)	-	-	-0.74***	(0.229)
Constant	α	-1.798***	(0.159)	-0.924*	(0.481)	-0.869*	(0.507)
n		2856		2856		2856	
obs		8628		8628		8628	
Log-likelihood		-3202.75		-2860.89		-2806.28	

Standard errors in parentheses
* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

C Appendix: Full Expected Values of S_{ik} for Specifications Two and Three

Supplier	Service	Duration	Bundled	Specification Two		Specification Three	
				Fitted S_{ik}	SE	Fitted S_{ik}	SE
BT	Pay-TV	6 months or under	No	-0.924 *	(0.481)	-0.632	(0.495)
BT	Pay-TV	6 months or under	Yes	-0.662	(0.531)	-0.289	(0.546)
BT	Pay-TV	7 to 12 months	No	-1.084 ***	(0.329)	-0.837 **	(0.349)
BT	Pay-TV	7 to 12 months	Yes	-0.723 **	(0.357)	-0.415	(0.376)
BT	Pay-TV	13 to 24 months	No	-0.589 **	(0.267)	-0.356	(0.29)
BT	Pay-TV	13 to 24 months	Yes	-0.742 ***	(0.265)	-0.481 *	(0.289)
BT	Pay-TV	25 to 48 months	No	-0.289	(0.293)	0.01	(0.316)
BT	Pay-TV	25 to 48 months	Yes	-0.554 *	(0.291)	-0.184	(0.315)
BT	Pay-TV	Over 48 months	No	-0.919 ***	(0.277)	-0.594 **	(0.3)
BT	Pay-TV	Over 48 months	Yes	-0.149	(0.251)	0.184	(0.276)
BT	Pay-TV	Don't know	No	-1.907 ***	(0.537)	-1.645 **	(0.551)
BT	Pay-TV	Don't know	Yes	-0.555	(0.563)	-0.194	(0.579)
BT	Broadband	6 months or under	No	-1.232 ***	(0.365)	-1.008 ***	(0.38)
BT	Broadband	6 months or under	Yes	-2.245 ***	(0.418)	-1.944 ***	(0.431)
BT	Broadband	7 to 12 months	No	-1.031 ***	(0.263)	-0.812 ***	(0.287)
BT	Broadband	7 to 12 months	Yes	-1.944 ***	(0.283)	-1.669 ***	(0.302)
BT	Broadband	13 to 24 months	No	-0.399 **	(0.166)	-0.187	(0.198)
BT	Broadband	13 to 24 months	Yes	-1.826 ***	(0.178)	-1.592 ***	(0.209)
BT	Broadband	25 to 48 months	No	0.07	(0.154)	0.287	(0.189)
BT	Broadband	25 to 48 months	Yes	-1.469 ***	(0.186)	-1.187 ***	(0.218)
BT	Broadband	Over 48 months	No	-0.522 ***	(0.145)	-0.192	(0.185)
BT	Broadband	Over 48 months	Yes	-1.027 ***	(0.146)	-0.694 ***	(0.184)
BT	Broadband	Don't know	No	-0.969 ***	(0.376)	-0.708 *	(0.393)
BT	Broadband	Don't know	Yes	-0.892 **	(0.4)	-0.537	(0.419)
BT	Mobile	6 months or under	No	0.879	(0.729)	1.107	(0.742)
BT	Mobile	6 months or under	Yes	0.784	(0.821)	1.071	(0.835)
BT	Mobile	7 to 12 months	No	-1.458 ***	(0.481)	-1.176 **	(0.493)
BT	Mobile	7 to 12 months	Yes	-1.454 **	(0.569)	-1.132 *	(0.584)
BT	Mobile	13 to 24 months	No	-0.391	(0.384)	-0.092	(0.4)
BT	Mobile	13 to 24 months	Yes	-0.901 *	(0.485)	-0.597	(0.501)
BT	Mobile	25 to 48 months	No	-0.336	(0.391)	-0.048	(0.405)
BT	Mobile	25 to 48 months	Yes	-0.958 *	(0.507)	-0.621	(0.524)
BT	Mobile	Over 48 months	No	-0.895 **	(0.378)	-0.506	(0.395)
BT	Mobile	Over 48 months	Yes	-0.483	(0.46)	-0.107	(0.477)
BT	Mobile	Don't know	No	-1.731 **	(0.74)	-1.469 *	(0.757)
BT	Mobile	Don't know	Yes	-0.737	(0.843)	-0.397	(0.863)
BT	Landline	6 months or under	No	-2.213 ***	(0.319)	-1.994 ***	(0.338)
BT	Landline	6 months or under	Yes	-2.507 ***	(0.396)	-2.238 ***	(0.413)
BT	Landline	7 to 12 months	No	-1.968 ***	(0.25)	-1.766 ***	(0.274)
BT	Landline	7 to 12 months	Yes	-2.163 ***	(0.279)	-1.93 ***	(0.299)
BT	Landline	13 to 24 months	No	-1.427 ***	(0.166)	-1.197 ***	(0.196)
BT	Landline	13 to 24 months	Yes	-2.135 ***	(0.184)	-1.909 ***	(0.213)
BT	Landline	25 to 48 months	No	-0.806 ***	(0.144)	-0.572 ***	(0.178)
BT	Landline	25 to 48 months	Yes	-1.626 ***	(0.183)	-1.354 ***	(0.215)
BT	Landline	Over 48 months	No	-1.487 ***	(0.079)	-1.139 ***	(0.135)
BT	Landline	Over 48 months	Yes	-1.273 ***	(0.141)	-0.948 ***	(0.178)
BT	Landline	Don't know	No	-2.274 ***	(0.362)	-2.012 ***	(0.388)
BT	Landline	Don't know	Yes	-1.478 ***	(0.407)	-1.149 ***	(0.428)
Sky	Pay-TV	6 months or under	No	-2.265 ***	(0.322)	-2.023 ***	(0.339)
Sky	Pay-TV	6 months or under	Yes	-2.379 ***	(0.405)	-2.043 ***	(0.416)
Sky	Pay-TV	7 to 12 months	No	-2.678 ***	(0.331)	-2.509 ***	(0.35)
Sky	Pay-TV	7 to 12 months	Yes	-2.693 ***	(0.356)	-2.449 ***	(0.372)
Sky	Pay-TV	13 to 24 months	No	-1.802 ***	(0.184)	-1.596 ***	(0.211)
Sky	Pay-TV	13 to 24 months	Yes	-2.33 ***	(0.228)	-2.084 ***	(0.248)
Sky	Pay-TV	25 to 48 months	No	-1.862 ***	(0.183)	-1.633 ***	(0.213)
Sky	Pay-TV	25 to 48 months	Yes	-2.502 ***	(0.247)	-2.19 ***	(0.269)
Sky	Pay-TV	Over 48 months	No	-2.373 ***	(0.136)	-2.069 ***	(0.173)
Sky	Pay-TV	Over 48 months	Yes	-1.979 ***	(0.214)	-1.654 ***	(0.24)
Sky	Pay-TV	Don't know	No	-3.019 ***	(0.577)	-2.769 ***	(0.6)
Sky	Pay-TV	Don't know	Yes	-2.043 ***	(0.637)	-1.682 **	(0.664)
Sky	Broadband	6 months or under	No	-0.703 *	(0.422)	-0.506	(0.432)
Sky	Broadband	6 months or under	Yes	-2.092 ***	(0.441)	-1.805 ***	(0.448)
Sky	Broadband	7 to 12 months	No	-0.755 **	(0.331)	-0.589 *	(0.349)
Sky	Broadband	7 to 12 months	Yes	-2.044 ***	(0.316)	-1.809 ***	(0.334)
Sky	Broadband	13 to 24 months	No	0.258	(0.227)	0.467 *	(0.249)
Sky	Broadband	13 to 24 months	Yes	-1.545 ***	(0.196)	-1.301 ***	(0.219)
Sky	Broadband	25 to 48 months	No	0.367	(0.274)	0.538 *	(0.296)
Sky	Broadband	25 to 48 months	Yes	-1.547 ***	(0.238)	-1.299 ***	(0.262)
Sky	Broadband	Over 48 months	No	-0.106	(0.244)	0.227	(0.269)
Sky	Broadband	Over 48 months	Yes	-0.986 ***	(0.205)	-0.638 ***	(0.234)

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Table 15 – continued from previous page

Supplier	Service	Duration	Bundled	Specification Two		Specification Two	
				Fitted S_{ik}	SE	Fitted S_{ik}	SE
Sky	Broadband	Don't know	No	-0.211	(0.55)	0.061	(0.57)
Sky	Broadband	Don't know	Yes	-0.51	(0.577)	-0.131	(0.604)
Sky	Mobile	6 months or under	No	1.739 *	(0.936)	1.892 **	(0.952)
Sky	Mobile	6 months or under	Yes	1.268	(0.989)	1.493	(1.01)
Sky	Mobile	7 to 12 months	No	-0.851	(0.784)	-0.671	(0.8)
Sky	Mobile	7 to 12 months	Yes	-1.223	(0.809)	-0.99	(0.835)
Sky	Mobile	13 to 24 months	No	0.598	(0.719)	0.844	(0.734)
Sky	Mobile	13 to 24 months	Yes	-0.288	(0.755)	-0.024	(0.779)
Sky	Mobile	25 to 48 months	No	0.293	(0.711)	0.485	(0.728)
Sky	Mobile	25 to 48 months	Yes	-0.705	(0.755)	-0.451	(0.781)
Sky	Mobile	Over 48 months	No	-0.148	(0.728)	0.196	(0.744)
Sky	Mobile	Over 48 months	Yes	-0.111	(0.756)	0.231	(0.781)
Sky	Mobile	Don't know	No	-0.642	(1.013)	-0.417	(1.035)
Sky	Mobile	Don't know	Yes	-0.023	(1.092)	0.291	(1.124)
Sky	Landline	6 months or under	No	-1.264 ***	(0.441)	-1.057 **	(0.452)
Sky	Landline	6 months or under	Yes	-1.934 ***	(0.465)	-1.664 ***	(0.475)
Sky	Landline	7 to 12 months	No	-1.272 ***	(0.362)	-1.109 ***	(0.377)
Sky	Landline	7 to 12 months	Yes	-1.842 ***	(0.331)	-1.636 ***	(0.348)
Sky	Landline	13 to 24 months	No	-0.349	(0.254)	-0.109	(0.275)
Sky	Landline	13 to 24 months	Yes	-1.433 ***	(0.212)	-1.184 ***	(0.236)
Sky	Landline	25 to 48 months	No	-0.087	(0.295)	0.113	(0.315)
Sky	Landline	25 to 48 months	Yes	-1.283 ***	(0.247)	-1.032 ***	(0.271)
Sky	Landline	Over 48 months	No	-0.65 **	(0.265)	-0.286	(0.289)
Sky	Landline	Over 48 months	Yes	-0.812 ***	(0.218)	-0.458 *	(0.246)
Sky	Landline	Don't know	No	-1.095 **	(0.522)	-0.809	(0.539)
Sky	Landline	Don't know	Yes	-0.675	(0.564)	-0.309	(0.587)
Talk-Talk	Pay-TV	6 months or under	No	0.383	(0.798)	0.81	(0.812)
Talk-Talk	Pay-TV	6 months or under	Yes	0.17	(0.791)	0.623	(0.804)
Talk-Talk	Pay-TV	7 to 12 months	No	-0.192	(0.721)	0.067	(0.736)
Talk-Talk	Pay-TV	7 to 12 months	Yes	-0.306	(0.709)	-0.04	(0.724)
Talk-Talk	Pay-TV	13 to 24 months	No	-0.171	(0.612)	0.124	(0.63)
Talk-Talk	Pay-TV	13 to 24 months	Yes	-0.799	(0.568)	-0.531	(0.585)
Talk-Talk	Pay-TV	25 to 48 months	No	-0.158	(0.683)	0.194	(0.702)
Talk-Talk	Pay-TV	25 to 48 months	Yes	-0.898	(0.653)	-0.53	(0.672)
Talk-Talk	Pay-TV	Over 48 months	No	-0.794	(0.674)	-0.454	(0.695)
Talk-Talk	Pay-TV	Over 48 months	Yes	-0.499	(0.631)	-0.206	(0.651)
Talk-Talk	Pay-TV	Don't know	No	-6.949	(541.401)	-6.31	(355.187)
Talk-Talk	Pay-TV	Don't know	Yes	-6.073	(541.401)	-5.39	(355.187)
Talk-Talk	Broadband	6 months or under	No	-0.395	(0.452)	-0.024	(0.465)
Talk-Talk	Broadband	6 months or under	Yes	-1.883 ***	(0.482)	-1.49 ***	(0.493)
Talk-Talk	Broadband	7 to 12 months	No	-0.609	(0.374)	-0.365	(0.393)
Talk-Talk	Broadband	7 to 12 months	Yes	-1.997 ***	(0.416)	-1.751 ***	(0.435)
Talk-Talk	Broadband	13 to 24 months	No	-0.451 *	(0.238)	-0.165	(0.266)
Talk-Talk	Broadband	13 to 24 months	Yes	-2.353 ***	(0.261)	-2.1 ***	(0.284)
Talk-Talk	Broadband	25 to 48 months	No	-0.269	(0.257)	0.014	(0.283)
Talk-Talk	Broadband	25 to 48 months	Yes	-2.283 ***	(0.286)	-1.99 ***	(0.312)
Talk-Talk	Broadband	Over 48 months	No	-0.867 ***	(0.268)	-0.509 *	(0.294)
Talk-Talk	Broadband	Over 48 months	Yes	-1.846 ***	(0.28)	-1.541 ***	(0.302)
Talk-Talk	Broadband	Don't know	No	-6.481	(541.401)	-5.831	(355.187)
Talk-Talk	Broadband	Don't know	Yes	-6.879	(541.4)	-6.19	(355.187)
Talk-Talk	Mobile	6 months or under	No	1.759 *	(0.94)	1.988 **	(0.962)
Talk-Talk	Mobile	6 months or under	Yes	1.189	(1.01)	1.422	(1.041)
Talk-Talk	Mobile	7 to 12 months	No	-0.993	(0.751)	-0.832	(0.78)
Talk-Talk	Mobile	7 to 12 months	Yes	-1.465 *	(0.824)	-1.318	(0.867)
Talk-Talk	Mobile	13 to 24 months	No	-0.399	(0.638)	-0.173	(0.664)
Talk-Talk	Mobile	13 to 24 months	Yes	-1.384 *	(0.713)	-1.208	(0.749)
Talk-Talk	Mobile	25 to 48 months	No	-0.632	(0.676)	-0.424	(0.702)
Talk-Talk	Mobile	25 to 48 months	Yes	-1.729 **	(0.761)	-1.527 **	(0.799)
Talk-Talk	Mobile	Over 48 months	No	-1.197 *	(0.66)	-0.926	(0.683)
Talk-Talk	Mobile	Over 48 months	Yes	-1.259 *	(0.73)	-1.058	(0.764)
Talk-Talk	Mobile	Don't know	No	-7.2	(541.401)	-6.695	(355.188)
Talk-Talk	Mobile	Don't know	Yes	-6.681	(541.401)	-6.154	(355.188)
Talk-Talk	Landline	6 months or under	No	-0.921 **	(0.457)	-0.529	(0.47)
Talk-Talk	Landline	6 months or under	Yes	-1.69 ***	(0.49)	-1.302 ***	(0.503)
Talk-Talk	Landline	7 to 12 months	No	-1.091 ***	(0.359)	-0.838 **	(0.377)
Talk-Talk	Landline	7 to 12 months	Yes	-1.761 ***	(0.404)	-1.532 ***	(0.423)
Talk-Talk	Landline	13 to 24 months	No	-1.023 ***	(0.233)	-0.694 ***	(0.262)
Talk-Talk	Landline	13 to 24 months	Yes	-2.207 ***	(0.258)	-1.936 ***	(0.282)
Talk-Talk	Landline	25 to 48 months	No	-0.689 ***	(0.233)	-0.365	(0.261)
Talk-Talk	Landline	25 to 48 months	Yes	-1.984 ***	(0.268)	-1.676 ***	(0.295)
Talk-Talk	Landline	Over 48 months	No	-1.376 ***	(0.245)	-0.975 ***	(0.273)
Talk-Talk	Landline	Over 48 months	Yes	-1.637 ***	(0.267)	-1.314 ***	(0.29)
Talk-Talk	Landline	Don't know	No	-7.33	(541.401)	-6.655	(355.187)
Talk-Talk	Landline	Don't know	Yes	-7.01	(541.401)	-6.321	(355.187)
Virgin	Pay-TV	6 months or under	No	-1.822 ***	(0.416)	-1.565 ***	(0.426)
Virgin	Pay-TV	6 months or under	Yes	-2.796 ***	(0.49)	-2.459 ***	(0.505)
Virgin	Pay-TV	7 to 12 months	No	-0.998 ***	(0.297)	-0.878 ***	(0.316)
Virgin	Pay-TV	7 to 12 months	Yes	-1.873 ***	(0.356)	-1.692 ***	(0.372)

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Table 15 – continued from previous page

Supplier	Service	Duration	Bundled	Specification Two		Specification Two	
				Fitted S_{ik}	SE	Fitted S_{ik}	SE
Virgin	Pay-TV	13 to 24 months	No	-0.787 ***	(0.247)	-0.547 **	(0.272)
Virgin	Pay-TV	13 to 24 months	Yes	-2.176 ***	(0.261)	-1.909 ***	(0.284)
Virgin	Pay-TV	25 to 48 months	No	-0.578 **	(0.258)	-0.3	(0.28)
Virgin	Pay-TV	25 to 48 months	Yes	-2.078 ***	(0.242)	-1.731 ***	(0.263)
Virgin	Pay-TV	Over 48 months	No	-1.837 ***	(0.245)	-1.591 ***	(0.272)
Virgin	Pay-TV	Over 48 months	Yes	-2.303 ***	(0.198)	-2.05 ***	(0.227)
Virgin	Pay-TV	Don't know	No	-1.829 ***	(0.482)	-1.482 ***	(0.495)
Virgin	Pay-TV	Don't know	Yes	-1.713 ***	(0.469)	-1.269 ***	(0.485)
Virgin	Broadband	6 months or under	No	-1.719 ***	(0.449)	-1.491 ***	(0.459)
Virgin	Broadband	6 months or under	Yes	-3.968 ***	(0.518)	-3.664 ***	(0.53)
Virgin	Broadband	7 to 12 months	No	-0.534 *	(0.303)	-0.401	(0.322)
Virgin	Broadband	7 to 12 months	Yes	-2.684 ***	(0.366)	-2.495 ***	(0.38)
Virgin	Broadband	13 to 24 months	No	-0.187	(0.202)	0.072	(0.23)
Virgin	Broadband	13 to 24 months	Yes	-2.85 ***	(0.249)	-2.57 ***	(0.27)
Virgin	Broadband	25 to 48 months	No	0.192	(0.223)	0.428 *	(0.248)
Virgin	Broadband	25 to 48 months	Yes	-2.583 ***	(0.241)	-2.283 ***	(0.263)
Virgin	Broadband	Over 48 months	No	-1.029 ***	(0.201)	-0.738 ***	(0.232)
Virgin	Broadband	Over 48 months	Yes	-2.77 ***	(0.201)	-2.477 ***	(0.227)
Virgin	Broadband	Don't know	No	-0.481	(0.421)	-0.094	(0.441)
Virgin	Broadband	Don't know	Yes	-1.64 ***	(0.398)	-1.161 ***	(0.421)
Virgin	Mobile	6 months or under	No	0.083	(0.581)	0.269	(0.597)
Virgin	Mobile	6 months or under	Yes	-1.248 *	(0.722)	-1.004	(0.742)
Virgin	Mobile	7 to 12 months	No	-1.271 ***	(0.334)	-1.121 ***	(0.351)
Virgin	Mobile	7 to 12 months	Yes	-2.503 ***	(0.512)	-2.314 ***	(0.529)
Virgin	Mobile	13 to 24 months	No	-0.487 **	(0.224)	-0.189	(0.252)
Virgin	Mobile	13 to 24 months	Yes	-2.233 ***	(0.433)	-1.93 ***	(0.452)
Virgin	Mobile	25 to 48 months	No	-0.523 **	(0.225)	-0.262	(0.254)
Virgin	Mobile	25 to 48 months	Yes	-2.381 ***	(0.44)	-2.073 ***	(0.461)
Virgin	Mobile	Over 48 months	No	-1.711 ***	(0.217)	-1.407 ***	(0.248)
Virgin	Mobile	Over 48 months	Yes	-2.535 ***	(0.4)	-2.246 ***	(0.421)
Virgin	Mobile	Don't know	No	-1.551 **	(0.637)	-1.211 *	(0.658)
Virgin	Mobile	Don't know	Yes	-1.793 **	(0.755)	-1.377 *	(0.778)
Virgin	Landline	6 months or under	No	-2.088 ***	(0.505)	-1.842 ***	(0.513)
Virgin	Landline	6 months or under	Yes	-3.618 ***	(0.557)	-3.322 ***	(0.57)
Virgin	Landline	7 to 12 months	No	-0.859 ***	(0.325)	-0.721 **	(0.343)
Virgin	Landline	7 to 12 months	Yes	-2.29 ***	(0.364)	-2.122 ***	(0.38)
Virgin	Landline	13 to 24 months	No	-0.602 **	(0.255)	-0.303	(0.279)
Virgin	Landline	13 to 24 months	Yes	-2.546 ***	(0.254)	-2.252 ***	(0.277)
Virgin	Landline	25 to 48 months	No	-0.071	(0.247)	0.204	(0.271)
Virgin	Landline	25 to 48 months	Yes	-2.127 ***	(0.225)	-1.815 ***	(0.25)
Virgin	Landline	Over 48 months	No	-1.381 ***	(0.217)	-1.05 ***	(0.245)
Virgin	Landline	Over 48 months	Yes	-2.403 ***	(0.179)	-2.096 ***	(0.209)
Virgin	Landline	Don't know	No	-1.172	(0.436)	-0.765 *	(0.457)
Virgin	Landline	Don't know	Yes	-1.613 ***	(0.417)	-1.138 ***	(0.438)
Mobile Firm	Pay-TV	6 months or under	No	-3.216 ***	(1.225)	-2.909 **	(1.235)
Mobile Firm	Pay-TV	6 months or under	Yes	-2.786 **	(1.236)	-2.495 **	(1.246)
Mobile Firm	Pay-TV	7 to 12 months	No	-0.185	(1.068)	-0.032	(1.074)
Mobile Firm	Pay-TV	7 to 12 months	Yes	0.344	(1.072)	0.462	(1.076)
Mobile Firm	Pay-TV	13 to 24 months	No	-0.346	(1.024)	-0.185	(1.029)
Mobile Firm	Pay-TV	13 to 24 months	Yes	-0.33	(0.997)	-0.24	(0.999)
Mobile Firm	Pay-TV	25 to 48 months	No	-0.022	(1.032)	0.202	(1.037)
Mobile Firm	Pay-TV	25 to 48 months	Yes	-0.118	(1.005)	0.079	(1.008)
Mobile Firm	Pay-TV	Over 48 months	No	-0.802	(1.044)	-0.64	(1.049)
Mobile Firm	Pay-TV	Over 48 months	Yes	0.136	(1.021)	0.208	(1.024)
Mobile Firm	Pay-TV	Don't know	No	-2.368 **	(1.153)	-2.08 *	(1.165)
Mobile Firm	Pay-TV	Don't know	Yes	-0.848	(1.177)	-0.56	(1.195)
Mobile Firm	Broadband	6 months or under	No	-3.849 ***	(0.695)	-3.501 ***	(0.714)
Mobile Firm	Broadband	6 months or under	Yes	-4.694 ***	(0.825)	-4.367 ***	(0.846)
Mobile Firm	Broadband	7 to 12 months	No	-0.457	(0.286)	-0.222	(0.309)
Mobile Firm	Broadband	7 to 12 months	Yes	-1.203 **	(0.511)	-1.009 *	(0.527)
Mobile Firm	Broadband	13 to 24 months	No	-0.481 **	(0.2)	-0.233	(0.227)
Mobile Firm	Broadband	13 to 24 months	Yes	-1.74 ***	(0.419)	-1.568 ***	(0.436)
Mobile Firm	Broadband	25 to 48 months	No	0.012	(0.209)	0.264	(0.235)
Mobile Firm	Broadband	25 to 48 months	Yes	-1.359 ***	(0.43)	-1.14 **	(0.448)
Mobile Firm	Broadband	Over 48 months	No	-0.73 ***	(0.21)	-0.454 *	(0.238)
Mobile Firm	Broadband	Over 48 months	Yes	-1.067 **	(0.436)	-0.885 *	(0.454)
Mobile Firm	Broadband	Don't know	No	-1.755 **	(0.719)	-1.359 *	(0.732)
Mobile Firm	Broadband	Don't know	Yes	-1.51 *	(0.841)	-1.118	(0.866)
Mobile Firm	Mobile	6 months or under	No	-2.365 ***	(0.335)	-2.071 ***	(0.352)
Mobile Firm	Mobile	6 months or under	Yes	-2.293 ***	(0.633)	-2.037 ***	(0.652)
Mobile Firm	Mobile	7 to 12 months	No	-1.512 ***	(0.162)	-1.271 ***	(0.193)
Mobile Firm	Mobile	7 to 12 months	Yes	-1.34 ***	(0.514)	-1.157 **	(0.53)
Mobile Firm	Mobile	13 to 24 months	No	-1.099 ***	(0.086)	-0.823 ***	(0.137)
Mobile Firm	Mobile	13 to 24 months	Yes	-1.441 ***	(0.461)	-1.257 ***	(0.478)
Mobile Firm	Mobile	25 to 48 months	No	-1.021 ***	(0.088)	-0.756 ***	(0.139)
Mobile Firm	Mobile	25 to 48 months	Yes	-1.474 ***	(0.474)	-1.259 **	(0.493)
Mobile Firm	Mobile	Over 48 months	No	-1.73 ***	(0.074)	-1.452 ***	(0.13)
Mobile Firm	Mobile	Over 48 months	Yes	-1.15 **	(0.467)	-0.983 **	(0.484)
Mobile Firm	Mobile	Don't know	No	-3.144	(0.494)	-2.805 ***	(0.504)

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Table 15 – continued from previous page

Supplier	Service	Duration	Bundled	Specification Two		Specification Two	
				Fitted S_{ik}	SE	Fitted S_{ik}	SE
Mobile Firm	Mobile	Don't know	Yes	-1.982 ***	(0.747)	-1.663 **	(0.769)
Mobile Firm	Landline	6 months or under	No	-4.062 ***	(0.837)	-3.782 ***	(0.852)
Mobile Firm	Landline	6 months or under	Yes	-4.188 ***	(0.903)	-3.956 ***	(0.925)
Mobile Firm	Landline	7 to 12 months	No	-0.626	(0.503)	-0.471	(0.515)
Mobile Firm	Landline	7 to 12 months	Yes	-0.652	(0.592)	-0.565	(0.608)
Mobile Firm	Landline	13 to 24 months	No	-0.739	(0.472)	-0.538	(0.486)
Mobile Firm	Landline	13 to 24 months	Yes	-1.28 **	(0.515)	-1.18 **	(0.533)
Mobile Firm	Landline	25 to 48 months	No	-0.094	(0.47)	0.109	(0.485)
Mobile Firm	Landline	25 to 48 months	Yes	-0.747	(0.517)	-0.602	(0.537)
Mobile Firm	Landline	Over 48 months	No	-0.926 **	(0.458)	-0.696	(0.472)
Mobile Firm	Landline	Over 48 months	Yes	-0.544	(0.516)	-0.435	(0.534)
Mobile Firm	Landline	Don't know	No	-2.291 ***	(0.839)	-1.959 **	(0.852)
Mobile Firm	Landline	Don't know	Yes	-1.327	(0.91)	-1.026	(0.935)
Other	Pay-TV	6 months or under	No	-1.276 ***	(0.48)	-1.088 **	(0.496)
Other	Pay-TV	6 months or under	Yes	-0.825	(0.61)	-0.59	(0.628)
Other	Pay-TV	7 to 12 months	No	0.127	(0.357)	0.338	(0.375)
Other	Pay-TV	7 to 12 months	Yes	0.677	(0.479)	0.916 *	(0.494)
Other	Pay-TV	13 to 24 months	No	-0.101	(0.284)	0.074	(0.305)
Other	Pay-TV	13 to 24 months	Yes	-0.065	(0.372)	0.104	(0.389)
Other	Pay-TV	25 to 48 months	No	-0.132	(0.305)	0.072	(0.324)
Other	Pay-TV	25 to 48 months	Yes	-0.207	(0.387)	0.033	(0.402)
Other	Pay-TV	Over 48 months	No	-0.814 ***	(0.294)	-0.627 **	(0.314)
Other	Pay-TV	Over 48 months	Yes	0.144	(0.37)	0.305	(0.387)
Other	Pay-TV	Don't know	No	-1.225 ***	(0.399)	-1 **	(0.416)
Other	Pay-TV	Don't know	Yes	0.316	(0.593)	0.605	(0.609)
Other	Broadband	6 months or under	No	-1.826 ***	(0.429)	-1.628 ***	(0.45)
Other	Broadband	6 months or under	Yes	-2.65 ***	(0.538)	-2.41 ***	(0.559)
Other	Broadband	7 to 12 months	No	-0.062	(0.234)	0.2	(0.259)
Other	Broadband	7 to 12 months	Yes	-0.787 **	(0.343)	-0.502	(0.361)
Other	Broadband	13 to 24 months	No	-0.153	(0.14)	0.079	(0.178)
Other	Broadband	13 to 24 months	Yes	-1.391 ***	(0.214)	-1.171 ***	(0.241)
Other	Broadband	25 to 48 months	No	-0.015	(0.134)	0.186	(0.172)
Other	Broadband	25 to 48 months	Yes	-1.364 ***	(0.232)	-1.134 ***	(0.258)
Other	Broadband	Over 48 months	No	-0.66 ***	(0.121)	-0.389 **	(0.166)
Other	Broadband	Over 48 months	Yes	-0.975 ***	(0.218)	-0.736 ***	(0.246)
Other	Broadband	Don't know	No	-0.529 *	(0.302)	-0.226	(0.326)
Other	Broadband	Don't know	Yes	-0.263	(0.485)	0.099	(0.506)
Other	Mobile	6 months or under	No	-0.313	(0.493)	-0.118	(0.513)
Other	Mobile	6 months or under	Yes	-0.219	(0.707)	0.001	(0.728)
Other	Mobile	7 to 12 months	No	-1.088 ***	(0.337)	-0.768 **	(0.355)
Other	Mobile	7 to 12 months	Yes	-0.895	(0.554)	-0.57	(0.572)
Other	Mobile	13 to 24 months	No	-0.742 ***	(0.211)	-0.431 *	(0.243)
Other	Mobile	13 to 24 months	Yes	-1.063 **	(0.453)	-0.781 *	(0.474)
Other	Mobile	25 to 48 months	No	-1.018 ***	(0.237)	-0.754 ***	(0.264)
Other	Mobile	25 to 48 months	Yes	-1.451 ***	(0.485)	-1.173 **	(0.504)
Other	Mobile	Over 48 months	No	-1.63 ***	(0.233)	-1.307 ***	(0.262)
Other	Mobile	Over 48 months	Yes	-1.029 **	(0.454)	-0.754	(0.474)
Other	Mobile	Don't know	No	-1.889 ***	(0.549)	-1.592 ***	(0.57)
Other	Mobile	Don't know	Yes	-0.705	(0.8)	-0.366	(0.822)
Other	Landline	6 months or under	No	-2.423 ***	(0.501)	-2.174 ***	(0.515)
Other	Landline	6 months or under	Yes	-2.528 ***	(0.594)	-2.263 ***	(0.611)
Other	Landline	7 to 12 months	No	-0.616 **	(0.265)	-0.314	(0.286)
Other	Landline	7 to 12 months	Yes	-0.621 *	(0.355)	-0.324	(0.372)
Other	Landline	13 to 24 months	No	-0.797 ***	(0.184)	-0.492 **	(0.215)
Other	Landline	13 to 24 months	Yes	-1.316 ***	(0.22)	-1.049 ***	(0.247)
Other	Landline	25 to 48 months	No	-0.506 ***	(0.176)	-0.234	(0.208)
Other	Landline	25 to 48 months	Yes	-1.137 ***	(0.238)	-0.861 ***	(0.265)
Other	Landline	Over 48 months	No	-1.24 ***	(0.178)	-0.896 ***	(0.211)
Other	Landline	Over 48 months	Yes	-0.837 ***	(0.23)	-0.551 **	(0.256)
Other	Landline	Don't know	No	-1.449 ***	(0.373)	-1.092 ***	(0.387)
Other	Landline	Don't know	Yes	-0.465	(0.536)	-0.074	(0.548)

Standard errors in parentheses

* ($p < 0.1$), ** ($p < 0.05$), *** ($p < 0.01$)

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