BT

CONSUMER CHOICE IN FIXED TELEPHONY: EVIDENCE FROM GREAT BRITAIN

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OXERA

Executive Summary

Consumer behaviour and choice decisions, and in particular evidence on the switching of suppliers, are among the most important indicators of the competitive state of a market. This paper looks at consumer choice in the fixed-telephony market from two angles, acknowledging the particularities of competition in this market: the consumer faces an initial opportunity to choose between competing suppliers at the level of access to the network. The choice of fixed-line access supplier takes place essentially between the incumbent provider, BT, and a number of cable operators that often offer bundled telephony and television services. However, customer choice is also observed at a second level for the delivery of calls, where the incumbent BT is competing with a multitude of indirect access (IA) operators.

The paper offers an overview of preliminary results based on descriptive and econometric analysis of panel data comprising an initial sample of over 2,000 households in Great Britain. The panel study spans the eight quarters of 2000 and 2001, with data collection focusing on household consumption of, and consumer attitudes to, telecoms services.

The work presented is intended to complement existing studies surveying the fixed-telephony market. The availability of data on actual household behaviour and choice decisions over a given time period improves the analysis of cross-sectional survey data and allows for differences in survey responses with respect to actual as opposed to hypothetical behaviour to be corrected. The econometric analysis of past behaviour related to switching of fixed-line operator and usage of IA operators can provide important confirmation of descriptive analysis. In addition, it allows for the impact of selected variables on customer choice to be quantified, in particular in relation to cost considerations and socio-demographic characteristics.

The evidence from the panel survey presented in the paper indicates that about 9% of households with cable availability switched access provider over the period of the panel. The number of households with the option to switch to cable who report that they have *ever* switched fixed-line supplier lies at around 22%. Regarding the use of IA operators for delivery of part or all of the calls made, around 13% of the panel sample made use of this option at the end of 2001.

In order to identify the drivers behind customer choice in fixed-telephony, the results of two probit models are presented. The first model concentrates on household choice of fixed-line supplier, and finds that, subject to cable availability, the main determinants of switching are factors linked to cost savings, which are characterised by price differentials between the incumbent and cable operators for call prices and advance charges. The analysis shows that an increase in the call price differential and in the advance charges differential lagged by a period increases the probability of switching significantly. Indeed, a 1% increase in the call price differential will increase the average probability of household switching by 0.4 percentage points (0.6 percentage points when only those households with the option to switch to cable are examined). Similarly, a 1% increase in the advance charges differential will increase the average probability of switching by 0.3 percentage points (0.4 percentage points when only those households with the option to switch to cable are examined).

An approximation of the marginal loss in revenue implied by these numbers leads to a figure of around £5m lost to BT per quarter in response to a 1% increase in the cost

differential for calls between BT and alternative cable providers. Switching experience in other sectors (e.g., gas and/or electricity) also plays an important role in the probability of switching fixed-line access provider. Having had the experience of supplier switching in energy (either gas or electricity) will increase the average probability of a household switching fixed-telephony supplier by 2 percentage points (4 percentage points when only those households with the option to switch to cable are examined).

Contrary to cost-related variables and previous switching experience, socio-economic and demographic characteristics of the household seem to play a less important role in determining the probability of switching. Neither in the descriptive nor in the econometric analysis of the data has evidence been found that low-income households benefit less from competitive offers made by cable or IA operators than higher-income ones.

The choice of one or several IA operators by a household for the delivery of calls is examined in a second probit model. The main conclusions from this model are similar to those drawn from the analysis of the choice of fixed-line access provider. Cost differentials between BT and IA operators have a significant impact on the probability of choosing IA. The estimation results show that a 1% increase of the price call differential between BT and IA, with respect to BT's price, would increase the average probability of choosing IA from 9% to 9.13%. This is likely to be a conservative estimate since, for reasons explained in the main text, the price differential for international calls is not included in the construction of the call price differential variable.

An approximation of the marginal loss in revenue implied by the above numbers leads to a figure of £2.45m lost to BT per quarter in response to a 10% increase in the cost differential for calls between BT and IA operators. Translating the increase in cost differentials into an increase in BT prices alone shows the sensitivity of consumers with regard to shifting (part of) their demand to IA providers. A 10% increase in the price of BT in local or national calls, or calls to mobile, will lead to an increase in the estimated average probability of IA take-up in the population from 9% to 11–12%.

It should also be noted that the real loss due to IA uptake is likely to be significantly higher because of the exclusion of international call differentials from the analysis. In addition, IA offers are likely to be particularly attractive to heavy telephone users, and the decision to subscribe to IA can be seen as gradual. Thus, an increasing proportion of calls will be transferred to one or several IA accounts once the customer has experienced the switching process and is aware of the alternatives to the incumbent's service. For the incumbent, such gradual transfer of calls will further increase the loss of call revenues over time.

In addition, bill composition and the number of long-distance calls made by a household are also revealed to be important determinants of the choice of IA. Again, there is no evidence that socio-demographic characteristics and income play a statistically significant role in a household's decision to use IA.

Overall, the preliminary analysis presented in this paper suggests that consumers display a significant awareness of price differentials in the fixed-telephony market, when considering both the choice of fixed-line provider and the use of IA. This can be interpreted as a sign that consumers exert pressure on the market players through the risk of switching if the price differential increases. The calculation of significant marginal loss figures of an order of magnitude of several million pounds per quarter confirms this

result. The switching of fixed-line supplier implies that all revenue generated by a given household is lost to the incumbent supplier, while the choice of IA will lead to loss of all or part of the household's call revenues.

Contents

1. Introduction

The aim of this paper is to study consumer choice in fixed telephony in Great Britain, focusing on two aspects:

- switching in the fixed-telephony access market, taking place between the incumbent operator, BT, and cable operators; and
- switching in the market for the delivery of calls, involving the decision to make use of IA operators, while not changing the fixed-line access provider.

The ability of customers to switch supplier is a key indicator of the state of competition in any market, as it shows that no single supplier in the market can exert market power (for instance, to raise prices) without the risk of losing market share. Conversely, an absence of switching may indicate barriers to competitive entry, or informational or other constraints that prevent customers from exercising choice. In the UK, competition was first introduced in fixed-telephony services over 20 years ago, when BT was privatised and a duopoly with Mercury was established. Since then there has been a significant increase in competitive activity in the industry (reflected in entry and declining price), driven by technological progress which has enhanced innovative and cost-efficient entry, and the evolution of the regulatory framework, which has gradually removed all remaining monopoly rights from BT, down to the unbundling of the local loop.

Since the introduction of competition in the fixed-telephony market, the incumbent BT has been subject to regulatory price and quality controls in network and retail services aimed at curbing the market power of the former monopoly and protecting new entrants and consumers alike. The findings on consumer switching presented in this paper feed into the policy debate on the maintenance of such controls. The increase of competition, in particular in the calls market, has led to a gradual roll-back of price controls by the industry regulator, OFTEL, and the complete removal of controls has been discussed for some time.[1] Parallels can also be drawn with the energy market, where supply price controls have been abolished by the regulator, OFGEM, as of April 2002 because of the increase in competitive activity. In this context, the analysis of consumer choice in the fixed-telephony market allows conclusions to be drawn as to whether operators are indeed constrained in their pricing policies by customer behaviour, or whether price caps continue to be needed to counteract market power.

The evidence on customer choice presented here is based on the analysis of data from a panel study, commissioned by BT and designed and administered by Oxford Economic Research Associates (OXERA). It should be noted that this paper presents preliminary results and is part of ongoing work on the study of fixed-telephony markets. The panel data span a period of eight quarters, from quarter 1 2000 to quarter 4 2001. Both a

[1] See OFTEL (2002*c*).

descriptive and an econometric analysis of the data are undertaken, and consumer behaviour is examined in terms of choice between the incumbent and cable for access to the networks, and between the incumbent and IA operators for the delivery of calls. For both aspects of consumer choice, the relevance of selected variables in driving switching decisions is formally tested in a probit model on the basis of a theoretical cost–benefit framework.

The work presented is intended to complement existing studies surveying the fixed-telephony market. The availability of data on actual household behaviour and choice decisions over a given time period improves the analysis of cross-sectional survey data and allows for differences in survey responses with respect to actual as opposed to hypothetical behaviour to be corrected. The econometric analysis of past behaviour related to switching of fixed-line provider and usage of IA operators can provide important confirmation of descriptive analysis. In addition, it allows for the impact of selected variables on customer choice to be quantified, in particular in relation to cost considerations and socio-demographic characteristics.

The main results from the analysis suggest that socio-economic and demographic characteristics of the household seem to play a less important role in determining the probability of switching than variables related to cost savings and alternative switching experiences. This general result holds for both switching of fixed-line provider and switching to an IA operator for the delivery of calls. In addition, the findings indicate an even distribution of switching occurrence across the population, allowing the conclusion that the benefits of competition in the form of lower prices and a proliferation of service offers do not exclude marginal households, in particular low-income ones.

The paper also presents some evidence related to the growing importance of mobile-only usage. Indeed, this can be considered a new form of competition for fixed-line operators and further research in this area should be undertaken.

The remainder of the paper is structured as follows:

- section 2 describes the panel data underlying the analysis in the paper;
- section 3 presents descriptive evidence linked to customer choice between BT and cable, and BT and IA operators. Some findings on mobile-only usage are also included in this section;
- section 4 reviews existing studies, and outlines the theoretical cost–benefit framework of switching underlying the subsequent econometric testing of the determinants of switching;
- section 5 presents the results of the probit model analysing consumer choice between BT and cable operators in the market of fixed-telephony access;
- section 6 presents the model results regarding the choice of IA operators; and
- section 7 concludes.

2. The Data

The data analysed have been gathered in the context of a panel study commissioned by BT, and designed and set up by Oxford Economic Research Associates (OXERA) in 2001. The fieldwork was undertaken by the market research company, Ipsos-RSL, and directed by OXERA.

The study was designed in three waves, with data collection taking place by means of questionnaires mailed to a representative sample of households in Great Britain.[2] The data span eight quarters between the first quarter of 2000 (Q1 2001) and the fourth quarter of 2001 (Q4 2001). The first wave collected retrospective information regarding the five quarters Q1 2000 to Q1 2001, while the second wave collected data for the second and third quarters of 2001. A total of 2,110 responses were collated after the first wave of questioning. The households retained after the first wave were sent the second questionnaire, after which 1,440 households were still included in the study. Data for Q4 2001 was gathered in the third wave, with a final number of 809 households included in the sample.

The data gathered from each household falls into two categories:

- information related to telecommunications supplier and consumption; and
- information on socio-demographic household characteristics.

Telecoms-related information refers in particular to the identity of the supplier of fixed-telephony services in each of the quarters; the tariff packages; household spending on fixed-line telephony; use of IA; and access to mobile telephony. The household consumption variables include, for each of the quarters, information on spending and usage (number of calls and call duration), which is categorised by call type (local, national, international, calls to mobile, and premium-rate services).

The socio-demographic control variables collected include, in particular, household size, income category and social grade, age and education level of head of household, as well as geographic location. The information on socio-demographic variables was collected only in the first wave and corresponds to Q2 2001. Therefore, the analysis in this paper ignores all possible change in these variables over the period covered by the panel (two years). However, given this relatively short overall time period, the unchanged demographics do not seem too strong an assumption.

In addition to the information from the survey, data on call prices for the eight quarters was collected from an industry price survey undertaken monthly by Magenta Systems.[3]

[2] Households in England, Wales and Scotland are included in the sample. However, households in Northern Ireland or other UK islands are excluded.
[3] Magenta Systems, *UK Telecom Tariff Comparisons*.

The survey includes prices for all fixed, mobile and IA service providers in the UK and information on all available tariff packages.

3. Descriptive Evidence

The development of competition in the fixed-telephony market has been of particular interest for OFTEL, and evidence on switching has been presented in the context of a number of market surveys commissioned by the regulator. The most relevant studies as far as comparison with the panel study is concerned are arguably OFTEL (2000), which analyses switching evidence based on an omnibus survey undertaken in February/March 2000; OFTEL (2001*a*) based on survey results from August 2001, and OFTEL (2002*a*), based on survey results from November 2001. In what follows, descriptive evidence from the OXERA panel study is presented, and, where relevant, comparisons with the OFTEL surveys are drawn. Further studies on switching behaviour in a broader range of markets are presented in section 4.1.

3.1 Household switching rates

Most of the information on switching behaviour was gathered during the second wave of the panel study, which took place in October 2001.

Table 3.1 shows the proportion of households reporting to have *ever* switched provider of fixed telephony. The question put to the panel members was explicit about the fact that responses should refer only to a change in the fixed-line access provider. Thus, the result should exclude households that have kept their fixed-telephone line but have opted for an IA provider for call delivery.

Table 3.1: Consumer switching in fixed telephony

	Frequency	Percentage
Switchers	209	15.5
Non-switchers	1,140	84.5
Total	**1,349**	**100**

Source: OXERA Household Panel (2002).

The 15.5% of switchers found is lower than the number reported by OFTEL for November 2001. Indeed, according to OFTEL, 21% of residential consumers said they had changed their fixed-telephone supplier (OFTEL, 2002*a*).[4] However, the proportion of switchers increases to 21.9% if only the households with the option to switch to cable are examined.[5] The proportion of households that have switched fixed-line provider during the period covered by the panel (Q1 2000 to Q4 2001) is 7% if the total panel sample is taken into account, and 9% if the base is corrected to include only households with cable availability.

[4] OFTEL (2002*a*) and OFTEL (2000) differ in the total number of switchers reported; while 21% are reported in the former, 25% are reported in the latter. OFTEL itself highlights the difference in OFTEL (2002*a*), paragraph 4.19.
[5] Over a base of 877 observations.

The analysis of the possibility of making use of an IA operator for the delivery of calls, while keeping the fixed-line provider unchanged, yields a rate of IA usage of around 13% among BT fixed-line users in 2001. Table 3.2 offers a more detailed picture of the evolution of the use of IA during the eight quarters included in the panel study.

Table 3.2: Dual usage of BT and IA

Quarter	Percentage	Base
Q1 2000	7.2	1,747
Q2 2000	7.6	1,718
Q3 2000	8.6	1,740
Q4 2000	9.8	1,752
Q1 2001	11.1	1,803
Q2 2001	12.4	1,326
Q3 2001	13.9	1,317
Q4 2001	13.2	750

Source: OXERA Household Panel (2002).

The numbers in Table 3.2 indicate a growing popularity in IA use, a phenomenon also noted by OFTEL. Indeed, IA is no longer used only for international calls, but for a variety of call types, such as local and national calls, as well as calls to mobiles (OFTEL, 2002*a*).

In addition, Table 3.3 displays dual usage of BT and IA for Q3 2001 according to annual household category. It emerges that there is an important proportion of low-income dual users of BT and IA. Indeed, around 47% of those who are dual users belong to households with an annual income of up to £20,000.

Table 3.3: Dual usage of BT and IA by household income (Q3 2001)

Income category (£ per year)	Frequency	Percentage
Under 5,000	8	4.57
5,000–9,999	23	13.14
10,000–14,999	27	15.43
15,000–19,999	24	13.71
20,000–24,999	32	18.29
25,000–34,999	35	20.00
35,000–44,999	17	9.71
45,000–54,999	7	4.00
55,000–99,999	2	1.14
100,000 +	0	0
Base	175	100

Source: OXERA Household Panel (2002).

To complete the picture on household choice, a number of questions regarding consumer attitudes towards switching were included in the panel questionnaires. In particular, the reasons for switching and not switching fixed-telephony provider were analysed with the aim of identifying possible barriers to switching and thus lack of competitive pressure on the market players.

3.1.1 Reasons for not switching

The main reasons given by the panel participants for not changing fixed-line provider are shown in Table 3.4.

Table 3.4: Reasons for not switching[1]

Reason	Frequency	Percentage
Satisfied with current supplier	881	77.6
Lower quality of alternative suppliers	182	16.0
Not enough information on alternatives	272	24.0
Too much information on alternatives	171	15.1
Preference to keep same phone number	572	50.4
Not worth the hassle	598	52.7
Base	1,135	

Note: [1] The sum adds to more than 100% as respondents were asked to mark all the reasons that apply.
Source: OXERA Household Panel (2002).

It emerges that the main reasons for not switching are:

- customer satisfaction with the current provider;
- keeping the same phone number;
- lack of interest (avoiding the hassle of changing supplier); and
- information on alternatives.

These findings are similar to OFTEL's conclusion—the 'reasons for not switching supplier were mostly positive.'[6] That is, consumers are mostly satisfied with their current supplier. Nevertheless, the remaining principal reasons for not switching would suggest an advantage in favour of the incumbent operator, and the need for proactive sales approaches by entrants in order to overcome customer inertia.

3.1.2 Reasons for switching

According to the responses given by the panel participants, cost savings are by far the most important reason for those who have switched. Other important reasons were dissatisfaction with the previous supplier and problems with quality of service. Conversely, moving house, advertising, recommendation from family or friend, and door-to-door or telephone sales were identified as relatively unimportant. This is an interesting result considering the importance attributed to proactive sales techniques in the rapid development of competition in the energy sector. Table 3.5 summarises these results.

[6] See OFTEL (2001*a*).

Table 3.5: Reasons for switching (%)

Reason	Very important	Quite important	Quite unimportant	Very unimportant	Not applicable	Total	Base
Cost savings	68.3	25.2	3.5	0.5	2.5	100	202
Dissatisfaction with previous supplier	16.5	20.1	20.1	10.3	33.0	100	194
Recommendation from family or friend	6.2	25.4	22.8	13.0	32.6	100	193
TV, radio or press advertising	3.7	13.5	32.3	23.4	27.1	100	192
Quality of service	15.0	21.2	15.0	14.0	34.7	100	193
Telephone sales	2.7	3.8	13.4	24.2	55.9	100	186
Door-to-door sales	3.2	14.2	13.7	24.2	44.7	100	190
Moving house	7.5	4.8	13.8	10.6	63.3	100	189

Source: OXERA Household Panel (2002).

3.2 Profile of switchers

In addition to evidence about absolute levels of switching and consumer attitudes, it is important to examine the distribution of switchers across different population groups in order to detect whether the benefits of competition are concentrated among certain customer groups only while other groups do not show the same signs of take-up of competitive offers. One of the most important variables in terms of identifying potential vulnerable households is income.

Table 3.6 displays switching evidence according to annual household income category. Similar to the case of dual usage of BT and IA, it emerges that almost half of those who have switched belong to households with an annual income of up to £20,000.

Table 3.6: Switching fixed-line supplier by household income

Income category (£ per year)	Frequency	Percentage
Under 5,000	11	5.58
5,000–9,999	22	11.17
10,000–14,999	38	19.29
15,000–19,999	27	13.71
20,000–24,999	35	17.77
25,000–34,999	37	18.78
35,000–44,999	15	7.61
45,000–54,999	8	4.06
55,000–99,999	3	1.52
100,000 +	1	0.51
Base	197	100

Source: OXERA Household Panel (2002).

The result that switching occurs across all income groups is corroborated in Table 3.7 for the case of social grade. The figures show that significant levels of switching occur among the lower social grades.

Table 3.7: Switching by social grade

Social grade	Frequency	Percentage
Upper middle class	1	0.48
Middle class	40	19.14
Lower middle class	69	33.01
Skilled working class	49	23.44
Working class	37	17.70
Lowest social level	13	6.22
Base	209	100

Source: OXERA Household Panel (2002).

Therefore, on the basis of these data, there seems to be no evidence that benefits of competition are not equally accessible to less privileged consumer groups.

3.3 Mobile-only usage

An interesting final point that can be examined in light of the data gathered in the panel concerns mobile-only users. It could be argued that mobile telephony is becoming an important substitute to fixed telephony and therefore represents true competition for the incumbent. Tables 3.8 and 3.9 analyse the evolution of mobile-only use and the profile of those consumers that have mobiles but do not have a fixed-line telephone (either BT or cable).

Table 3.8 presents the proportion of households that have mobiles for the last three quarters of 2001 only. Around 5.5–6% of households surveyed are using a mobile phone and do not have a fixed line. This finding concurs with the numbers reported by OFTEL (2002*b*).

Table 3.8: Mobile-only users

Quarter	Percentage	Base
Q2 2001	5.45	2,110
Q3 2001	5.56	1,440
Q4 2001	5.69	809

Source: OXERA Household Panel (2002).

Table 3.9 shows the profile of mobile-only users by household income for the last three quarters of 2001 in order to examine whether mobile-only possession is concentrated only in certain customer groups. The results suggest that mainly low-income households have only mobile and no longer have fixed-line access. Indeed, over 85% of mobile-only users belong to households with annual income of less than £20,000.

Table 3.9: Mobile-only users by household income

Income category (£ per year)	Q2 2001		Q3 2001		Q4 2001	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Under 5,000	28	25.23	19	24.68	12	27.27
5,000–9,999	27	24.32	19	24.68	12	27.27
10,000–14,999	23	20.72	22	28.57	12	27.27
15,000–19,999	16	14.41	8	10.39	5	11.36
20,000–24,999	8	7.21	4	5.19	1	2.27
25,000–34,999	4	3.60	2	2.60	1	2.27
35,000–44,999	4	3.60	3	3.90	1	2.27
45,000–54,999	1	0.90	0	0	0	0
55,000–99,999	0	0	0	0	0	0
100,000 +	0	0	0	0	0	0
Base	111	100	77	100	44	100

Source: OXERA Household Panel (2002).

3.4 Summary of evidence

The main conclusions that can be drawn from the evidence presented in this section can be summarised as follows.

- Around 15% of households included in the panel survey report to have switched fixed-telephone supplier at least once. This result refers to switching of the supplier of access to the fixed network only and excludes evidence on switching to IA. If only the households with the option to switch to cable are considered, the proportion of switching increases to 21.9%. In addition, the proportion of dual users—i.e., households that report using both BT (or cable) and one or several IA providers—is around 13% and has increased significantly over the eight quarters included in the panel survey. Given these numbers, overall switching—i.e., encompassing switching of fixed-line supplier between BT and cable, and choice of IA to deliver calls—is likely to be in the range of 21–25%, as reported by OFTEL (2000) and OFTEL (2002*a*).

- The evidence reviewed does not suggest that low-income customer groups are missing out in terms of competitive offers. In fact, according to the evidence presented, a significant proportion of those who switch fixed-line provider are low-income households. Similarly, there is evidence that low-income households represent a significant proportion of households using IA.

- The main reason for switching as reported by the panel participants is cost considerations. This indicates that telephone customers display a significant degree of price sensitivity, which in turn is evidence of competitive pressure exercised in the market by the consumers.

- Last, mobile-only seems increasingly to be offering an alternative to traditional fixed-line telephony. Again, the evidence from the panel supports the conclusion that low-income households face no disadvantage in this trend.

4. Analytical Framework

In this section, a theoretical framework of operator switching in fixed-telephony is set out. Evidence linked to determinants of switching is reviewed, and, on the basis of this review and the conclusions drawn from the panel data description presented in section 3, a theoretical cost–benefit framework is established.

4.1 Determinants of switching: review of existing studies

A research study released by the Department of Trade and Industry (DTI, 2000) looks at switching in energy services, fixed and mobile telecommunications, mortgages, current and savings accounts, and home and car insurance. In the study, the determinants of switching are identified to be the result of interaction between three factors:

- opportunity—i.e., accessibility of competitors and the extent to which consumers can shift easily;
- inclination—i.e., the perceived benefits of switching and/or the desire to leave a company which has provided unsatisfactory service; and
- perception of risk or disinclination.

Whether a person switches to another supplier or not is a function of where the balance lies between these factors. The DTI study concludes that, in most markets, the balance of factors is tipped in favour of existing suppliers. There is lack of knowledge and trust in alternative suppliers (in other words, the reputation of a company plays an important role in customer choice),[7] high perception of risk and apathy, and, in some cases, genuine barriers (e.g., presence of penalty clauses, or debts).

In terms of information needs, it is interesting to note that the DTI study concludes that consumers have easy access to information on what companies offer, but they do not find it easy to identify the right company or package to suit their individual needs.

Surveys agree that the main driver of switching counteracting the switching costs listed in the previous paragraphs is cost savings—DTI (2000), OFTEL (2000), OFGEM (2001*a* and *d*).[8]

Various studies also seem to concur on the finding that those who have switched do not find the experience inherently difficult. According to the DTI study, 75% of switchers found it easy, and a further 20% found it fairly easy to switch. It should also be highlighted that those who have shifted in one market are also those who are most likely

[7] The conclusion that brand is important in consumer decision-making in the case of telecoms is supported by OFTEL (2001*b*).

[8] In view of the reputational effect identified with respect to switching barriers, it is interesting to note that, in Ventura (1999), the leading factor influencing customer preferences is not price, but the identity of the company or the brand supplying the service.

to shift in other markets. This finding is confirmed in OFTEL (2000), in which it was noted that those who switched their telecoms supplier were also more likely than average to have switched supplier of other utilities. This last result can be interpreted in two ways. First, repeated switching experiences reflect inherent consumer characteristics linked to lower risk aversion, and thus overall lower barriers to switching for a sub-group of households. Second, the result could also suggest that switching behaviour is 'habit forming', in the sense that a successful switching experience will lower switching barriers through a reduction of the perceived uncertainty.

Among the markets surveyed in DTI (2000), switching levels vary significantly, and specific reasons can be found for the variations. The highest levels of switching were reported in the insurance market, with 53% of consumers having switched their car insurance provider in the five-year period considered by the survey, and 30% of consumers having switched home insurance. One explanation for these high switching rates is that many insurance contracts require active renewal after a given period (e.g., every year). This automatically increases switching opportunities. Moreover, a number of competing insurance suppliers will contact households about to renew their contract, thus reducing the search costs for the household.

The deregulated energy markets are also reported to have high levels of switching, a fact that is mainly attributed to the highly proactive marketing and sales techniques employed in the industry, in particular doorstep selling. The DTI study quotes figures of 37% for gas and 26% for electricity, but it should be noted that these are somewhat in contradiction with evidence from OFGEM (2000), which quotes 29% and 19%, respectively. The discrepancy is likely to stem from the fact that the reference periods in the two studies are not identical. Moreover, different phrasing of the question might have elicited different responses among the households responding to the respective surveys.

Some financial services have among the lowest levels of switching. Only 12% of respondents have switched mortgage provider in the five-year period prior to the survey, and only 6% of customers had changed their current-account bank in the same period. In addition to particularly high aversion of risk in these services, the result might also be influenced by the fact that penalty clauses are often integrated in mortgage contracts, preventing customers from switching.

According to DTI (2000), the telecoms sector shows fairly low switching rates in terms of fixed-line access provider—only 11% of customers had done so. The lower rates are likely to be at least partly caused by the possibility of having IA, which allows customers to exercise choice without actually having to switch their fixed-line provider. However, the switching numbers are higher in the mobile sector, with 20% of customers having switched. OFTEL (2000) broadly confirms the DTI (2000) results for mobile telephone, reporting 25% of mobile network switchers, but also indicates higher levels of switching in the fixed-telephony sector (25%). It should be noted that the evidence from the OXERA Household Panel presented in section 3 above is more in line with the lower estimates for actual fixed-line switching (around 15% of households participating in the panel study reported to have switched fixed-telephony supplier for access).

4.2 A theoretical cost–benefit framework

On the basis of the evidence reviewed so far, a theoretical framework of supplier switching can be constructed. In addition to being guided by the conclusions from the reviewed evidence, the model follows the framework set out in Parmar et al. (2000).

Formally, the probability P that the event 'switching supplier' S occurs can be expressed as a function of switching costs C and switching benefits B for household i.

$$P_i = P(S=1)_i = P(N_i^* \leq N_i) = F(C_i, B_i, \beta) \qquad \text{(Equation 1)}$$

where β represents a set of parameters and F is the distribution of (unobserved) net benefits N. N_i^* is the critical (or threshold) value for household i beyond which switching occurs.

Switching costs can be classified into several categories. First, time costs refer to the search and evaluation costs of finding the most appropriate offer, and possible administrative time for filling in forms. In customer surveys, time costs are most likely to be reflected in the answer that switching is 'too much hassle'. Time costs are likely to be positively related to the opportunity cost of alternative activities, and hence to income (Y) and/or employment status (EM) and household size (HS). The effect of education (ED) is ambiguous, since higher education may, on the one hand, reduce the time required to reach and implement a switching decision, but, on the other, may signal a higher opportunity cost, falling into the same category as variables such as income and employment status.

In addition to time costs, psychological barriers are likely to be important in terms of switching costs. Psychological barriers are likely to be positively related to household characteristics such as age (A). Previous experience of switching is, in turn, likely to lower psychological barriers where such experiences have been successful and easy, as they are reported to be in most cases. Thus, switching in other markets, such as gas (G) and electricity (El), are likely to lower the cost of switching. As already mentioned, previous switching experiences might also act as a signal for households with intrinsically lower aversion to risk and thus reflect an unobserved household characteristic.

Finally, 'true' barriers to switching need to be taken into account. In the context of switching the fixed-line telephony supplier, the most important barrier is arguably the lack of an alternative supplier. As cable operators are currently the most important alternative to the incumbent BT, cable availability for the household is included in the cost function (CA).

The above conceptualisation of switching costs leads to the following cost function:

$$C = C(Y/EM, ED, HS, A, El, G, CA) \qquad \text{(Equation 2)}$$

With regard to switching benefits, the primary driver behind switching is the potential saving in the fixed-telephony bill received by the household. Cost savings will essentially depend on the price differential between the incumbent supplier and its competitors. Differences can occur with respect to call charges ($\Delta Ccall$) and fixed advance charges included in the bill ($\Delta Cfix$). In addition, cost savings will depend on the amount of telecommunications services used (V), and, in this context, on household size (HS). It can

also be assumed that the benefit of switching is greater if the customer reports to be dissatisfied with their current supplier (*Dissat*).

Hence, the following benefit function can be assumed:

$$B = B(\Delta Ccall, \Delta Cfix, V, HS, Dissat) \qquad \text{(Equation 3)}$$

The model outlined above will be estimated within a probit framework in section 5 to provide formal evidence regarding the question of what determines the choice of fixed-line supplier. In section 6, a second probit model is estimated to address the fact that customer choice in the fixed-telephony market can also take the form of choosing an IA operator for the delivery of all, or part, of the calls made, while keeping the same access provider.

5. A Probit Model of Switching of Fixed-line Provider

With the aim of testing formally which factors influence switching of the fixed-line provider, a probit model is estimated in this section on the basis of the theoretical cost–benefit switching framework set out in section 4.2. The choice that consumers face with regard their fixed-line provider is basically between the incumbent BT and cable operators offering telephony services. The option of mobile-only usage is not considered in the model at this stage.

Probit models are used to model and predict the probability of discrete events. The variable to be explained here is the decision to change supplier, which is a 'yes'/'no' binary variable. The probit model allows quantitative conclusions to be drawn about which factors have an effect on the probability that a given household will switch supplier, and the extent of their relative impact.

More formally, the decision as to whether a household switches fixed-telephony supplier (S=1) or not (S=0) in the analysed period can be expressed as a function of a set of variables, grouped in a vector x so that: $\text{Prob}(S=1) = F(\boldsymbol{\beta}'\mathbf{x})$ (Equation 4)

where F is a function constrained to the 0–1 interval, and β represents the set of parameters that reflect the effect of a change in x on the probability.

The probit model assumes that the function F is normally distributed—i.e.:

$$\text{Prob}(S=1) = \int_{-\infty}^{\beta'x} \phi(t)dt = \Phi(\boldsymbol{\beta}'\mathbf{x}) \quad \text{(Equation 5)}$$

where ϕ is the standard normal density function, and Φ is the standard normal cumulative distribution function.

A probit model following the above specification has been estimated taking into account switching rates across the first seven quarters of the panel (Q1 2000 to Q3 2001). The variable to be explained represents actual switching[9] and takes a binary 1–0 form. It includes all households having switched in any of the first seven quarters of the panel.[10] In addition, an alternative probit model has been constructed comprising only those households having the actual option to switch to cable. That is, it corrects switching by the availability of cable services; this availability is deduced from the household postcode.

[9] Actual switching can be contrasted with intended switching, which has been the subject of other switching studies, notably Parmar et al (2000).

[10] The proportion of those households who had *ever* switched fixed-line provider is higher than that explained in the model, as the panel covers only seven quarters.

The explanatory variables considered for the determination of switching cable and BT correspond to those identified in the previous sections and can be grouped into three categories. The variables related to socio-economic and demographic characteristics of the household include income category, age of the head of household, employment status of the head of household, educational level attained by head of household, and size of household. Regarding geographic location, the household postcode is linked to the availability of cable services.

The second category of explanatory variables is related to cost savings, including the call price differential between BT and cable operators (for local and national calls, as well as calls to mobiles), and the advance charges differential between BT and cable. Advance charges have been defined as line rental plus discount costs minus bundled calls (i.e., 'free' inclusive minutes).

The last group of explanatory variables considers aspects associated with the switching experience. This group includes a variable relating to household experience in switching energy (gas and/or electricity) supplier. In addition, the panel responses regarding the reasons for switching are considered, and the importance of cost savings and dissatisfaction with previous suppliers are included to establish a link between what people report as being theoretically important and what their actual behaviour shows.

The probit equation to be estimated is then:

$$\text{Prob}(S=1) = \beta_0 + \beta_1 Y + \beta_2 A + \beta_3 EM + \beta_4 ED + \beta_5 HS + \beta_6 CS + \beta_7 Dissat + \beta_8 \Delta Ccall + \beta_9 \Delta Cfix + \beta_{10} \Delta Cfixprev + \beta_{11} CA + \beta_{12} En + \varepsilon$$

(Equation 6)

where Y stands for household income group, A is age of head of household, EM stands for employment status of head of household, ED is the education level of head of household, HS is household size, CS is the reported importance of cost savings as a reason for switching, $Dissat$ is the importance of dissatisfaction with previous supplier, $\Delta Ccall$ is the call price differential between BT and cable, $\Delta Cfix$ stands for the advance charges differential, $\Delta Cfixprev$ is the advance charges differential lagged a period, CA denotes cable availability in postcode area of the household, En is switching experience in energy (gas and/or electricity), and ε is the error term, assumed to be normally distributed. Where the dependent variable refers only to those households having the actual option to switch to cable, the right-hand side of Equation 6 excludes CA.

The Appendix provides a detailed description of each of the explanatory variables used in the modelling. The results of the estimation are presented in Tables 5.1 and 5.2. The second column of the tables displays the estimated coefficients of the probit model. Due to the non-linear nature of the probit model, however, these coefficients cannot be

interpreted in a straightforward manner to indicate the increase in the probability of switching, given a one-unit increase in the corresponding explanatory variable.[11] The third column, therefore, displays the marginal impact of the explanatory variables on the probability of switching—i.e., it represents the change in probability of a unit change in the explanatory variable, all other variables being held at sample average. In formal terms, the marginal effect for a change in x_1 is given by:

$$\frac{\partial \Phi}{\partial x_1} = \phi(\boldsymbol{\beta}'\mathbf{x})\beta_1 \qquad \text{(Equation 7)}$$

Table 5.1 reports the results from modelling the probability of switching fixed-line operator, while Table 5.2 reports the results when the sample is limited to only those households where cable services are available.

Table 5.1: Probit estimation results—switching fixed-line supplier

Dependent variable: switching fixed-line supplier[1] **Number of observations: 1,743**		
Variable	**Coefficient[2]**	**Marginal impact on probability of switching[3]**
Income category	NS	NS
Age of head of household	–0.06*	–0.004*
Employment status of head of household	NS	NS
Education level of head of household	NS	NS
Household size	0.07*	0.005*
Importance of cost savings[4]	0.71***	0.079***
Importance of dissatisfaction with previous supplier[4]	0.44**	0.043**
Call price differential (BT – cable)	0.054***	0.004***
Advance charges differential	NS	NS
Advance charges differential—previous period	0.041***	0.003***
Availability of cable[4]	0.59***	0.04***
Switched energy supplier[4]	0.23**	0.02**
Predicted probability at sample average		0.031

Notes: [1] Refers to those who have switched in any of the seven quarters of the panel. [2] Coefficients with a statistical confidence interval below 90% are not reported and denoted by NS = not significant. For reported coefficients, the statistical confidence levels are indicated by asterisks, where * stands for statistical significance within a 10% interval, ** within a 5% interval, and *** within a 1% interval. [3] The marginal impact, dF/dx, represents the change in probability of a unit change in the independent variable, all other variables being held at sample average. [4] dF/dx is for discrete change of a dummy variable from 0 to 1, all other variables being held at sample average.

[11] For a detailed discussion of non-linear binary models, see, for example, Greene (1997).

**Table 5.2: Probit estimation results—
switching fixed-line supplier adjusted by cable availability**

Dependent variable: switching fixed-line supplier adjusted by cable availability[1]		
Number of observations: 1,129		
Variable	**Coefficient[2]**	**Marginal impact on probability of switching[3]**
Income category	NS	NS
Age of head of household	–0.10**	–0.011**
Employment status of head of household	NS	NS
Education level of head of household	NS	NS
Household size	NS	NS
Importance of cost savings[4]	0.69***	0.108***
Importance of dissatisfaction with previous supplier[4]	0.51**	0.078**
Call price differential (BT – cable)	0.06***	0.006***
Advance charges differential	NS	NS
Advance charges differential—previous period	0.04***	0.004***
Switched gas supplier[4]	0.33**	0.04**
Predicted probability at sample average		0.054

Notes: [1] Refers to those who have switched in any of the seven quarters of the panel, adjusted by the availability of cable determined by the household postcode. [2] Coefficients with a statistical confidence interval below 90% are not reported and denoted by NS = not significant. For reported coefficients, the statistical confidence levels are indicated by asterisks, where * stands for statistical significance within a 10% interval, ** within a 5% interval, and *** within 1% interval. [3] The marginal impact, dF/dx, represents the change in probability of a unit change in the independent variable, all other variables being held at sample average. [4] dF/dx is for discrete change of a dummy variable from 0 to 1, all other variables being held at sample average.

The results of the estimation reported in the above tables suggest a number of conclusions that are in line with the findings of the descriptive evidence set out in section 3. Socio-economic and demographic characteristics of the household seem to play a less important role in determining the probability of switching than variables related to cost savings and alternative switching experiences. Indeed, factors such as household income, employment status of the head of household or education display coefficients that are not statistically significant.[12]

One demographic variable affecting the probability of switching fixed-line supplier is the age of the head of household. The variable has the expected negative sign—i.e., households headed by older people are less likely to switch than others. In addition, there

[12] Alternative definitions of the income variable were used (e.g., including the midpoint income of each income category, and dummy variables for low-income groups), but the results did not significantly differ from those reported in the tables.

is some indication that household size has an impact on switching probability. Table 5.1 shows that larger households are more likely to switch. However, this result does not hold when the sub-sample of households with cable availability is considered.

Cable is the main fixed-line alternative to BT in the market for access.[13] As expected, the availability of cable has significant impact on the probability of switching. In practice, as mentioned above, the availability of cable is a precondition for switching fixed-line supplier. In the context of the model, however, the impact of the cable availability variable on the average probability of switching can be interpreted as heightened customer awareness regarding alternative options available for telecoms services. Indeed, having the option to subscribe to cable services will increase the probability of switching by 0.04 (i.e., the average probability of switching to cable increases by 4 percentage points if cable availability is considered).

Besides cable availability, the most important variables to have an effect on switching probability are price differentials between the incumbent and cable operators (for calls and advance charges). The figures reported in both tables show that an increase in the call price differential and in the lagged advance charges differential increases the probability of switching significantly. Indeed, a 1% increase in the call price differential will increase the average probability of household switching by 0.4 percentage points (0.6 percentage points when only those households with the option to switch to cable are examined).[14] Similarly, a 1% increase in the advance charges differential will increase the average probability of switching by 0.3 percentage points (0.4 percentage points when only those households with the option to switch to cable are examined). These results are further supported by the significance of the importance of cost savings as a reason for switching in both tables.

In order to facilitate the interpretation of the results, and to form an idea of the impact of the estimated cost sensitivity of households for the industry, the marginal effect on the switching probability may be translated into absolute numbers using the following approximation: according to the panel survey results, around 77% of the households were subscribers of BT in 2001.[15] Given that the panel is based on a random representative sample of the population of Great Britain, it can be assumed that, of a total of approximately 24.5m households in Great Britain,[16] 18.86m were BT subscribers. According to the panel responses, 7% of sample participants[17] reported to have switched

[13] As mentioned earlier, the emergence of mobile-only as alternative to fixed-line access is an interesting field of research; however, it has not been considered in this modelling exercise.

[14] That is, a 1% increase in the price call differential (with respect to BT's price) will increase the average probability of switching from 3.1% to 3.5%, in the 'unadjusted' switching case, and from 5.4% to 6% in the switching adjusted by cable availability case.

[15] This number comprises households subscribing to BT only, as well as those subscribing to BT and using IA operators for the delivery of calls.

[16] The population figures are based on National Statistics (2001), *Annual Abstract of Statistics*, 2001 edition.

[17] This refers to the percentage of switchers in the total population as opposed to the percentage of switchers in the sub-group of households with cable availability.

fixed-line provider over the panel period. This would represent a total of 1.3m households switching between BT and a cable operator over the eight quarters covered by the panel study. If it is assumed that all switching took the form of switching away from BT, and given an average quarterly BT bill of approximately £68 reported by the panel respondents,[18] the total loss of revenue for BT due to the switching was £88.4m per quarter for the panel period.

In terms of the marginal impact, the estimation results suggest that a 1% increase in the average cost differential for calls between BT and alternative cable providers would increase the average probability of switching from 3.1% to 3.5% in the 'unadjusted' switching case, and from 5.4% to 6% for the model that includes only households with the option to switch to cable. Translating this into absolute numbers, this would imply a marginal loss of 75,440 households in the unadjusted case, and of 73,800 households in the case where only the households with cable availability are considered (65.2% of the population). In terms of revenue, this represents a marginal loss of £5m per quarter for BT. It is worth to note the following: the price differential is expressed in terms of the price of BT. That is, it refers to $(P_{BT}–P_{CA})/ P_{BT}$. Therefore, it is not correct to interpret a 10% increase in the price differential as an equivalent increase in the BT price. Indeed, the increase in the BT price to achieve a 10% increase in the differential will be significantly less than 10%.[19]

Similar calculations may be undertaken to estimate the total and marginal loss implied by the estimated impact of cost differentials for advance charges.

Switching experience in other sectors (e.g., gas and/or electricity) also plays an important role in the probability of switching in fixed-telephony. It has been suggested in section 4 that switching behaviour is 'habit forming', in the sense that a successful switching experience in another sector (e.g., energy) will lower switching barriers in the fixed-telephony market through a reduction of the perceived uncertainty (e.g., quality of service). The fact that alternative switching experiences can also be considered as a signal for inherently less risk-averse households should also be taken into account. Table 5.1 shows that having had the experience of supplier switching in energy (either gas or electricity) will increase the average probability of a household switching fixed-telephony supplier by 2 percentage points (4 percentage points in Table 5.2).

Overall, the estimation results suggest that, provided that cable is available, the main drivers behind switching are variables linked to perceived cost savings and the actual price differentials between operators. In addition, the relative insignificance of socio-

[18] Note that OFTEL (2002*a*) reports an average UK quarterly bill of £82 (incl. VAT). This is very similar to the average from the panel study, which is for Great Britain and excludes VAT.

[19] For example, assume an average price differential between BT and cable of 10%; and a price for BT of 10 and a price for cable of 9. This would result in a differential of (10 – 9)/10 = 0.1. Now assume a 10% increase in the price differential as a result of an increase in BT's price (keeping the price of cable constant). In order to achieve that 10% increase, BT's price would need to be 10.11—i.e. (10.11 – 9)/10.11 = 0.11. That is, the percentage increase in BT's price would need to be 1.1%.

economic and demographic household variables—in particular, income category and employment status—seems to confirm that the switching experience is not (or no longer) confined to higher-income households. These results corroborate findings in the UK energy sector that switching has become more evenly spread across all population groups with the development of competition, and that all customer groups have the opportunity to switch supplier and take advantage of the offers.

6. Switching to Indirect Access

As highlighted throughout the paper, an important aspect of the analysis of consumer choice in fixed telephony is the availability of IA for the delivery of calls. The modelling of the decision to take IA can increase the understanding of the state of competition in the markets for access and in the fixed-telephony markets.

One of the particular features of the fixed-telephony market is that competition can take two basic forms. The first involves competition between the incumbent operator and cable operators (as examined in the previous section), and implies a complete shift of supplier for both the provision of access to the fixed-line network and the delivery of calls. The second form of competition involves the incumbent service provider and IA operators, and implies competition for the delivery of calls only, while the access provider remains unchanged.

Competition by IA operators has caused the most significant pressure on call prices since the introduction of competition. While IA operators initially concentrated on the international calls market where the highest returns could be found, IA competition has now permeated the entire calls market. Indeed, IA operators are not used solely for savings on international calls, but for a variety of call types, such as Internet access, national calls, local locals and calls to mobiles.[20]

The main question addressed in this section focuses on what determines consumer choice of IA, and in this context, on the relative importance of socio-demographic household characteristics compared to other factors, such as variables linked to potential cost savings, and bill composition. The inclusion of bill composition in the explanatory variables of the model takes into account the possibility of certain types of consumer (in particular, heavy long-distance users) being more likely to take up IA.

6.1 Modelling the decision to take IA

Different factors can be thought to influence the decision to take IA. These include socio-economic and demographic characteristics of the household, prices of alternatives to BT (cable, IA, mobile) faced by the households, and their usage patterns of telephony services. It can be argued that the higher the price differential between BT and IA, for a given pattern of consumption, the higher the probability of IA take-up. In this context, it is still likely that IA take-up is higher among households displaying a relative larger proportion of long-distance calls. However, as already mentioned, competitive IA offers are now available for all call categories.

In modelling the decision to take IA, the variable to be explained takes a binary 1–0 form, the positive outcome referring to those households with one or more IA provider across the eight quarters included in the panel (ie, Q1 2000 to Q4 2001).

[20] See OFTEL (2002*a*).

The explanatory variables considered are the following. In terms of socio-economic and demographic characteristics of the household, they include income category, age of head of household, educational level attained by head of household, and size of household.

A further set of explanatory variables is related to potential cost savings, including the price differential between BT and an average of IA operators[21] for local and national calls, as well as calls to mobiles. The estimation excludes international calls due to the difficulty of constructing meaningful call price differentials in the international call category without having information on the exact destination of the international calls that a household undertakes.

The last group of explanatory variables considers aspects related to bill composition and usage. In particular, it includes the share of long-distance calls (national plus international) in the total call bill of a household. Usage is captured by the number of long-distance calls, which can still be considered the most relevant call category for IA choice. The relevance of the impact of the selected variables is tested in a probit model, similar to that explained in section 5.

The model to be estimated is

$$\text{Prob}(S=1) = \beta_0 + \beta_1 Y + \beta_2 A + \beta_3 ED + \beta_4 HS + \beta_5 \Delta Ccall + \beta_6 RSlongd + \beta_7 V + \varepsilon$$

(Equation 8)

where Y stands for household income group, A is age of head of household, ED is the education level of head of household, HS is household size, $\Delta Ccall$ is the call price differential between BT and IA, $RSlongd$ is the share of long-distance calls in total call bill, V is the number of long-distance calls and ε is the error term, assumed to be normally distributed.[22]

The main results of the estimation, presented in Table 6.1, are summarised below.

Similar to the results in modelling the choice of fixed-line provider, socio-economic and demographic characteristics of the household seem to play no major role in deciding whether to take IA. In particular, household income, age of the head of household, education level of the head of household, and size of household display coefficients that are not statistically significant.

The most important variables to have an effect on the probability of IA take-up are call price differentials between the incumbent and IA operators, as well as the share of long-distance calls in the total bill. The estimation results reported in Table 6.1 show that a unit

[21] The average of IA operators is weighted by the relative share of the most used IA providers used by the respondents in the panel.

[22] The inclusion of alternative experiences was also considered, but failed to show significant coefficients.

increase in the call price differential between BT and IA increases the average probability of IA take-up by 0.13 percentage points (i.e., a 1% increase of the price call differential, with respect to BT's price, would increase the average probability of IA take-up from 9% to 9.13%). It should be noted that the price differential for international calls is not included in the construction of the call price differential variable.

As already demonstrated in section 5, an approximation of the real numbers implied by the model estimations can be undertaken. According to Table 3.2, it can be estimated that around 12.5% of the panel sample were using IA in 2001. Assuming that most IA users are BT subscribers for fixed-network access, and considering a total number of 18.86m households in Great Britain using BT in 2001, a total of 2.36m IA users can be estimated. Considering that the average quarterly BT bill of £68 decreases by £10 to £58 if the BT subscriber is also an IA user, the revenue lost to BT is £23.6m per quarter for the existing number of IA users.[23]

In terms of the marginal impact, the estimation results for IA usage suggest that a 1% increase in the average cost differential for calls between BT and an average of IA operators will increase the average probability of using IA from 9% to 9.13%. An approximation of the marginal loss in revenue implied by the above numbers leads to a figure of £2.45m per quarter lost to BT in response to a 10% increase in the cost differential for calls between BT and IA operators. Similar to the argument made in section 5 in the context of the marginal loss analysis, it needs to be highlighted that the increase in the average cost differential between BT and IA providers cannot be interpreted as an equivalent increase in BT prices. In order to evaluate the impact of an increase in BT prices, reference needs to be made to the formula for the calculation of the price differential $(P_{BT} - P_{IA})/ P_{BT}$. Translating the increase in cost differentials into an increase in BT prices alone shows the sensitivity of consumers with regard to shifting (part of) their demand to IA providers. Given current BT and IA price levels for local and national calls, as well as calls to mobiles, a hypothetical increase of 10% of BT prices in either of these call categories would lead to an increase in the price differential in the range of 17–27%. In turn, such an increase in the price differential would imply an increase in the estimated average probability of IA take-up in the population of 2–3 percentage points—i.e., from an estimated 9% to 11–12%.

It should also be noted that the real marginal loss due to IA is likely to be significantly higher because of the exclusion of international call differentials from the analysis. In addition, IA offers are likely to be particularly attractive to heavy telephone users, and the decision to subscribe to IA can be seen as gradual. Thus, an increasing proportion of calls will be transferred to one or several IA accounts once the customer has experienced the switching process and is aware of the alternatives to the incumbent's service. For the

[23] Given that the average call bill of IA users with their IA operator is £51, the real average loss for BT is likely to be significantly higher than this estimate.

incumbent, such gradual transfer of calls will further increase the loss of call revenues over time.

The composition of the call bill plays a similarly significant role regarding to the probability to choose IA. As expected, this probability increases with the share of long-distance calls in the total bill. In particular, a 1% increase in the share of long-distance calls in the total bill would increase the average probability of IA take-up from 9% to 9.1%.

Furthermore, a volume effect can be discerned in the estimation results. There is a positive relation between the probability of IA take-up and the volume of long-distance calls—the higher the number of long-distance calls made by the household, the higher the probability of IA take-up. This would indicate that not only does the share of long-distance calls in the total bill matter, but heavy users are also more inclined to overcome switching costs, as the absolute cost savings are larger.

Table 6.1: Probit estimation results—decision to take IA

Dependent variable: IA user[1]		
Number of observations: 623		
Variable	**Coefficient**[2]	**Marginal impact on probability of switching**[3]
Income	NS	NS
Age of head of household	NS	NS
Education level of head of household	NS	NS
Household size	NS	NS
Call price differential (BT – IA)	0.008*	0.0013*
Share of long-distance calls in total call bill	0.008**	0.0013**
Number of long-distance calls	0.002**	0.0003**
Predicted probability at sample average		0.090

Notes: [1] Refers to those households that have one or more indirect service providers. [2] Coefficients with a statistical confidence interval below 90% are not reported and denoted by NS = not significant. For reported coefficients, the statistical confidence levels are indicated by asterisks, where * stands for statistical significance within a 10% interval, ** within a 5% interval, and *** within a 1% interval. [3] The marginal impact, dF/dx, represents the change in probability of a unit change in the independent variable, all other variables being held at sample average. dF/dx is for a discrete change in the dummy variable from 0 to 1, all other variables being held at sample average.

Overall, the modelling results suggest that the main drivers behind the decision to take IA are the variables linked to the price differentials between the incumbent operator and IA providers, and the composition of the bill.

7. Concluding Remarks

This paper offers an overview of preliminary results regarding consumer choice in fixed-telephony services. It contains both descriptive and econometric analysis of panel data comprising an initial sample of over 2,000 households in Great Britain. The panel study spans the eight quarters of 2000 and 2001, with data collection focusing on household consumption of and consumer attitudes to telecoms services.

Consumer behaviour and choice decisions, and in particular evidence on the switching of suppliers, are among the most important indicators of the competitive state of a market. The paper looks at consumer choice from two angles, acknowledging the particularities of competition in the fixed-telephony market: the consumer faces a first opportunity to choose between competing suppliers at the level of access to the network. The choice of fixed-line access supplier takes place essentially between the incumbent provider, BT, and a number of cable operators who often offer bundled telephony and television services. However, customer choice is also observed at a second level for the delivery of calls, where the incumbent BT is competing with a multitude of IA operators.

The evidence presented in the paper indicates that about 9% of households with cable availability responding to the survey switched over the period of the panel. The number of households who report that they have *ever* switched fixed-line access supplier lies at around 15% (22% if only those households with cable availability are considered). Regarding the use of IA operators for delivery of part or all of the calls made, around 13% of the panel sample made use of this alternative at the end of 2001. No evidence has been found that low-income households benefit less from competitive offers made by cable or IA operators than higher-income ones.

In order to identify the drivers behind consumer choice in fixed telephony, the results of two probit models are presented in this paper. The first model concentrates on household choice of fixed-line supplier, and finds that, subject to cable availability, the main determinants of switching are factors linked to cost savings. Another important role is played by alternative switching experiences in the energy market. Conversely, socio-demographic household characteristics—including, in particular, income—play a relatively small role in influencing switching of fixed-line provider.

The choice of one or several IA operators by a household for the delivery of calls is examined in the second probit model. The main conclusions from the model are similar to those drawn from the analysis of the choice of fixed-line provider. Cost differentials between BT and IA providers have a significant impact on the probability of choosing IA. In addition, bill composition and the number of long-distance calls made by a household are also revealed as important determinants of the choice of IA. Again, there is no evidence that socio-demographic characteristics and income play a statistically significant role in a household's decision to use IA.

Overall, the analysis presented in this paper suggests that consumers display a significant responsiveness to price differentials in the fixed-telephony market, when considering both the choice of fixed-line provider and the use of IA. This can be interpreted as a sign that consumers exercise competitive pressures on the market players. The calculation of significant marginal loss figures of an order of magnitude of several million pounds in response to small increases in the cost differential between BT prices and those of its competitors confirms this result. The switching of fixed-line supplier implies that all

revenue generated by a given household is lost to the incumbent supplier, while the choice of IA will lead to loss of call revenues

This paper is preliminary, and a number of issues raised herein deserve further analysis. A more detailed examination of the price sensitivity of consumers to call prices would be of particular interest in order to quantify the exact impact of call price changes on operator revenues.

Appendix: Description of Explanatory Variables

Variable	Description
Advance charges differential	Price differential between BT and cable for advance charges, as a percentage of BT advance charges. Advance charges defined as line-rental charges plus discount costs minus bundled calls. Data refer to Q3 2001.
Advance charges differential—previous period	As defined above. Data refer to Q3 2000.
Age	Age of head of household.
Availability of cable	1, if cable services are available for the household postcode. Information valid at March 2002.
Call price differential (BT – cable)	Averaged price differential between BT and cable for calls to mobiles, local and national. In percentage of BT price.
Call price differential (BT – IA)	Averaged price differential between BT and IA for calls to mobiles, local and national. In percentage of BT price.
Education level of head of household	1 = secondary school or earlier, 2 = higher education below university, 3 = university degree, 4 = professional qualification.
Employment status of head of household	1 = full-time, 2 = part-time, 3 = self-employed, 4 = unemployed, 5 = never worked, 6 = retired, 7 = student.
Household size	Number of persons.
Importance of cost savings	1, if cost saving is a ‘very important’ or ‘quite important’ reason for switching; 0 otherwise.
Importance of dissatisfaction with previous supplier	1, if dissatisfaction with previous supplier is a ‘very important’ or ‘quite important’ reason for switching; 0 otherwise.
Income category	Annual income of the household grouped in 10 categories: 1 = under £5,000, 2 = £5,000–£9,999, 3 = £10,000–£14,999, 4 = £15,000–£19,999, 5 = £20,000–£24,999, 6 = £25,000–£34,999, 7 = £35,000–£44,999, 8 = £45,000–£54,999, 9 = £55,000–£99,999, 10 = £100,000+.
Number of long-distance calls	Total number of long-distance calls made, per quarter. Long-distance includes national and international calls.
Share of long-distance calls in total call bill	Spending on long-distance calls as a percentage of total call bill of dual users, per quarter. Long-distance includes national and international calls.
Switched energy supplier	1, if respondent has changed energy supplier during the period of the panel; 0 otherwise.

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