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Satisfaction of business customers with mobile phone and internet services in Spain ☆

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ABSTRACT

Lately there has been a growing debate on the differences between business and residential telecom consumers. Yet, evidence on these differences is lacking. This study partially fills this gap by econometrically analyzing the drivers of satisfaction with mobile and fixed internet services for business clients in Spain. The results reveal that the factors that drive satisfaction for micro-enterprises and residential customers are similar, but the drivers of satisfaction for small and medium-sized enterprises (SMEs) are distinct. For example, alternative DSL operators outperform the incumbent for micro-enterprises, but not for SMEs. Overall, for both fixed internet and mobile services, operators with small market shares perform better than the incumbent, and business clients' satisfaction levels increase when they perceive that they can switch operators. Finally, subscribing to mobile and fixed bundles and dealing only with one telecom operator increase SMEs' satisfaction.

1. Introduction

Ample empirical evidence supports the idea that the diffusion of information and communications technology (ICT) services is an important driver of economic growth (Gruber, Hätönen, & Koutroumpis, 2014). For example, Czernich, Falck, Kretschmer, and Woessmann (2011), using Organization for Economic Co-operation and Development country level data compiled between 1996 and 2007, found that broadband adoption has a significant positive impact on national annual per capita growth, estimated at 0.9–1.5% for every additional 10% increase in broadband penetration. Similar results have been reported in other areas, like China (Kumar, Stauvermann, & Samitas, in press) or the Small Pacific Island States (Kumar, Kumar, & Patel, 2015). Moreover, a recent survey of the literature indicates that ICT services have also had a positive significant effect on business productivity (Cardona, Kretschmer, & Strobel, 2013). Hence, ICT services play a key role in entire industries and sectors.

Traditionally, regulatory bodies assumed that large commercial customers enjoyed high bargaining power, which largely reduced the risks of abuses from dominant telecommunications operators. However, the increased competition brought about by alternative networks (cable) and by local loop unbundlers in the residential segment, together with the economic

☆ The views expressed are entirely those of the authors and do not necessarily represent those of CNMC. The usual caveat applies.

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crisis, has highlighted the competitive problems faced by European enterprises, a market segment where incumbent operators still have an important stronghold, and has brought the traditional *laissez-faire* regulatory approach into question.

Combined with the well-established notion that digital markets must play a crucial role in the economic recovery of Europe (Gruber et al., 2014), this has resulted in electronic communications regulators' growing interest in the business segment. Several authorities have looked into the ways operators market their services to enterprises and questioned whether such offers cater adequately to their needs. National regulatory authorities (NRAs) such as the former Spanish Comisión del Mercado de las Telecomunicaciones (CMT, 2011) or the British Office of Communications (OFCOM, 2010) and private stakeholders such as WIK (Godlovitch, Monti, Schäfer, & Stumpf, 2013) have published studies that reflect on the differences between mass market and high-end users, focusing on the special needs of the latter, and emphasizing the importance of telecommunications services for national productivity. Unsurprisingly, the 2014 Explanatory Note of the European Commission (EC) Recommendation on Relevant Markets has for the first time distinguished the mass retail market from the high-quality retail market, also acknowledging differences in the related wholesale markets and, in this way, has opened the door to NRAs considering business and residential customers separately (European Commission, 2014).

Given these trends, an empirical study was conducted to identify the main drivers of satisfaction with mobile and fixed internet services in Spain for micro-enterprises, small and medium enterprises (SMEs), and large firms. When possible, the results were compared with the drivers of satisfaction for residential consumers to identify distinct competition and market conditions in each segment. The results can provide policy makers and telecom managers with insight into the business market.

This is the first study that deals with data on the drivers of business clients' satisfaction for both mobile and internet services. Gijón, Garín-Muñoz, Pérez-Amaral, and López-Zorzano (2013) published a study based on survey data from 2009 on the drivers of Spanish residential consumers' satisfaction with cell phone services. The present paper is based on a survey of business consumers carried out between 2010 and 2011 and deals with both mobile and fixed internet services. Therefore, some of the drivers of consumer satisfaction in the present study are firm-related.

The previous paper (Gijón et al., 2013) comprehensively reviewed the literature based on surveys from residential customers from 2000 to 2012, which mainly dealt with mobile services. They classified studies into two types: confirmatory studies[1] that test specific theories of consumer satisfaction (e.g., the American Customer Satisfaction Index model (ACSI) or the European Customer Satisfaction Index model (ECSI)) and exploratory models[2] that identify the drivers of consumer satisfaction without using a theoretical framework. Like Gijón et al., the present study sought to identify drivers without using a theoretical framework. The studies reviewed by Gijón et al. identified consumer satisfaction as the main determinant of customer loyalty and most found that the quality of service and the company's reputation are important drivers of consumer satisfaction. The few studies focused on fixed internet services also refer to residential customers, see for example the Federal Communications Commission report (FCC, 2010).

The present study provides insights into the key drivers of satisfaction with mobile and internet services in the business sector. Briefly, the main results are as follows. First, the paper corroborates the idea that micro-enterprises are similar to residential consumers, with similar satisfaction drivers for the mobile markets that differ from those of SME's. Second, when enterprises perceive that they can switch telecom operators easily, satisfaction levels increase. Third, in the internet market, alternative digital subscriber line (DSL) operators with small market shares outperform the incumbent for micro-enterprises. However, in the mobile market, where companies' market shares are more aligned, they do not. Finally, other factors that raise satisfaction levels are having a single telecom operator and subscribing to bundles of fixed and mobile services.

The rest of the paper is organized as follows. Section 2 presents the data used in this study. Section 3 describes the empirical models for business customers' satisfaction with mobile and fixed internet services, and Section 4 concludes.

2. The data

The data used for the empirical analysis were collected from December 2010 to February 2011 in a survey commissioned by CMT (now integrated within the Comisión Nacional de los Mercados y la Competencia, CNMC). The survey aimed to evaluate satisfaction with telecom services in the business segment through telephone interviews with company managers responsible for ICT contracts. The descriptive results of the survey were published by CMT (2011).

The sample consisted of 1511 companies representative of Spanish enterprises. It excluded telecom operators. As most Spanish enterprises are micro-enterprises (i.e., they have <10 employees) sample quotas were required to ensure a minimum number of enterprises of every size (micro-enterprises, SMEs, and large companies). Therefore, to produce unbiased estimates at the national level, sampling weights were derived by taking into account the size of the company, the economic sector, and the region where the company had its main premises.

[1] See Turel and Serenko (2006), Martensen, Gronholdt, and Kristensen (2000) and Vranakis, Chatzoglou, and Mpaloukas (2012).

[2] See Gerpott, Rams, and Schindler (2001), Kuo, Wu, and Deng (2009), Kim, Park, and Jeong (2004), Eshghi, Haughton, and Topi (2007), Leelakulthanit and Hongcharu (2011) and Khayyat and Heshmati (2012).

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In addition to measures of overall satisfaction, measures of satisfaction with price and customer service were collected for both mobile and fixed internet services on scales ranging from 1 to 5, where 1 corresponded to the lowest level of satisfaction and 5 to the highest.

Table 1 reports descriptive statistics for the sample. Note that the frequencies are unweighted but the percentages and means are weighted and should therefore be interpreted as being representative nationally. This table describes the companies' characteristics as well as the services they subscribed to and the operators they contracted.

Table 1 also provides the descriptive statistics for the variables related to satisfaction with mobile phone and fixed internet services; mean values ranged from 3.05 (satisfaction with mobile customer service) to 3.56 (overall satisfaction with fixed internet). Table 1 also reports the mean number of mobile lines per employee and fixed internet lines per employee, reflecting the intensity of companies' use of these services. The expenditures per employee for mobile and fixed services could be related to the number of lines contracted or the intensity of use of services, or to the characteristics and quality of services the companies contract (e.g., some companies employ high speed broadband or dedicated circuits). Differences in these expenditures could also reflect price dispersion or differences in companies' ability to negotiate better prices.

Other results deserve comment. For example, 73.6% of firms state they could switch providers if they wanted to (i.e., 26.4% could not). One reason for this is that the number of suppliers of specialist services some enterprises need is limited: not all operators offer them and in a few regions the number of competitors is low. In addition, 54.1% of companies contract mobile and fixed services from the same operator; however, only 13.9% contract these mobile services within a bundle (in particular, the variable "mobile bundle" takes the value 1 if the mobile service is bundled with any fixed service). Bundling

Table 1
Characteristics of enterprises and descriptive statistics.

Variable description (Variable name in the regression models)		Frequency	Percent
Firm size	Less than 10 employees	757	95.05
	10–49 employees	454	4.17
	50–199 employees	150	0.63
	200 or more employees	150	0.15
Type of activity	Industry	145	7.00
	Construction works	222	15.50
	Commerce	386	24.21
	Transport and communications	93	6.80
	Other services	665	46.49
The firm contracts mobile services		1369	83.17
The firm contracts internet services		1397	82.66
The firm declares having enough telecom supply alternatives		1040	73.62
The firm contracts a fixed-mobile bundle		378	13.93
The firm switched mobile provider in the last year (Mobile switch)		182	16.42
The firm faces termination penalty clauses in mobile contract (Penalty clauses)		1025	73.71
The firm contracts mobile broadband (Mobile broadband)		901	43.52
The firm switched fixed internet provider in the last year (Internet switch)		116	13.12
The firm benefits from fixed internet guaranteed speed (Guaranteed speed)		997	70.84
Same fixed and mobile provider		887	54.11
Mobile operator	Movistar	797	49.84
	Orange	178	18.21
	Vodafone	365	27.12
	Yoigo and VMO	29	4.83
Fixed internet operator	Movistar	1033	71.08
	Alternative DSL operators	211	17.64
	Business specialists	23	0.18
	Cable operators	111	11.11
		Frequency	**Mean**
Overall satisfaction with mobile service		1367	3.51
Satisfaction with mobile price		1359	3.33
Satisfaction with mobile customer service		1342	3.05
Overall satisfaction with fixed internet		1320	3.56
Satisfaction with fixed internet price		1090	3.39
Satisfaction with fixed internet customer service		1271	3.42
Mobile lines per employee		1511	1.70
Fixed internet lines per employee		1511	0.80
Mobile expenditure per employee, in euros per month (Mobile expenditure)		1369	49.89
Fixed expenditure per employee, in euros per month (Fixed expenditure)		1384	86.79

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Table 2
Variables by operator.

	Mobile service				Fixed internet service			
	Movistar	Vodafone	Orange	Yoigo and VMO	Movistar	DSL operators	Business specialists	Cable operators
Satisfaction								
Overall	3.55	3.37	3.45	4.08	3.43	3.78	4.04	3.97
Price	3.28	3.28	3.43	3.72	3.25	3.81	4.45	3.66
Customer service	3.01	2.97	3.13	3.59	3.30	3.59	3.94	3.77
Lines and expenditures per employee								
Mobile lines	2.06	2.06	2.04	1.80	–	–	–	–
Mobile expenditure, in euros per month	54.32	47.61	46.92	28.14	–	–	–	–
Internet lines	–	–	–	–	0.97	0.92	0.27	1.18
Fixed expenditure, in euros per month	–	–	–	–	91.11	78.13	302.88	70.28

Table 3
Correlations between satisfaction indices.

Mobile overall	1					
Mobile price	0.698	1				
Mobile customer service	0.651	0.583	1			
Fixed internet overall	0.310	0.281	0.215	1		
Fixed internet price	0.261	0.259	0.117	0.697	1	
Fixed internet customer service	0.298	0.278	0.347	0.651	0.545	1

typically entails a discount with respect to the sum of the prices of its components. In 2011 bundles of fixed services such as broadband, voice, and access were common in Spain, but bundles comprising fixed and mobile services were not generally commercialized,[3] and usually only large customers could obtain these discounts.

Table 2 reports the satisfaction variables by operator. Overall, in the mobile market satisfaction was greater for late entrants such as Yoigo and the virtual mobile operators (VMOs) and in the fixed internet market for cable operators and companies specializing in services for businesses.[4] Cable and specialist operators supply fixed internet services through alternative networks rather than through the incumbent' network.[5] However, whereas cable operators serve any kind of customer, business specialists do not serve residential consumers. Yoigo and the VMOs entered the mobile market later than the other network operators (Movistar, Orange, and Vodafone); however, whereas Yoigo is a network operator (although it does not have national coverage and relies on roaming agreements in some zones), VMOs rely entirely on wholesale services to deliver their services to the public. The sample sizes do not allow treating the two types of operators separately, but the similarities between them suggest that it is reasonable to group them: they are all latecomers, did not operate in fixed markets at the time of the study, were characterized by offering cheaper services, and relied partially or entirely on wholesale services.

Finally, as expected, correlations among satisfaction indices within the same type of service were relatively high (roughly 0.6–0.7), but correlations among satisfaction indices between mobile and fixed internet services were lower (roughly 0.1–0.3). This shows that enterprises differentiate between their satisfaction with each type of service, and that there is no overall firm effect on the satisfaction variables (Table 3).

3. Empirical models for business customer satisfaction

This section examines the determinants of satisfaction for mobile and fixed internet services (overall satisfaction, satisfaction with prices, and satisfaction with customer service). Compared to residential customers, business customers are highly heterogeneous in their demands. For example, large multisite firms may request tailor-made offers including specialized connections, further quality guarantees, or complementary goods such as information technology services and support. In addition, they differ from residential customers in that some of them have a one-to-one relationship with providers and have greater bargaining power. For instance, according to the descriptive results published by CMT (2011),

[3] This situation has since changed dramatically. According to CNMC from the fourth quarter of 2014, over 40% of fixed voice lines in Spain were contracted bundled with mobile services (CNMCData, 2015).

[4] Some examples of these business specialists in the Spanish fixed internet market are British Telecom (BT), Colt, and Verizon. These operators mainly focus on tailor-made products demanded by companies with intensive and complex requirements for data transmission services.

[5] Although cable operators and business specialists do not have a fixed network that covers all the Spanish territory.

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whereas only around 40% of micro-enterprises contact more than two operators when they search for services, over 60% of larger enterprises do. Similarly, only about 50% of micro-enterprises negotiate better offers with their telecom providers, but over 85% of large companies do.

For these reasons, micro-enterprises (<10 employees), SMEs (from 10 to 199 employees), and large enterprises (200 or more employees) were analyzed separately[6] to determine whether the drivers of satisfaction differ in function of the size of the business client, given their differences in access to suppliers and distribution channels (operators serving micro-enterprises focus mainly on the mass market, whereas specialized operators serve more complex needs).

Therefore, for each firm size, a linear relationship between each satisfaction variable and its possible determinants was estimated by ordinary least squares (OLS). The satisfaction variables ranged from 1 to 5 and were treated as continuous because OLS coefficients are directly interpretable and allow the results to be compared with those of other recent studies (Gijón et al., 2013). However, since the satisfaction variables are ordinal, the OLS analysis was complemented by fitting ordered logit and ordered probit regressions. The results of these analyses corroborate those presented here and are available upon request.

Finally, for each model, robust standard errors and selected summary statistics (e.g., *F*-test of joint significance, coefficient of determination, number of observations, and the maximum variance inflation factor (VIF)) are provided.

Overall, all the models perform well with the exception of the models for large firms, where for example the mobile customer service satisfaction model is not statistically significant. This result is unsurprising as the number of observations available for the large firm models were small (around 100 observations). Nonetheless, for the sake of completeness, these results are included in the tables, although the discussion focuses on micro-enterprises and SMEs (where the number of observations exceeds 500).

Similarly to previously reported results (Gijón et al., 2013), the coefficients of determination were roughly between 0.1 and 0.3, and overall VIF values remained below the recommended cutoff of 5.[7]

3.1. Satisfaction with mobile services

For mobile services (mobile voice and short message service (SMS)), the following variables were included in the models: mobile operator (Movistar, the reference category,[8] Orange, Vodafone, and late entrants (Yoigo and VMOs)), sector (where commerce is the reference category), number of mobile lines per employee, and mobile expenditure per employee (in euros per month) and its square.[9] Additionally, a series of binary variables were included: whether the enterprise contracted mobile broadband, contracted a fixed-mobile bundle, switched mobile provider during the previous year, had a termination clause in its mobile contracts, had enough telecom supply alternatives, and had the same provider for fixed and mobile services. To control for heterogeneity across different autonomous regions, sixteen dummies and a constant were used in each model (results not shown in the table).[10] Table 4 provides the results of the nine models for satisfaction with mobile services.

For micro-enterprises and SMEs, overall satisfaction with latecomers (Yoigo and VMOs) was greater than with Movistar, and there was no significant difference between Movistar and the other established network operators. Gijón et al. (2013) reported similar findings for residential consumers.

Moreover, in both micro-enterprises and residential consumers there is a U-shaped relationship between overall satisfaction and expenditure; in other words, for lower values, satisfaction decreases with expenditure, while for higher values, satisfaction increases with expenditure. By contrast, for SMEs, expenditure does not seem to affect satisfaction levels, and for large companies the effect is statistically significant but of the opposite sign.

Similarly, for micro-enterprises, the larger the number of mobile lines per employee, the lower their overall satisfaction; however, for SMEs, the opposite is true. The regressions for satisfaction with price and customer service yielded the same results. One reason is that, unlike SMEs, micro-enterprises cannot benefit from quantity discounts when they contract several lines, and contracting several lines can also imply better service (e.g., specialized customer service). The CMT contested Movistar's aggressive discounts for heavy users, bringing proceedings against it for alleged infringement of regulatory obligations.[11]

Interestingly, both micro-enterprises and SMEs were more satisfied with prices when they contracted mobile services bundled with fixed services, possibly due to discounts associated with bundled products.

Another powerful determinant of satisfaction on all three dimensions (overall, price, and customer service) and for all three types of firms was having enough telecom alternatives, for which statistically significant coefficients ranged roughly between 0.4 and 0.8.

[6] In the models for SMEs, to capture size effects, a dummy variable was included; this dummy variable takes the value 1 for companies with 50–199 employees and 0 otherwise.

[7] In the case of large firms, the quadratic term of the expenditure variables was eliminated to avoid VIF values that would otherwise be larger than 10.

[8] Movistar was chosen as the reference category in all models, as this company is the incumbent and the one with largest market share in all markets.

[9] This variable was introduced to capture potential nonlinear effects of expenditure on satisfaction.

[10] For large companies, only a constant term was added due to the limited size of the sample for this group.

[11] Among the ex-ante obligations imposed on Movistar, CMT included the obligation that Movistar set retail prices that were economically replicable by its rivals using wholesale offers.

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Table 4
Mobile satisfaction determinants.

Explanatory variables		Overall mobile service			Mobile price			Mobile customer service		
		Micro-enterprises	SME	Big enterprises	Micro-enterprises	SME	Big enterprises	Micro-enterprises	SME	Big enterprises
Operator (ref.: Movistar)	Orange	−0.092 (0.185)	−0.065 (0.207)	−0.430 (0.369)	0.110 (0.172)	−0.048 (0.196)	−0.218 (0.352)	0.355 (0.220)	−0.079 (0.278)	−0.336 (0.361)
	Vodafone	−0.264 (0.166)	0.155 (0.137)	0.244 (0.241)	−0.153 (0.145)	0.166 (0.145)	0.374* (0.207)	0.055 (0.186)	0.116 (0.186)	0.298 (0.222)
	Yoigo and MVO	0.523** (0.264)	0.415** (0.193)	–	0.238 (0.273)	0.394 (0.255)	–	0.796** (0.306)	0.322 (0.294)	–
Firm size (ref.: 10–49)	50–199 employees	–	0.315*** (0.094)	–	–	0.345*** (0.098)	–	–	0.630*** (0.124)	–
Type of activity (ref.: Commerce)	Industry	0.105 (0.286)	−0.310** (0.129)	−0.526 (0.371)	0.194 (0.194)	−0.184 (0.130)	−0.647* (0.334)	−0.210 (0.280)	−0.283 (0.177)	−0.550 (0.347)
	Construction works	0.159 (0.145)	−0.153 (0.121)	−0.060 (0.262)	0.201 (0.142)	−0.155 (0.132)	0.307 (0.288)	0.338** (0.171)	−0.089 (0.177)	−0.264 (0.477)
	Transport and com.	0.043 (0.250)	−0.082 (0.192)	−0.154 (0.290)	−0.139 (0.259)	−0.009 (0.147)	−0.379 (0.320)	−0.195 (0.272)	−0.126 (0.265)	−0.341 (0.320)
	Other	0.045 (0.115)	−0.276*** (0.092)	−0.083 (0.191)	0.082 (0.113)	−0.149 (0.105)	−0.114 (0.208)	−0.182 (0.145)	−0.267* (0.146)	−0.252 (0.235)
Mobile lines per employee		−0.039*** (0.012)	0.235*** (0.088)	−0.003 (0.106)	−0.029*** (0.011)	0.249*** (0.094)	0.021 (0.121)	−0.024* (0.012)	0.255** (0.105)	0.008 (0.121)
Mobile expenditure		−0.004** (0.002)	0.0003 (0.001)	0.001** (0.001)	−0.004 (0.002)	−0.0002 (0.001)	0.002** (0.001)	−0.004 (0.003)	0.002 (0.001)	−4.24e-05 (0.001)
Mobile expenditure squared		9.52e-06** (4.50e-06)	−7.93e-08 (8.52e-07)	–	1.47e-06 (5.07e-06)	3.88e-07 (9.20e-07)	–	9.14e-06* (5.44e-06)	−1.31e-06 (1.20e-06)	–
Mobile broadband		0.032 (0.111)	−0.096 (0.110)	0.151 (0.226)	−0.030 (0.105)	−0.178 (0.108)	0.234 (0.218)	0.126 (0.130)	−0.067 (0.145)	−0.302 (0.291)
Firm contracts a fixed-mobile bundle		0.224 (0.162)	0.074 (0.090)	0.284 (0.205)	0.300** (0.148)	0.220** (0.091)	0.100 (0.201)	0.066 (0.195)	0.250** (0.126)	0.155 (0.233)
Mobile switch		−0.076 (0.140)	−0.264* (0.147)	−0.280 (0.370)	−0.074 (0.134)	−0.383*** (0.146)	−0.344 (0.347)	−0.164 (0.170)	−0.187 (0.177)	−0.557 (0.399)
Penalty clauses		0.135 (0.115)	−0.036 (0.106)	−0.207 (0.191)	0.082 (0.108)	0.128 (0.105)	−0.074 (0.209)	0.072 (0.150)	−0.126 (0.135)	−0.075 (0.238)
Firm has enough supply alternatives		0.672*** (0.112)	0.521*** (0.101)	0.411* (0.208)	0.638*** (0.111)	0.520*** (0.101)	0.454* (0.232)	0.662*** (0.140)	0.863*** (0.128)	0.423* (0.249)
Same fixed and mobile provider		−0.034 (0.144)	0.046 (0.122)	−0.135 (0.309)	−0.022 (0.138)	0.030 (0.132)	−0.042 (0.217)	0.244 (0.163)	0.106 (0.167)	0.016 (0.228)
F (*p*-value)		3.82 (p < 0.001)	2.87 (p < 0.001)	1.82 (p=0.0438)	4.94 (p < 0.001)	3.10 (p < 0.001)	2.04 (p=0.0206)	3.32 (p < 0.001)	4.34 (p < 0.001)	0.91 (p=0.5494)
R^2		0.1807	0.1702	0.1441	0.1856	0.1794	0.1901	0.1640	0.1778	0.0961
n		600	550	131	596	546	130	582	547	129
Max VIF		4.94	3.65	2.36	5.01	3.62	2.36	4.96	3.63	2.34

Notes: In parenthesis robust std. error.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

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Table 5
Fixed internet satisfaction determinants.

Explanatory variables		Overall internet service			Internet price			Internet customer service		
		Micro-enterprises	SME	Big enterprises	Micro-enterprises	SME	Big enterprises	Micro-enterprises	SME	Big enterprises
Operator (ref.: Movistar)	DSL operators	0.222* (0.133)	0.031 (0.151)	−0.348 (0.308)	0.409*** (0.155)	−0.359 (0.223)	0.015 (0.458)	0.072 (0.167)	0.258 (0.163)	0.261 (0.385)
	Business specialists	–	1.026*** (0.299)	−0.100 (0.397)	–	1.234*** (0.262)	0.114 (0.395)	–	1.251*** (0.286)	0.423 (0.427)
	Cable operators	0.506*** (0.155)	0.597*** (0.175)	0.355 (0.256)	0.282* (0.167)	0.994*** (0.215)	0.468 (0.322)	0.330* (0.19)	0.892*** (0.211)	0.990*** (0.283)
Firm size (ref.: 10–49)	50–199 employees	–	0.200* (0.114)	–	–	0.224 (0.138)	–	–	0.224* (0.129)	–
Type of activity (ref.: Commerce)	Industry	−0.243 (0.254)	0.108 (0.132)	−0.533 (0.353)	−0.041 (0.260)	0.029 (0.169)	0.548 (0.452)	−0.294 (0.286)	0.056 (0.149)	−0.725* (0.409)
	Construction works	−0.053 (0.159)	−0.004 (0.125)	0.226 (0.307)	−0.132 (0.161)	−0.291* (0.169)	0.900 (0.669)	0.118 (0.169)	−0.085 (0.153)	−0.165 (0.461)
	Transport and com.	−0.398** (0.198)	−0.033 (0.198)	−0.272 (0.315)	−0.021 (0.250)	0.493*** (0.183)	1.237** (0.516)	−0.101 (0.227)	0.111 (0.270)	−0.381 (0.378)
	Other	0.120 (0.113)	−0.018 (0.107)	−0.204 (0.281)	0.082 (0.120)	−0.181 (0.138)	0.470 (0.443)	0.162 (0.134)	−0.082 (0.123)	−0.409 (0.337)
Internet lines per employee		0.015 (0.051)	0.499*** (0.189)	0.448 (0.571)	−0.074 (0.075)	0.242 (0.288)	2.096 (1.304)	0.102 (0.08)	0.379 (0.268)	0.339 (0.662)
Fixed expenditure		0.002** (0.001)	−0.0003 (0.0002)	−3.30e−06 (8.00e−05)	0.0005 (0.001)	−0.0007** (0.0003)	−7.65e−05 (5.37e−05)	0.0009 (0.001)	−0.0003 (0.0003)	9.19e−05 (7.78e−05)
Fixed expenditure squared		−9.72e−07* (4.99e−07)	4.78e−08 (4.27e−08)	–	−1.13e−07 (5.94e−07)	1.07e−07* (6.15e−08)	–	−2.70e−07 (5.90e−07)	4.83e−08 (5.52e−08)	–
Guaranteed speed		0.431*** (0.115)	0.397*** (0.103)	−0.043 (0.258)	0.423*** (0.126)	0.555*** (0.120)	0.741* (0.380)	0.267** (0.127)	0.380*** (0.117)	0.272 (0.372)
Internet switch		0.191 (0.164)	−0.285 (0.204)	−0.109 (0.289)	0.227 (0.187)	−0.528** (0.240)	0.667** (0.300)	0.136 (0.170)	−0.401* (0.217)	−0.685* (0.365)
Firm has enough supply alternatives		0.435*** (0.116)	0.610*** (0.107)	0.394* (0.201)	0.507*** (0.124)	0.661*** (0.117)	0.276 (0.303)	0.650*** (0.126)	0.684*** (0.123)	0.236 (0.263)
Same fixed and mobile provider		−0.072 (0.102)	0.189* (0.103)	−0.145 (0.204)	−0.067 (0.116)	0.017 (0.118)	0.107 (0.264)	0.037 (0.118)	0.389*** (0.123)	0.396 (0.287)
F (*p*-value)		4.52 ($p < 0.001$)	4.32 ($p < 0.001$)	1.70 ($p = 0.0727$)	3.77 ($p < 0.001$)	5.47 ($p < 0.001$)	3.29 ($p < 0.001$)	5.34 ($p < 0.001$)	3.90 ($p < 0.001$)	2.27 ($p = 0.0112$)
R^2		0.2265	0.2382	0.1768	0.2009	0.3178	0.2645	0.2229	0.2218	0.1772
n		582	516	115	526	392	76	549	500	117
Max VIF		2.91	4.10	2.60	3.18	4.72	2.59	3.01	4.12	2.62

Notes: In parenthesis robust std. error.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

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It is also noteworthy that termination clauses in mobile contracts had no effect on satisfaction. Finally, there was no clear pattern of differences between sectors in terms of satisfaction with mobile services, and this finding is consistent with a coherent commercial policy targeting high value customers regardless of the sector to which they belong.

3.2. Satisfaction with fixed internet services

The models for fixed internet service included the following variables: fixed internet operator (Movistar, the incumbent and reference category; alternative DSL operators; business specialist operators; and cable operators), sector (where commerce was the reference category), number of internet lines per employee, and fixed expenditure per employee (in euros per month) and the square of this variable.[12] Several binary variables were included as regressors: whether the operator guaranteed internet speed, the firm switched internet providers during the last year, the firm had enough telecom supply alternatives, and the firm had the same provider for fixed and mobile services. To control for heterogeneity across autonomous regions, 16 dummies and a constant were used in each model.[13] Table 5 provides the results of the nine models for satisfaction with fixed internet services.

The impact of operators on business clients' satisfaction differs between micro-enterprises and SMEs. Micro-enterprises expressed greater overall satisfaction and satisfaction with prices for alternative DSL and cable operators than for the incumbent operator. By contrast, SMEs' satisfaction indices were not significantly higher for alternative DSL operators, but all the satisfaction variables were significantly higher for operators who mainly rely on their own network (and on the leased lines of Movistar), such as cable and specialist operators.[14] In particular, the coefficient of specialist operators is large, greater than 1. This result is due to the distinct needs of larger companies, and reflects the difficulties of alternative DSL operators who rely on regulated wholesale broadband access services to compete for these customers and have designed their network to provide services for the mass market.

Interestingly, in the mobile models, where the market shares of the three largest operators are similar, no significant differences in satisfaction were found between the incumbent (Movistar) and Vodafone and Orange. By contrast, in the fixed internet market, micro-enterprises expressed greater satisfaction with Vodafone and Orange (who have low market shares relative to Movistar[15]). This suggests that these two operators try to gain fixed internet consumers by boosting micro-enterprises' consumer surplus, either by lowering prices or increasing quality levels. However, in the mobile market, where their market shares are more aligned with the incumbent's, these companies seem to behave differently.

Micro-enterprises and SMEs have different needs: micro-enterprises demand standard quality internet connections (like residential connections), but SMEs demand packages of services including complex connections, quality guarantees, and complementary services. Nevertheless, all types of firms value quality-of-service agreements such as guaranteed speed for fixed internet.

The differing results in the SME and micro-enterprise models are probably related with the different needs of these types of company. For micro-enterprises, the number of internet lines had no impact on overall internet satisfaction, whereas for SMEs more lines per employee were associated with greater satisfaction, possibly because broadband access may be more productive in SMEs.

The impact of fixed expenditure per employee on satisfaction levels also differed with company size. For micro-enterprises, the effects were significant and the relationship had an inverse U shape (i.e., at low levels of expenditure per employee, increasing expenditure increased satisfaction, but at high levels of expenditure the opposite occurred). However, for SMEs this variable had no effect on overall satisfaction.

In Spain, fixed internet services are nearly always bundled with other services (mainly fixed telephony). Interestingly, among SMEs overall satisfaction was higher in companies with the same provider for fixed and mobile services than among those with different providers, and this effect is even stronger in terms of satisfaction with customer service. Thus, having a single telecom operator and therefore a single customer service agent could benefit SMEs.

Finally, having enough supply alternatives is a powerful determinant of internet satisfaction and the type of the activity does not show a clear pattern in terms of fixed internet satisfaction.

4. Conclusions

This study has revealed several drivers of Spanish enterprises' satisfaction with their telecommunications services, identifying the similarities and differences between such drivers for two types of activities (fixed internet and mobile services) and between micro-enterprises and SMEs.

[12] This variable was introduced to capture potential nonlinear effects of expenditure on satisfaction.

[13] Again, in the case of the big companies only a constant term was added due to the limited size of the sample for this group.

[14] These operators do not cater for the needs of micro-companies and are not included in the micro-firm regressions.

[15] Vodafone and Orange provided around 70% of the lines offered by alternative DSL operators. Their combined market share was just over 10% of internet lines, compared to 71% for Movistar. By contrast, in the mobile market the combined market share of Vodafone and Orange was 45%, compared to 50% for Movistar.

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The availability of enough supply alternatives (i.e., the perception of competition in the market) is a key driver for all the satisfaction variables for companies of all sizes.

For micro-enterprises, the relationship between expenditure and overall satisfaction differs between mobile service (U form) and fixed internet service (an inverse U form). For low values of expenditure, increasing expenditure for internet may improve the quality of access (more speed, more capacity, and others), but increases in expenditure for mobile services can bring only limited improvement because the services contracted are usually homogeneous (voice and SMS).

Interestingly, for mobile services, the results for micro-enterprises are completely aligned with residential clients' results obtained by Gijón et al. (2013), confirming the idea that micro-enterprises' needs and satisfaction are similar to those of residential customers. Unfortunately, data on satisfaction drivers for internet services for residential consumers is lacking, precluding comparison with the findings of this paper for micro-enterprises. However, the differences in the drivers of satisfaction between micro-enterprises and SMEs show that the business market for internet services is not homogenous.

In conclusion, given the differences between types of business consumers, European NRAs should consider whether differential regulatory intervention is necessary. Indeed, the EC's "Recommendation on relevant markets within the electronic communications sector susceptible to ex ante regulation" already includes a wholesale market for high-quality access provided at a fixed location. In Spain, the CNMC recently published a proposal[16] to differentiate between mass and business markets for internet that considers the need to impose a special wholesale access obligation on the significant market power operator to enable other companies to cater to the specific needs of business customers (symmetric capacity, higher key performance indicators, etc.). Moreover, SMEs and micro-enterprises differ in which operators achieve higher satisfaction values than the incumbent. Alternative DSL operators outperform the incumbent for micro-enterprises, but do not for SMEs. Clearly, in the SME segment these operators who rely on local loop unbundling and regulated bitstream services are not as well positioned as operators who have deployed their own networks. These operators, in particular Vodafone and Orange, outperform Movistar for fixed internet services but not for mobile services; this difference could be related to their smaller share of the fixed internet market and need to compete for new customers in contrast to the mobile market where their market shares are similar to that of Movistar.

Recently, the EC imposed remedies in three mergers of mobile operators in Europe,[17] resulting from a finding that they would lead to a substantial impediment to effective competition, even if they would not necessarily lead to dominance or coordinated effects. In those so-called "gap cases" the EC argument is, in part, that small companies have a positive influence on competition as they are more aggressive in trying to gain market share. The results are consistent with this viewpoint as it is argued that Vodafone and Orange offer better deals to gain clients (resulting in higher satisfaction levels) precisely in the markets where they have a smaller presence.

Finally, for SMEs, fixed and mobile bundles and having a single operator for fixed and mobile services were related to better satisfaction outcomes. These two results are especially relevant for both European and Spanish markets, where there is ongoing consolidation, as they suggest room for improvement in business clients' satisfaction levels, on top of any potential cost synergies that may benefit the companies. Provided there is enough competition within the telecom market, the fact that convergent bundles and having a single operator for all services increases SMEs' satisfaction could favor a benign view of some mergers in the telecom sector.

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[16] See the public consultation (only Spanish version available): http://www.cnmc.es/Portals/0/Notas%20de%20prensa/20141219_ProyectoMedida.pdf

[17] These cases are: case M.6497, Hutchinson 3G Austria/Orange Austria, 12 December 2012, case M. 6996, Hutchinson 3G UK/Telefonica, 28 May 2014, and case M.7018, Telefonica Deustchland/E-Plus, 2 July 2014.

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