Computing abuse related damages in the case of new entry: An illustration for the Directory Enquiry Services market[*]

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November 2005

Abstract

A number of European countries, among which the UK and Spain, have opened up their Directory Enquiry Services (DQs, or 118AB) market to competition. We analyse the Spanish case, where both local and foreign firms challenged the incumbent as of April 2003. In this paper, we argue that the incumbent had the ability to abuse its dominant position, and that it was a perfectly rational strategy. In short, we allege that the incumbent raised its rivals' costs directly by providing an inferior quality version of the (essential) input, namely the incumbent's subscribers' database. In addition, we illustrate how it is possible to quantify the effect of abuse in situation were the entrant has no previous history in the market. To do this, we use the UK experience to construct the relevant counterfactual, that is the "but for abuse" scenario. Taking the UK as a reference probably results in underestimating damages, since competitive and regulatory conditions

in the UK made entry more difficult. After controlling for relative prices and advertising intensity, we find that one of the foreign entrants achieved a Spanish market share of only half of what it should have been in the absence of abuse. We claim that this difference to the quality deterioration induced by the abuse.

JEL classification:

Keywords: .

1. Introduction

The European Union has initiated the liberalisation and opening up to competition of telecommunications through the adoption of a series of Directives which has been shouldered by the publication of green papers and recommendations. Typically, this liberalisation process involves setting timetables that set a deadline for complete market opening, with an allowance being made for Member States being able to liberalise ahead of the deadline. Liberalisation affected distinct services at different moments in time; for instance, data transmission and mobile telephony were opened up to competition early on, while fixed line voice telephony was liberalised later on. In practical terms, one of the last telecom services to be effectively liberalised are Directory Enquiries (DQs) over the telephone networks. The latter service has traditionally been provided by the incumbent under a regulated monopoly regime. Calls to a single universal number would give access to an operator that would provide the phone number of a physical or legal subscriber. The same kind of services was also available, at much higher prices, for international DQs. That was made possible by a series of international agreements that involved setting a single protocol for international DQs between members of the International Telecommunications Union.

Two large markets, the UK and Spain, were respectively effectively opened to competition in December 2002 and April 2003. The UK market was considered one of the most attractive, as the total number of DQ calls was estimated to

be about 600 million per year prior to liberalisation. Both UK and non-UK firms entered the market to challenge the incumbent, British Telecom (BT). In Spain, a similar entry pattern is observed, with two non-Spanish firms challenging the incumbent Telefónica de España and its subsidiary, TPI as of April 2003. Further entry by local firms followed, while the Telefónica group later launched an additional brand.

The objective of the paper is to assess whether the Telefónica group abused its dominant position in the DQ market by impeding the entry of new competitors. While the concept of abuse of dominance has been under discussion over the last few years, its application is straightforward in the case analysed in this paper. There is no doubt that the incumbent enjoyed a dominant position at the time when the market was effectively opened to competition. In addition, the conduct imputed to Telefónica does not fall into "grey area actions" that may be considered pro-competitive in a different situation. In the present context, the evidence is consistent with the claim that Telefónica allegedly raised its rivals costs and arguably made entry more difficult by deteriorating the quality of an input that ought to have been made available for free, namely the database containing information pertaining to fixed line (PSTN) subscribers. As will be described further on, we believe that Telefónica's strategy was both implementable and profit maximising.

The remainder of this paper proceeds as follows: section 2 briefly describes the technological characteristics of DQ services provision and drivers of demand. Section 3 provides a conceptual rationalisation of the incumbent's behaviour and makes explicit predictions regarding the market share of entrants submitted to aggressive behaviour by highlighting the importance of search costs. Section 4 quantifies damages by using the UK experience to construct the "but for" scenario.

2

Section 5 concludes.

2. Supply and demand characteristics

The basic input required to provide DQ services is the database pertaining to fixed line subscribers. The latter are, principally, households, firms, and public administrations. In the case of Spain, and in accordance with EU rules on cost orientation, the incumbent was supposed to provide this data for free in a ready to use standardised format to all entrants that met the relevant regulatory requirements. In addition to the phone number(s), the database had to include additional information such as postal address as well as fax number(s) whenever applicable. From a commercial perspective, intelligent network numbers (90X or 80X) are particularly relevant, since they the fall into the category of "Frequently Used Numbers" (FUNs), i.e. they represent a large proportion of DQ enquiries.

For an agent that does not own a network, the second necessary input is access to the network so that enquiries to a given 118AB number end-up being directed to the pertinent call center. Once routed to a centre, the call is put in a queue before being answered by an operator that uses a search engine to extract the relevant information from a database. Once the enquiry is completed, the operator may offer "call termination", that is to connect the caller to the number that was sought. This activity is highly profitable as the per second rate that applies to this extension of the call is the same as that of the original call to a 118AB (which is well above a normal fixed line call). Call termination is an example of value added service provided by DQ operators; others include the provision of additional information such as e-mail, opening times of commercial estblishments, or SMS delivery of the number. While the basic technology is pretty standard, firms can develop tools to improve upon existing search engines.

In addition, part of the operators' job can be mechanised (e.g., an artificial voice reciting the sought after number). Note that once the basic operation has been set-up, a DQ service provider is not faced with capacity constraints, save in the very short-run. It is indeed easy to attend a growing number calls, either by hiring more operators or by subcontracting part of the activity to a third party.

Prior to liberalisation, DQ services did not include value-added services and were typically provided by the incumbent monopoly operator at a regulated price. Basic DQ services may be considered as forming part of universal service obligations that have to be maintained by incumbent operators. As a consequence, Spanish authorities decided to maintain a basic DQ service at a regulated price to be provided by the incumbent, Telefónica. In principle, the market was opened to entry for licensed operators in April 2002. For a period of one year, the old regulated number (1003) was to co-exist with commercial 118AB numbers. In practice, the incumbent ensured that entry was impeded while 1003 still existed. However, during this period, the Telefónica Group launched two numbers of its own in February 2003. The first (11888) was introduced by its fully controlled subsidiay, TPI. The second (11818) was launched by Telefónica as a direct substitute for 1003 as the new regulated service. In the UK, a similar path was chosen: following liberalisation in December 2002, the old regulated number provided by BT (192) was maintained until the end of August 2003; thereafter both the old number and regulated services disappeared altogether. The difference between Spain and the UK is that effective entry was possible for non-incumbent firms during the parallel running of the old number and the new commercial ones.

At first sight, the product may appear as homogeneous: a call to a 118AB provider aimed at obtaining a subscriber's telephone number. In practice, the products are differentiated, both horizontally and vertically. In terms of quality,

DQ providers differ in terms of the accuracy of the information they provide (see for instance, OFCOM 2003 & 2004). Some providers offer compensation for providing inaccurate and/or incomplete information, or offer to call back for free if they are unable to provide the information on the spot. In addition, the speed at which an enquiry is being dealt with may differ across providers, for instance because of the time spent queuing before being attended by an operator. In the industry's jargon, "Service Levels" refer to the time spent queuing while "Average Handling Time" is the average number of seconds that are effectively charged on a call. Since the price effectively charged is usually formed by a two part tariff (a fixed fee for connection plus a per second fee), quality adjusted prices may differ across two operators that offer the service with the same tariff structure (as AHTs may differ).

Since the new DQ umbers were unknown to the public, the opening of the market was accompanied by intensive advertising campaigns to promote brand recognition. In that respect, it is worth mentioning that in the UK, the advertising campaign pursued by the one of the new entrants (The Number) acquired something close to "cult status" and received various advertising awards. Even after the initial launch period, advertising remains important to maintain number awareness (i.e., aimed at ensuring that actual or potential customers remember the 118AB number being advertised). In addition, advertising has resulted in product differentiation, either by stressing superior quality in terms of accuracy and speed, or by announcing lower prices, or a combination of both. The degree of differentiation may be real or perceived; what is however clear is that market shares do respond to advertising, if only because the latter maintains number awareness.

Despite the fact that there is no significant difference between the technology

used in the UK and Spain, that entrants adopted similar strategies in each of these markets, and that there is no a priori reason to believe that there exist marked divergences in terms of consumer behaviour, the evolution of market structure has been quite different across the two countries. In the UK, although the number of licensed operators is very large, the market quickly evolved into an oligopoly dominated by The Number and BT. These two firms account for about 80% of the market, while the remainder is shared among smaller operators. Among the fringe, three operators nonetheless enjoy a significant market share: Yell, Maureen, and Conduit. The striking characteristic of the UK market is that the largest operator is not the incumbent: BT's market share is estimated at 35%, while The Number's stands at about 45%.[1] Given Spain's less extensive market, the number of active operators with a significant market share is smaller. The main difference with the UK is reflected in the dominance still enjoyed by the Telefónica group. The latter offers three products: a regulated one (11818), and two commercial ones (11822 and 11888). 11822 is provided by Telefónica de España, while 11888 marketed by its fully controlled subsidiary TPI (Telefónica Publicidad e Información). As can be seen from Table 1, the data provided by the industry regulator CMT (Comisión del Mercado de las Telecomunicaciones) indicate these three brands accounted for more than 81% of the market at the end of 2003.[2] During 2004, that dominance was maintained, with the three Telefónica brands still accounting for more than 79% of market revenue. Apart from a change in the relative position of the smaller operators over the period, it is also worth noting that while the overall market share of the Telefónica group has barely changed, there has been a migration from

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[1]Industry regulator OFCOM does not provide information on market shares. The UK figures appearing in the text have been obtained from the press (BBC online) and speciliased information providers (e.g. 118tracker).

[2]This holds irrespective of whther market size is approximated by number of calls, total minutes, revenue, or total number of enquiries (the latter may differ from total calls as a single call may result in two or more enquiries).

the regulated number (11818) towards the commercial ones (11888 and 18822).The rise of TPI's number (a Telefónica subsidiary) has been particularly spectacular: its share of market revenue jumped from 29.5% to 49.1% over one year. It is worth pointing out that this number (11888) is also the most expensive among the main commercial ones.

Insert Table 1 about here

3. Rationality of the alleged abuse

One of the new entrants on the Spanish market asked us to quantify the possible damages resulting from the incumbent's actions. For the remaimder of this paper, we will refer to this firm as "the entrant". In what follows (and in line with Spanish legal practice), we will refer to the direct costs as the ones that can be precisely quantified and that are directly related to the abuse. The indirect damages stem from the quantifiable additional loss of profits that resulted from the incumbent's actions.

Our central claim is that Telefónica impeded the entry of new competitors through a combination of actions. First, it erected a series of obstacles to new entrants prior to the effective opening of the market on April 5 2003 (the "launch date"). For instance, prior to launch, it dragged its feet to provide terms and conditions for network access; when it did the price turned out to be such that downstream activity would have been loss making under any reasonable parameter constellation (a clear attempt of price-squeeze leading to foreclosure). On that particular issue, the industry regulator had to intervene in order to force Telefónica to make a reasonable non-discriminatory and cost-oriented offer. Second, the incumbent apparently succesfully impeded entry during the period of parallel

7

running of the old regulated and new commercial numbers. As will be seen below, the regulator was forced to take corrective action. Third, Telefónica failed to provide the database in timely manner and in the format stipulated by the CMT. When it did provide the data, it proved to be defective in a number of respects. Many compulsory fields were left empty or were inaccurate (e.g. a fax instead of a phone number would appear in the extraction process, or when more than one number was associated with a commercial or administrative entity, it did not stipulate which was the main one). In addition, intelligent network entries (which represent the a large part of FUNs numbers) were simply missing.

For a new entrant, this generated additional costs that would not have otherwise been incurred. Since the data was faulty, the entrant hired personnel to "correct it". This task involved obtaining information from printed version of the telephone directory (white and yellow pages) and/or surfing the web. In addition, operators were, all else equal, slower since the extractions would sometimes return blank fields, leading to an increase in AHTs. In addition, the new entrant was faced with a very real short term problem, namely to provide information once the operation had gone live. Since the data was of such poor quality, the firm had to turn to the E.115 service, a costlier alternative which was meant to be used for international enquiries only. E.115 is a protocol developed by members of the ITU in order to provide foreign phone numbers in a standardised format. That service is offered by existing telecom operators on the basis of per consultation fee; it is not possible to download the E.115 database. In addition, E.115 consultations are slower, thus leading to increased AHTs. Given that each E.115 consultation effectively cost about 0.40 €, and that the entrant's prices stood at approximately 0.30€ per enquiry, it meant that the margin was negative, even before advertising and other expenses were taken into account. Apart from generating pecuniary

costs, the faulty database led to a deterioration in service quality. During the early stages, the entrant's AHTs were well above international standards, and above its performance in the UK market. Moreover, the accuracy of the information suffered substantially. In short, this new operator was offering lower quality at a price above the one it would have charged had AHTs been shorter.

Raising a rival's direct costs (RRDC) and forcing quality deterioration (QD) form part of a single abusive strategy; *stricto sensu*, forcing QD increases a rival's costs. However, distinguishing between increases in direct costs and QD is useful in the context of the empirical exercise. We will refer to RRDC as the effect of Telefónica's actions on the entrant's costs, while forced QD represents abuse induced changes in the residual demand faced by that firm.

A combination of RRDC and forced QD is a very attractive strategy for an incumbent bent on impeding entry into a lucrative market.[3] Compared to a more "traditional" case of predatory pricing, a combination of RRDC and QD provides immediate benefits, as opposed to sacrificing short term profits for future, possibly elusive, profits once exit takes place. In addition, it does not require exit: it is sufficient to weaken the entrant in order to achieve additional profits above those that would obtain in an abuse-free situation. It does not require a "deep pocket" either.[4] As will be argued below, the existence of search costs in this market renders this strategy all the more attractive, since it can have permanent effects beyond the time period during which the abuse is taking place *stricto sensu*. For all of the above, such a strategy (involving both RRDC and QD) is more credible. To sum-up, within the menu of aggressive postures, RRDC combined with QD is highly attractive for the incumbent.

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[3]See the classic contributions of Salop and Scheffman, (1983, 1987).

[4]It should be noted that the Telefonica Group is highly unlikely to face such a constraint in any case.

Economides (1998) presents a model that neatly fits this situation. In his model, there is a vertically integrated firm that enjoys a position of upstream monopoly for the provision of an essential input for downstream production. In the latter, the monopolist control a subsidiary that competes à la Cournot with other firms. He shows that, under very general conditions, the vertically integrated monopolist has an incentive to raise its downstream rivals' costs. In his own words (p. 278): "Therefore *any* increase of rivals' costs above zero results in increased profits for the integrated monopolist and subsidiary". In addition, "Raising rivals' costs allows the monopolist to "manage" the downstream market and force independents to exit. Thus, in the medium and long run, the consequences of non-price discrimination can be much more adverse to social welfare than the short run consequences that I have described" (p. 278). Last, Economides (1998) shows that his results also applies when cost raising strategies are substituted by forcing quality downgrading: "inspection of the profit maximization conditions (..) shows that the results of this paper also hold for a discriminatory degradation of the quality of the input offered to rivals which decreases the willingness to pay for the rivals' downstream output but leaves costs unaffected. In such a setup, independent downstream firms have marginal cost $w + s$, but, since they have a lower quality product, consumers are willing to pay only $p - r$ for their product (while consumers pay p for the subsidiary's output). That is, the independents face a demand curve that is a parallel downward shift by r of the demand faced by the subsidiary" (pp. 278-279). It is worth noting that similar results would obtain if the downstream industry were to de modelled as a horizontally differentiated market in the line of Salop (1979). Our claim is that the Telefónica's strategy resulted in both directly increasing costs and downgrading quality, with

each effect reinforcing one another.[5]

Objections were raised to Economides' (1998) paper; in particular, the generality of his findings were questioned. In a series of contributions (Sibley and Weisman, (1998a, b)), models were presented in which a vertically integrated monopolist facing competition in the downstream market would *not* have incentives to RRDC. The intuition is the following: if the monopolist enjoys positive margins in the upstream market and its downstream market share is very small, a countervailing effect to the incentive to RRDC emerges. Since the monopolist derives profits from selling the essential input, it benefits from larger sales to downstream firms as long as its subsidiary commands a negligible market share. Mandy (2000) provides a general overview of models were this second effect may dominate the cost raising incentive. Mandy (2000) also identifies the real world conditions required for the cost raising incentive to disappear. None of these conditions are present in the case at hand, that is Telefónica clearly has incentives to RRDC and to force QD. First, upstream margins are zero, or close to zero: the database had to be provided for free, and interconnection charges are cost-oriented. In both cases, this results from a regulatory decision. By contrast, downstream margins are very high: 40% or more. Last, Sibley and Wiesman (1998a) simulated their model using reasonable parameter values. They show that if the downstream subsidiary enjoys a market share greater than 26%, the cost-raising incentive dominates, even under the most "adverse" conditions for this effect to be present. Given that Telefónica's market share is way above this threshold, RRDC is optimal.[6]

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[5]Conceptually, RRDC and QD may be considered as indistinguishable, as a single action produces one outcome. In practical terms, the distinction between RRC and QD is useful, as we have directly observed some of the direct costs associated with Telefonica's actions aimed at RRDC, while the "indirect effect" (QD) is econometrically estimated.

[6]This statement holds true irrespective of how market share is computed on the basis of number of calls, minutes, or revenue. It holds even if Telefónica's market share is computed

Given the specifics of this market, Telefónica's actions may have an effect beyond the time period during which the entrant had to operate with a defective database. The existence of search costs combined with the fact that this market was opened to effective competition for the first time in April 2003 means that developments during the launch period (the first 4 to 6 months) persist over time. Liberalised DQ services were new to Spanish consumers: a single regulated number (1003) was replaced by various 118AB numbers; the latter (save for the regulated one) were allowed to provide value-added services; quality levels were unknown; and finally, prices levels (and differences thereof) were also new. In short, consumers were offered a new product whose characteristics were unknown, i.e. consumers had to incur search costs in order to obtain information regarding these new offers. For an average consumer, these search costs are low in absolute value, but very large compared to the potential savings to be achieved by incurring them. As is well known, this is the trade-off facing consumers: it is not the absolute value of search costs that matter, but whether it is worth incurring them. As pointed-out by the British National Audit Office (2005), expenditure on DQ services is a very low proportion of income; as a consequence, the savings to be achieved by looking for the best offer are minute when compared to total expenditure.

The evolution of this market splits naturally into an initial launch phase followed by a stablisation period. During the launch phase, providers build (or consolidate, in the case of the incumbent) a customer base through intensive advertising, while consumers experiment the products on offer. It is plausible to think that the bulk consumers that have a satisfactory experience with a 118AB number will stick to it. By contrast, a bad experience during this experimentation

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after netting out calls to the regulated number (11818).

phase is likely to induce the consumer to switch. In addition, a negative experience during that initial phase may induce more consumers to switch (or choose another brand for the first purchase) because of hearsay. During the second phase, firms set profit maximising prices given the market share that they have achieved during the launch period. As a consequence, market shares and prices stabilise, while advertising becomes more sporadic and aimed at maintaining awareness of a particular 118AB number. In a market with these characteristics, second period market shares are a function of first period ones.[7] This correspondence is strongest when agents share the same technology, i.e. face similar costs. Last, the existence of search costs also ensures that second period equilibrium prices will be set above marginal cost.

Given the existence of search costs, consumers that have decided to patronise a brand during the first phase will not switch to another brand during the second phase, unless there is an intense advertising campaign and/or a very competitive offer. Such a strategy is unlikely to be profitable, since it is much more costly to induce customers to switch to a new brand as opposed to simply maintaining them.[8] In other words, the time to profitably build a market share is during the launch phase, when customer's have not yet chosen a brand to patronise. Once clients have identified a 118AB number and are satisfied with it, they are highly unlikely switch, since search costs are high relative to potential savings. To conclude, if sabotage is successful during the initial launch phase, its effect will be permanent. In the context of this case, it means that if there is an initial loss of market share, it will not be profitable to try to recover this lost customer base during the "stabilisation phase", even if the essential input is of adequate quality.

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[7]See, for instance, the extensive analysis carried for the OFT by NERA (2003).

[8]In general terms, the marketing litarature (see, for instance, Kotler (1997)) indicates that in order to attract a new customer, it is necessary to spend five times more on advertising as compared to maintaing a client that already buy the product.

4. Identification of the effects of the alleged abuse

For practical purposes, we have decomposed possible abuse related losses into direct costs and the additional loss of profits once the direct costs have been netted out. It is straightforward to show that the lost profits resulting from the abuse are always larger than the direct costs that can be imputed to the incumbent's actions. Save for the polar cases of Betrand competition with no capacity constraints or perfect competition, firms face a downward slopping residual demand curve. Suppose constant marginal costs MC, and that a firm faces the residual demand depicted in Figure 1. In the absence of abuse, the firm would earn gross profits equal to $BCDE$. If its costs are increased to MC', and profits dwindle to AB. The "direct damage" is equal to the quantity produced under abuse times the increase in costs, that is D. Even if the firm manages to recover D through the courts, it still suffers a net loss, as $A < CE$.[9]

Insert Figure 1 about here

While useful to show that total damages are greater than direct costs, the analysis presented above represents a simple comparative statics exercise and therefore can not embody some important characteristics of the issue at hand. In particular, it ignores the importance of search costs and the fact that the abuse occurred before and during the launch phase. In this paper, we almost completely ignore abuse related costs prior to April 2003 because of lack of quantifiable data; it should however be borne in mind that their consequence was that the entrant was not as ready as it would have liked on launch day.

New entrants in these kind of markets need to build a market share; this is

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[9]This always holds, since profit maximization in the absence of abuse implies that BCDE>ABD.

achieved first and foremost by intense advertising. The latter increases demand for the firm's product in each period and can be coupled with low, cost oriented prices during the launch phase. Once a sufficiently large market share is built, prices are raised in order to recoup advertising outlays and generate profits. If a firm adopts a combination of low initial prices and heavy advertising, one would expect a steady increase in market share, followed by a drop once prices are raised (which would correspond to the beginning of the stabilisation period). After prices are increased, advertising intensity would decline, as would be aimed at maintaining number awareness and as a reaction to protect market share from competitors advertising and/or price changes An alternative is to build a market on the basis of advertising only, charging high prices from the start. In that case, market share would not drop at the beginning of the stabilisation period, as no price adjustment is required to start obtaining profits. As in the previous scenario, both advertising and price changes would be reactive in nature once the market stabilises. Figure 2 depicts the expected evolution over time of two firms adopting these two alternative strategies: Firm 1, which initially charged prices equal (or close to) marginal cost adjusts prices as of period 3, while Firm 2 does not experience a drop in market share as it has charged prices above marginal cost right from the start. As of period 4, which corresponds to the first phase of the stabilisation period, both market shares fluctuate around a level. In Spain and the UK, the entrant has adopted the advertising *cum* low initial prices to build its customer base, and raised its prices later. In Graph 1, we represent the evolution of that firm's market share in these two markets; the scale on the vertical axis has been transformed for reasons of confidentiality.[10] An example of the alternative is given by another new entrant in Spain: the latter has not changed its prices

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[10]The construction of these market shares is described in section 6.

since day one of its launch, and has relied exclusively on advertising to build and maintain its market share.

It is easy to represent the evolution of a firm that is subjected to an abuse which results in inflated costs and forced QD. *Ceteris paribus*, higher costs mean that fewer resources are available for advertising. More importantly, QD means that advertising is less effective at increasing demand during each period of the launch phase.[11] Once the "stabilisation period" begins, the market share fluctuates around a level which is lower than that which corresponds to an abuse-free situation. This evolution is depicted by the line labelled Firm 1' in Figure 2. Note that the gap between curves Firm1 and Firm 1' *only* reflects the forced QD suffered by the entrant; direct costs have to be added to the profit loss stemming from this lower market share.

This statement is illustrated in Figure 3. In order to simplify exposition, assume that this corresponds to the first period of the stabilisation phase and that forced QD results in the leftward shift of the residual demand curve faced by the firm from $d(p)$ to $d'(p)$ (a realistic assumption given the fact that this is a new product). In addition, the incumbent's RRDC strategy raises constant marginal costs upwards from MC to MC'. To simplify, assume that the firm chooses prices and quantities which correspond to the intersection between marginal revenue (MR) and marginal cost (MC). In the absence of any kind of abuse, the firm

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[11]The period by period increase in demand can be modelled as a shift, a rotation, or a combination of both; the conclusions are unaffected.

would face $d(p)$ and MC, set price at p^1, sell q^1, and obtain gross profits equal to $\Pi = (p^1 - MC)q^1$. As a consequence of the abuse, the firm faces MC' and $d'(p)$, sets price at p^* and sells q^*, obtaining $(p^* - MC')q^*$ gross profits. In this example, the "direct costs" as we have defined them are equal to $(MC' - MC)q = X$. Full compensation for lost profit is equal to $(p^1 - MC)q^1 - (p^* - MC')q^*$. As will be explained below, we cannot estimate this amount. However, what we can estimate is the market share that the entrant ought to have obtained in the absence of QD, *given the price it actually set* (p^* in this example). Concretely, we are able to estimate the magnitude of $(p^* - MC)(q^2 - q^*) = Y$. Thus, the damages that were able to quantify are the sum of X (direct costs) and Y (the latter due to QD). Note that the amount that we identified is smaller than the one that corresponds to full compensation.[12] Figure 3 also permits to depict the damages suffered by the entrant's during later periods when data problems were supposedly solved. In the initial stages, the entrant faces MC', and damages we compute amount to $X + Y$. At a later stage, marginal costs fall back to MC, and our approach proxies Z, defined as $Z = (p^3 - MC)(q^4 - q^3)$.

Insert Figure 3 about here

5. Construction of the "but for" scenario

In order to compute damages, it is necessary to construct a counterfactual, the "but for the abuse" scenario. The latter exercise can not make use of the data pertaining to the market and time period during which the abuse took place as the data is distorted (Hall (1994), Ashurst (2004)). Since we believe that the entrant never experienced an abuse-free situation in Spain, this precludes the use

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[12] Again, this obtains immediately: in the absence of abuse, p^1 and q^1 maximise profits; therefore p^* and q^4 yield lower gains.

of Spanish data to build the "but for" scenario. We have therefore used the UK market to construct a competitive reference point. We chose econometric estimation over possible alternatives, such as calibrating a theoretical model. The fundamental reason is that we need to capture the idiosyncrasies of a market characterised by first time entry and a launch period dedicated to building a customer base in the case of a new entrant. Calibrating a model a carrying out comparative statics exercises would not permit a proper treatment of this crucial initial phase.

Using the UK experience to construct the but for scenario is motivated by the following reasons. First and foremost, we observe the same firm on both markets. In addition, the entry strategy adopted is the same in both countries: cost oriented prices shouldered by heavy advertising, followed by a posterior increase in prices. Second, the opening up of the market coincides almost perfectly in the two countries (December 2002 for the UK, April 2003 for Spain). The actual launch dates for the entrant is April 2003 on both markets. Third, the UK market has not been distorted by any abuse.[13] Fourth, the initial market structure is very similar across the two markets: an incumbent facing the entry of new competitors. Last, the technology used in both markets is essentially the same.[14]

There are nonetheless some important differences across the two markets. In Spain, the old regulated number (1003) was abolished as of April 2003. In addi-

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[13]There has been a complaint against BT filed by the new entrants. The core of the case was whether BT had abused its dominant position by advertising its new number in the paper editrion of the phonebook. A detailed enquiry, which included the use of econometric techniques, was carried out. The case was closed without penealties, as it was established that BT's conduct had had no material effect on competition (Decision of the Director General of Telecommunications, case CW/604/03/03).

[14]The entrant's experience in other markets presents some serious drawbacks to be used to construct the "but for" scenario. Apart from the fact that the time periods do not concide, the main limitations is that in these other countries, liberalisation has been incomplete. However, it is important noting that the entrant already had extensive experience in terms of entering foreign markets in which it had to operate in a different language than that of its country of origin.

tion, the regulator imposed a so-called "carrousel". During the period April-July 2003, calls to 1003 were answered by a recorded message that quoted the numbers of the active entrants.[15] Since the numbers were quoted on a rotating basis, a large number of calls were directed to the new entrants.[16] By contrast, in the UK, the old regulated number was maintained until the end of August 2003, and no "carrousel" was put in place after the disappearance of the 192 number. In addition, the number of active entrants has been larger in the UK, even if allowance is made of the different country and market sizes (60 versus 40 million inhabitants). Last, the UK has pioneered telecom liberalisation in Europe, possibly suggesting that both consumers and firms are well accustomed to a fiercely competitive environment, and therefore act accordingly (e.g. being more price sensitive). All these characteristics suggest that, in the absence of abuse, entry in the UK would have been more difficult than in Spain. In the econometric exercise, we are only able to control for the maintenance of the 192 number by including a time dummy; it is not however possible to control for the other characteristics that make the UK market more competitive. From the perspective of computation, these uncontrolled-for differences imply that we probably underestimate the true amount of damages.

6. Econometric specification and variable definition

We estimate a market share equation for the entrant in the UK market; we then use these UK results to predict the evolution of that operator's market share in Spain. Estimating a market share equation is fairly standard approach in the marketing literature as it can be used to predict how a firm's market share would

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[15]In April, 4 new numbers were active; in July 2003, 6 (?) numbers were quoted.

[16]The imposition of a carrousel by the CMT was motivated by the desire to facilitate entry in view of the impediments that new operators had faced as a consequence of the incumbent's behaviour prior to the launch date.

react to a change in variables such as price and/or advertising (Kumar and Heath (1990)).

The specification of these empirical models fall into three categories: additive, multiplicative, and attraction models. The latter is the most adequate, as it simultaneously estimates the behaviour of all market participants share and it embodies a series of restrictions (e.g. market shares sum to 1). Unfortunately, lack of data prevent us from following this route; we have therefore only estimated additive and multiplicative models.

The equation we estimated is given by:

$$MS_t^{UK} = \alpha_0^{UK} + \alpha_1^{UK}t + \alpha_2^{UK}t^2 + \beta_1^{UK}P_t^{UK*} + \beta_2^{UK}X_t^{UK*} + Q_t'\beta_3^{UK} + \varepsilon_t \quad (6.1)$$

where MS_t^{UK} is the entrant's market share in the UK at time t; $P_t^{UK*} = \dfrac{P_t^{ENTRANT\ UK}}{\frac{1}{J}\left(\sum\limits_{J} P_t^{J\ UK}\right)}$ is its price in the UK relative to its competitors, with J equal to the number thereof; and $X_t^{UK*} = \dfrac{X_t^{ENTRANT\ UK}}{\frac{1}{J}\left(\sum\limits_{J} X_t^{J\ UK}\right)}$ is the firm's advertising in the UK relative to total advertising effort. Q_t' is a set of time dummies to control for possible changes in market shares due to holidays and different days of the week. It also includes a dummy taking value 1 for the period April-August 2003 (and zero thereafter) to control for the continued existence of the old regulated number (192). We also include a squared time trend (t and t^2) to account for the fact that we are dealing with first time entry (i.e., by definition, market share can only go-up). In "mature" or "stabilised" markets it is common to introduce market share lagged one period. As mentioned above, this would not allow us to

control for the specificities of "launch phase". Nevertheless, in order to check the robustness of our results, we re-estimated (eq. (1)) as of October 2003 by which time the launch phase had more or less ended. In that set of results, we dropped the squared trend and used lagged market share instead. Equation (1) is specified in additive form; we also estimated it in multiplicative form. This simply means that the dependent variable (MS_t^{UK}) and the regressors $(P_t^{UK^*}$ and $X_t^{UK^*})$ have been log transformed.

Equation (1) can be thought of as reduced form equation corresponding to the second stage of a sequential decision process, with the first stage consisting of the entry decision, the choice of entry strategy and the selection of product characteristics. In that sense, all the regresssors can be considered to be pre-determined, that is exogenous. In our context, this assumption seems to be valid: advertising is booked months ahead of actual spend, and the entrant's strategy is also determined in advance. More precisely, the entrant sets prices equal, or close to, marginal cost during the launch phase (approximately 6 months) and then raises its prices (typically by doubling them), but remaining among the cheapest commercial alternatives. This is the pattern observed on both the UK and Spanish markets. In addition, since we estimate a market share equation for one firm only, any firm-level time-invariant fixed effect (that could also affect the error) will be picked-up by the constant, since the estimations are obtained with data for a single agent over many time periods (more than 500 daily observations). However, there may be one last source of endogenity, if there exist daily shocks that affect both daily prices and the error term. In order to check that our main results are robust to this potential source of endogeneity, we used lagged prices and advertising as instruments. In another specification we used the entrant's relative price on the Spanish market as instruments for UK prices. These additional results are

qualitatively very similar to our central results, indicating that endogeneity is not a serious problem at the time of estimating equation (1).

6.1. Variable definition

The entrant provided us with their daily call volumes and AHTs; eq. (1) was thus estimated on the basis of daily volumes and prices (computed on the basis of AHTs). Some of the variables, such as market size, are not publicly available; competitors' AHTs (and therefore prices) are not observed with daily frequency; last, advertising effort is available on a monthly basis. We therefore had to construct some of these variables on the basis of reasonable assumptions, described in the next sub-section.

One particular issue regards the possible existence of daily time specific effects. We have dealt with this issue by estimating eq.(1) in two different ways. The first consists of smoothing the data beforehand with a 30 day moving average. The second involves introducing time dummies for each days of the week. Details for each procedure are provided below.

6.1.1. UK data

According to BT, market volume stood at about 600 million calls at the time when the 192 number was abolished; it was estimated to have fallen by 45% in October 2004, representing 315 million calls at that time. We assumed that the monthly reduction was proportional and constructed total market size accordingly.[17] We were able to cross-check our estimates with the figures provided by an independent consultancy. Performance House/118 tracker provides an estimate for monthly market size during the period December 2003-November 2004. Their estimate of

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[17]More precisely we assumed that volumes in October 2004 were equal to 26250000 monthly calls, and that they stood at 50416666 in March 2003. We applied a proportional montly reduction between these two dates.

total market volume over that time period stands at 378 million calls, while our estimates yields 370 million for the same time period. In addition, the correlation between the two monthly series is 0.9. We are therefore confident that we have used a fairly accurate measure of UK market size and its evolution. That market volume figure includes outsourcing services, that is called attended on behalf of another company. We consider outsourcing as forming a distinct market, as it is not directed at final consumers. The market size we used for the UK nets out outsourcing calls from total call volumes. The entrant's daily data indicates that calls on a Saturday are about half those of a week day, and double those of a Sunday. We applied that correction and divided monthly volume by the number of days of each month in order to get daily market size. Note that this procedure probably generates fluctuations in daily market sizes larger than what they really are; this is part of the reasons why our preferred estimates is the one that uses smoothed data.

In its study of service quality, OFCOM (2004) indicates that there are at least 30 active providers. According to the Performance House report mentioned above, five numbers represent more than 93% of total volume. These are the competitors that we included in the empirical exercise. To construct their prices, we used publicly available information on their tariff structure (and changes thereof over time) and the average AHTs provided by OFCOM. As far as the new entrant is concerned, we were able to construct daily prices for services provided through BT's network (minutes charged divided by the total number of calls, taking into account the entrant's tariff structure).

Monthly advertising expenditure for the entrant and all of its competitors was obtained from Initiative UK, a market intelligence firm; the original data comes from the Nielsen Media Research Multimedia System. The figure represents gross

advertising (i.e. prior to discounts) in all outlets: TV, newspapers, radio, movie theaters, and street advertising. The regressor is simply the ratio of the entrant's advertising to total effort.

6.1.2. Spanish data

According to the CMT annual report, call volumes for 2003 stood at 127,26 million calls. At the time of writing our report, industry sources indicated that volumes had fallen by 10% around October 2004. We have assumed that this drop occurred month by month in a proportional manner.[18] We applied the same adjustment as in the UK to obtain daily market shares (i.e, week-day call volumes are double those pertaining to a Saturday). Since no company provides outsourcing services in Spain, no adjustment was made to total market size.

At the end of 2003, 95% of calls we concentrated in four numbers: TPI's 11888 (TPI is a fully controlled Telefónica subsidiary), Telefónica's two numbers (11818, and 11822; the latter started operating in July 2003), Telegate's 11811, and Conduit (11850). Another two numbers have gained market share in 2004: Multiasistencia y Gestión (MGA, 11824, that starts operations in June 2003) and Antena 3's number, 11843, that is launched in May 2004. These are the agents that we used in the empirical analysis. In order to construct competitors' effective prices, we divided the total number of minutes by call volumes for each operator on the basis of the data reported in the CMT annual report. For the entrant, we constructed daily prices, as we have AHTs for each day. With this information in hand, we built the entrant's relative price (to this end, we had to assume that competitors' AHTs obtained from the CMT report remained constant).

The entrant's advertising effort relative to its competitors has been computed

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[18] After having estimated damages, the actual figure for 2004 was published by the CMT. We re-estimated equation (1) and derived a new of abuse related damages. The latter turn out to be similar to the ones presented in the text.

on the basis of the data provided by Initiative España. The original data comes from INFOADEX, a specialist provider of advertising data in Spain. As in the UK, we constructed the ratio of the entrant's effort to total advertising expenditure. Table 2 provides summary statistics for each of the two markets. Table 3 reports information that we deemed useful for understanding the situation. It relates operators advertising effort to their market share in Spain. Some interesting patterns emerge: for instance, in view of their advertising, it seems that new entrants systematically achieve a lower market share compared to the Telefónica numbers.[19]

Insert Tables 2 and 3 about here

7. Econometric results and quantification of damages

Apart from direct costs (X, as defined in section 4), we estimate "indirect damages" as the difference between the entrant's sales had QD not occurred, and the market share it did command, *given observed prices and advertising expenditure in Spain.* As mentioned above, we are unable to compute the abuse-free profits that the entrant's would have obtained by choosing prices and advertising optimally (which correspond to Π defined previously).[20] What we do instead is to estimate eq. (1) for the UK, and then use parameter estimates and *observed prices and advertising* in Spain to predict the entrant's markets share had forced QD been absent. Note that this approach is consistent both for the time period when the entrant's direct costs had been inflated as well as for later periods when data

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[19]Clearly, this information is incomplete, as it does not take into account prices. However, given that Telefónica's prices (and in particular, TPI's) are among the highest, the inference that can be drawn from Table 3 would not vary had prices been properly taken into account.

[20]This observation, coupled with the fact that the UK market is, all else equal, more competitive than Spain, clearly suggests that the "true" alleged damages are larger than our estimates.

problems were supposedly solved. In the initial stages, the entrant faces MC', and damages we compute amount to $X + Y$. At a later stage, marginal costs fall back to MC, and our approach proxies Z (see definition in section 4).

Our central results are obtained with six different specifications. Three of them are obtained with the additive functional form, while for the remaining three, both dependent and independent variables have been log transformed. For each functional form, we present two sets of results which differ in the way we have dealt with the possible existence of time specific fixed effects. Last, we have estimated eq. (1) in both forms, but only as of October 2003, which roughly corresponds to the end of the launch phase.

The use of daily data dictates that the possible existence of (daily) time specific effects have to be explicitly dealt with. One approach consists of smoothing the data with a 30 day moving average: this eliminates daily effects. We have smoothed both the dependent variable as well as the regressors. This has the added advantage that it allows both advertising effort and changes in relative prices to have a lagged impact. However, the main advantage of smoothing the data is that it does not require making any assumptions regarding these time specific effects, nor is it necessary to assume that they follow the same pattern in the UK and Spain. Apart from daily effects, there may exist other seasonal influences. For instance, Bank Holidays, Summer months (July and August), or the Christmas season may influence consumption patterns. Since there is no a priori reason to believe that seasonality patterns are the same in Spain and the UK, we decomposed the predicted market share for Spain in two pieces: the non seasonal part and the seasonal part. We used a three stages procedure to recover these two elements. First, we estimated eq. (1) for the UK with the full set of time dummies (daily and monthly). Next, we predicted the entrant's non seasonally

adjusted market share in Spain using the parameters estimates obtained for the UK, save for the time dummies. We then computed the difference between this prediction and observed market share in Spain, obtaining a set of residuals. The latter were then regressed on all time dummies, obtaining a set of estimates of time dummies for Spain that are used to predict the seasonal component of the entrant's market share. Last, we constructed the predicted market share as the sum of the seasonal and non-seasonal components estimated previously.

Results [I] are obtained with smoothed (i.e., there is no need to control for daily time effects) data and an additive specification, while results [IV] uses the same smoothed data but log transformed (multiplicative specification). Results [II] are obtained with non-smoothed data (i.e. daily effects are directly controlled for) and the additive specification, while for results [V], the data is expressed in logs (multiplicative model). In all cases, we control for the summer months, the Christmas period, and Bank Holidays.

The third set of results is obtained with a different specification and time period. The data only runs from October 2003 (instead of April), and the time trend and its square have been substituted by lagged market share. The objective is to assess how the econometric model behaves during the "stabilisation"or "mature" phase. In addition, it allows us to use the more conventional form in which lagged market share is used as a regressor. Given that the estimation does not include the time period during which the old BT number coexisted with commercial one, the April-August dummy is dropped. This sets of results also provides additional insights when predicting the entrant's market share in Spain. The corrective measure imposed by the CMT, the so-called carrousel, was no longer in place. Since it is likely that the carrousel inflated entrants' market share, this last set of results yields a damage estimate in the absence of that palliative. The introduction

of the lagged market share prevents the smoothing of the data (by definition, lagged market share would appear on both sides of eq. (1)). Consequently, results [III] (additive form) and [VI] (multiplicative specification) are obtained with non-smoothed data. Summing-up, results [I, II, IV and V] are obtained with 19 months of daily data, while [III and VI] only cover 13 months. The smoothing of the data with a 30 day moving average means that 30 daily observations are lost.

As mentioned above, we believe that decisions on prices and advertising are pre-determined, i.e. exogenous. If this is the case, OLS is both consistent and efficient. We checked the validity of this assumption with models [II] and [V]. This choice is motivated by the fact that the smoothing introduced in specifications [I] and [IV] generates an auto-correlated error structure that can not easily be dealt with. We therefore estimated equation (1) with non-smoothed data and using lagged values of the regressors as instruments. Each daily observation was instrumented with seven variables which correspond to daily observations -7 to -13.

Table 4 presents our central OLS results obtained with the additive specification, while Table 5 pertains to the multiplicative model. Recall that these estimations are obtained for the UK market; we do not estimate the evolution of the entrant's market share with Spanish data. In Table 6, we present the result of estimating equation (1), specification [II] and [V], with GMM and lagged values of the regressors as instruments. We briefly comment this last set of results before continuing. As indicated by the Hausman test, we can not reject the null that our regressors are exogenous. In addition, the Sargan test of mispecification indicates that our instruments are valid. Moreover, the point estimates reported in Table 6 are very similar to those appearing in Tables 4 and 5, confirming the information conveyed by the Hausman test. We interpret these findings as consistent with the

assumption regarding the exogeneity of the regressors. Thus, in the remainder of the paper, we comment on the OLS results.

In both Table 4 & 5, the goodness of fit is surprisingly high: the adjusted R^2 ranges from a minimum of 0.66 (model [II]), to 0.78 (specification [I]). With the exception of relative advertising in specification [VI], the variables of interest (relative prices and advertising) have the expected sign and are highly significant. Both the time trend and its square ([I, II, IV, and V]), as well as lagged market share ([III and VI]) are significant at the 1% level and of the expected sign. Graphs 2 and 3 plot the entrant's actual market share in the UK and the one predicted by models [I] and [IV]. This simple visual evidence suggest that our predicted shares do a decent job of tracking that firm's real world performance in the UK.

Insert Tables 4, 5 and 6 about here

Insert Graphs 2 and 3 about here

These estimates are used to predict the entrant's market share in Spain had forced QD not occurred, *given the prices and advertising chosen by that firm.* Graphs 4 and 5 present the observed market shares as well the predicted ones (for reasons of confidentiality, the vertical axis has been re-scaled, i.e the values appearing on the vertical axis are imaginary). The predicted market share in Graph 4 is constructed with the point estimates obtained from model [I], while in graph 5, we have used model [IV]. In both cases, we observe that the predicted market share stands above what the entrant achieved in Spain. This visual evidence indicates that our econometric model does a good job of picking-up the turning points in the evolution of the entrant's market share. It is also worth noting that the gap is smallest at the beginning of the period. This is compatible with the specificity

of the Spanish market, namely that a carrousel was put in place during the first four months. In other words, the CMTs actions somehow "corrected" Telefónica's abusive behaviour; once the carrousel was removed, the entrant's market share fell well below what it ought to have achieved given its prices and advertising effort. Our claim is that this drop is due to forced QD.

Insert Graphs 4 and 5 about here

Table 7 summarises the damage estimates as well as the number of lost calls for each specification. For reasons of confidentiality, the monetary amounts and lost calls have been scaled to 100 with respect to models [I] and [III]. In addition, we compute monthly average lost calls and monthly average lost profits in order to compare models [III] and [VI] to the other estimations.[21] The direct costs (E.115 service, extra personnel etc..) also appear in Table 5. As can be readily seen, the range of damage estimates is pretty narrow for the 19-months sample: the largest difference is between specifications [I] and [IV] and amounts to 6.5%. The avergae monthly loses confirm that the carrousel limited injury to the entrant: estimated average monthly damages are higher in models [III] and [VI].[22] Last, the direct costs amount to 38.8% of the monetary damage estimated with specification [I].

Insert Table 7 about here

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[21]Recall that [III] and [VI] only span the period October 2003-October 2004.

[22]The reason why the monthly amount of lost profits may be larger than the monthly number of calls is due to the fact that margins are larger during the post launch-phase period. For instance, there is a larger monthly loss of calls in model [I] compared to [III]. However, the monthly loss of profits os larger in the case of model [III]; this is due to the fact that the calls in model [III] carry a larger margin, as the entrant had raised its prices.

8. Robustness checks

We interpret the small variation in the estimation of damages across specifications as evidence that our results are robust. In addition, our findings confirm that the carrousel imposed by the CMT had a palliative effect on Telefónica's behaviour. In this section, we provide simple additional robustness checks. Since we either smoothed the data or estimated daily fixed effects for Spain in an indirect manner and transformed monthly variables into daily ones, we re-estimated eq. (1) with monthly data for the period April 2003-October 2004 (i.e., a monthly version of [I, II, IV and V]). The results are presented in Table 8.

Insert Tables 8 about here

The goodness of fit is slightly lower when compared to the estimates appearing in Tables 4 and 5, but it remains high. In the same vein, the point estimates for relative prices and advertising are less precisely but they remain of the expected sign and their magnitude is similar to that obtained in the first estimation. Despite the fact that the sample is much smaller, our estimation of injury remains practically identical. Table 9 provides estimates of damages as well as lost calls. As in the previous exercise, the figures are expressed as a fraction of the estimates obtained with daily data and model [I].

Insert Table 9 about here

Graph 6 compares the entrant's actual market share in Spain and the one it could have hoped to achieve given its relative price and advertising effort. Again, the pattern is very similar to what is obtained with daily data: the gap is narrower at the beginning of the period, reflecting the existence of the carrousel.

At a later stage, we obtained some additional data pertaining to the entrant's main competitors in Spain, and in particular, the evolution of their monthly market share over the period July 2003-October 2004. We are therefore able to assess whether our econometric estimates can predict the evolution of the market share of the entrant's competitors. In other words, we want to see whether our approach allows us to predict the "ups" and "downs" in the market share of other operators. The information we have pertains to 4 additional numbers. Graphs 6, 7, 8, and 9 present the actual market share and the ones that our econometrics would predict. As before, the vertical axis has been re-scaled. In addition, we do not specify which curve pertains to the predicted and actual market shares. Apart from confidentiality, this omission is due to the fact that we can not estimate a firm specific effect (the constant) for each of these operators. This means that our predictions are up to a scale parameter.

This visual evidence suggests that the econometric model does a good job of approximating the evolution in the market shares of the entrant's competitors. Last, we have computed the correlation between actual and predicted markets shares for these four numbers. This information is presented in Table 10.

These statistics confirm the visual evidence provided by Graphs 7 to 10: the empirical estimates yield good results for 118AB numbers other than the entrant's

9. Conclusions

TBW

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Table 1: Market shares in Spain, measured by revenues, minutes, and number of calls

	2003 (% of total)			2004 (% of total)		
	# of calls (million)	Revenue (million €)	Minutes (million)	# of calls (million)	Revenue (million €)	Minutes (million)
I: Telefónica de España (11822 & 11818)	92.45 (72.7%)	37.16 **(51.7%)**	69.55 (57.8%)	48.04 (48.2%)	27.91 **(30.1%)**	42.42 (35.1%)
II: TPI (Telefónica subsidiary, 11888)	18.16 (14.3%)	21.21 **(29.5%)**	29.33 (24.4%)	34.88 (35.0%)	45.56 **(49.1%)**	54.89 (45.5%)
Telefónica Group (I+II)	110.61 **(87.0%)**	58.37 **(81.2%)**	98.88 **(82.2%)**	72.92 **(83.2%)**	73.47 **(79.2%)**	97.51 **(80.6%)**
Telegate (11811)	6.79 (5.3%)	6.87 (9.5%)	9.80 (8.1%)	9.24 (9.3%)	10.62 (11.4%)	13.78 (11.4%)
Conduit (11850)	6.02 (4.7%)	3.02 (4.2%)	7.95 (6.6%)	NA	NA	NA
MGA (11824)	NA	NA	NA	3.38 (3.4%)	4.42 (4.8%)	4.40 (3.6%)
Others	3.84 (3.0%)	3.69 (5.1%)	3.64 (3.0%)	4.14 (4.2%)	4.35 (4.7%)	5.26 (4.4%)
Total	127.26 (100%)	71.95 (100%)	120.26 (100%)	99.69 (100%)	92.85 (100%)	120.74 (100%)

Source: Comisión del Mercado de las Telecomunicaciones, Informe Anual (2003, 2004).

Table 2: Summary statistics

Variable	# of observations	Mean	Standard deviation	Min	Max
Market share, UK	575	0,093	0,032	0,013	0,232
Relative price, UK	575	0,751	0,212	0,480	0,995
Relative advertising, UK	575	0,132	0,158	0,000	0,421
Market share, Spain	575	0,037	0,032	0,005	0,176
Relative price, Spain	575	0,769	0,219	0,322	0,985
Relative advertising, Spain	575	0,064	0,189	0	0,842
Dummy April-August (UK only)	575	0,257	0,438	0	1
July	575	0,108	0,310	0	1
August	575	0,108	0,310	0	1
Christmas	575	0,016	0,124	0	1
Bank Holidays, UK	575	0,023	0,149	0	1
Bank Holidays, Spain	575	0,028	0,165	0	1

Table 3: Informative statistics

	2003 Advertising (% of total advertising)[1]	2003 Market share (% of total revenues)[2]	2004 Advertising (% of total advertising)[1]	2004 Market share (% of total revenues)2	2003 Ratio market share/advertising	2004 Ratio market share/advertising
	(I)	(II)	(III)	(IV)	(II/I)	(IV/III)
Telefónica de España (11822 & 11818)	0.0	51.70	10.1	30.10	NA	2.97
TPI (11888)	45.1	29.50	29.0	49.10	0.65	1.69
Telegate (11811)	22.9	9.50	20.1	11.40	0.41	0.57
Conduit (11850)	15.5	4.20	3.7	NA	0.27	NA
MGA (11824)	15.6	NA	26.6	4.80	NA	0.18

Sources

[1] : Initiative España

[2] CMT Informe Annual (2003, 2004)

Table 4: OLS estimates of the entrant's market share with daily data, UK market, additive model

Explanatory variables	Model [I]		Model [II]		Model [III]	
	(A)	(B)	(A)	(B)	(A)	(B)
Relative price, t	-0.1297*	0.0091	-0.1089*	0.0103	-0.0430*	0.0048
Relative advertising, t	0.1070*	0.0068	0.0936*	0.0074	0.0247*	0.0049
t	0.0004*	3.5E-05	0.0002*	4.3E-05		
t^2	-5.1E-07*	4.1E-08	-3.7E-07*	5.1E-08		
Market share$_{t-1}$					0.2462*	0.0347
Constant	0.1417*	0.0055	0.1507*	0.0074	0.1117*	0.0066
Time dummies						
April-August 2003	-0.0730*	0.0040	-0.0792*	0.0054		
Bank Holidays	-0.0039	0.0041	-0.0371[*]	0.0056	-0.0505*	0.0032
July	0.0121*	0.0020	0.0158*	0.0028	0.0023	0.0017
August	0.0359*	0.0022	0.0363*	0.0031	-0.0031**	0.0017
Christmas	0.0016	0.0046	-0.0184*	0.0066	-0.0141*	0.0030
Tuesday			-0.0014	0.0029	-0.0025	0.0016
Wednesday			-0.0027	0.0029	-0.0038*	0.0016
Thursday			-0.0031	0.0029	-0.0038*	0.0016
Friday			-0.0061*	0.0029	-0.0064*	0.0016
Saturday			-0.0028	0.0029	-0.0065*	0.0016
Sunday			0.0098*	0.0029	0.0018	0.0016
Number of observations	545		575		397	
Adjusted R^2		0.78		0.66		0.69

Notes:

(A): coefficient estimates; (B) standard error

(*) Significant at the 1%; (**) Significant at the 5%; (***) Significant at the 10%

Table 5: OLS estimates of the entrant's market share with daily data, UK market, multiplicative model

Explanatory variables	Model [IV]		Model [V]		Model [VI]	
	(A)	(B)	(A)	(B)	(A)	(B)
Relative price, t	-1.2313*	0.0888	-0.7949*	0.0844	-0.2642*	0.0419
Relative advertising, t	0.0026***	0.0013	0.0087*	0.0016	-0.0003	0.0007
t	0.0074*	0.0004	0.0057*	0.0005		
t^2	-1.2313*	0.0888	-8.4E-06*	7.2E-07		
Market share$_{t-1}$					0.1130*	0.0313
Constant	-3.8466*	0.1105	-3.2201*	0.1191	-2.0934*	0.0782
Time dummies						
April-August 2003	-0.3848*	0.0455	-0.5431*	0.0606		
Bank Holidays	-0.0946***	0.0526	-0.8262*	0.0668	-0.9487*	0.0457
July	0.1725*	0.0258	0.1400*	0.0353	0.0039	0.0237
August	0.2982*	0.0276	0.2637*	0.0372	-0.0827*	0.0235
Christmas	0.0580	0.0591	-0.2699	0.0797	-0.2475*	0.0427
Tuesday			0.0043	0.0352	-0.0178	0.0223
Wednesday			-0.0130	0.0353	-0.0337	0.0223
Thursday			-0.0148	0.0350	-0.0425	0.0222
Friday			-0.0537	0.0350	-0.0675*	0.0222
Saturday			-0.0230	0.0352	-0.0727*	0.0223
Sunday			0.1150*	0.0351	0.0291	0.0224
Number of observations	545		575		397	
Adjusted R^2		0.74		0.68		0.68

Notes:

(A): coefficient estimates; (B) standard error

(*) Significant at the 1%; (**) Significant at the 5%; (***) Significant at the 10%

Table 6: GMM estimates of the entrant's market share with daily data, UK market, additive model

Explanatory variables	Model [II]		Model [V]	
	(A)	(B)	(A)	(B)
Relative price, t	-0.1081*	0.0127	-0.7949*	0.0844
Relative advertising, t	0.1096*	0.0098	0.0087*	0.0016
t	0.0002*	0.0001	0.0057*	0.0005
t^2	0.0000*	0.0000	0.0000*	0.0000
Constant	0.1574*	0.0094	-3.2201*	0.1191
Time dummies				
April-August 2003	-0.0897*	0.0077	-0.5431*	0.0606
Bank Holidays	-0.0401*	0.0071	-0.8262*	0.0668
July	0.0175*	0.0025	0.1400*	0.0353
August	0.0363*	0.0040	0.2637*	0.0372
Christmas	-0.0165*	0.0058	-0.2699*	0.0797
Tuesday	-0.0022	0.0029	0.0043	0.0352
Wednesday	-0.0034	0.0028	-0.0130	0.0353
Thursday	-0.0038	0.0028	-0.0148	0.0350
Friday	-0.0066**	0.0027	-0.0537	0.0350
Saturday	-0.0034	0.0029	-0.0230	0.0352
Sunday	0.0086**	0.0034	0.1150*	0.0351
Number of observations	562		562	
Sargan test (p-value), [degrees of freedom]	17.477 (0.133) [12]		7.884 (0.794) [12]	
Hausman test (p-value) [degrees of freedom]	4.76 (0.989) [14]		25.91 (0.027) [14]	

Notes:

(A): coefficient estimates; (B) standard error

Instruments: Lagged relative price and advertising. We have used all lags pertaining to week -1, i.e. we have seven instruments for each observation. This results in losing 13 observations.

(*) Significant at the al 1%; (**) Significant at 5% level; (***) Significant at the al 10% level.

Table 7: Damage estimates and number of lost calls (Model [I] = 100). Models [I, II, IV and V] are obtained with 19 months of data (April 2003 – October 2004), while models [III and VI] were estimated with 13 months (October 2003 –October 2004)

	Model	# of calls lost, 19 months	Lost profits, 19 months	Monthly # of calls lost	Monthly lost profits
Additive model	I	100.0	100.0	100.0	100.0
	II	106.3	105.7	106.3	105.7
	III	.	.	95.1	128.0
Multiplicative model	IV	93.6	105.7	93.6	105.7
	V	86.6	98.2	86.6	98.2
	VI	.	.	91.1	122.8
Direct costs		38.8			

Table 8: OLS estimates of the entrant's market share with monthly data, UK market.

Explanatory variables	Additive model		Multiplicative model	
	(A)	(B)	(A)	(B)
Relative price, t	-0.1415*	0.0458	-0.9398**	0.4254
Relative advertising, t	0.0834**	0.0337	0.0113	0.0078
t	0.0129**	0.0053	0.2309*	0.0730
t^2	-0.0005**	0.0002	-0.0092*	0.0030
April-August 2003	-0.0523**	0.0203	-0.3831	0.2666
Constant	0.1280*	0.0332	-3.6598*	0.5736
Number of observations				
Adjusted R^2	0.65		0.61	

Notes:

(A): coefficient estimates; (B) standard error

(*) Significant at the 1%; (**) Significant at the 5%; (***) Significant at the 10%

Table 9: Damage estimates and number of lost calls obtained with monthly data. Each cell is expressed as a proportion of the estimates obtained with model [I] and daily data (cf. Table 5).

	# of calls lost	Lost profits
Additive model	93.6	102.5
Multiplicative model	77.0	94.5

Table 10: Correlation between predicted (additive model) and actual market share

Operator #	Correlation
1	71.9
2	80.6
3	72.4
4	66.0

Figure 1: Effect of cost raising strategies on the injured party
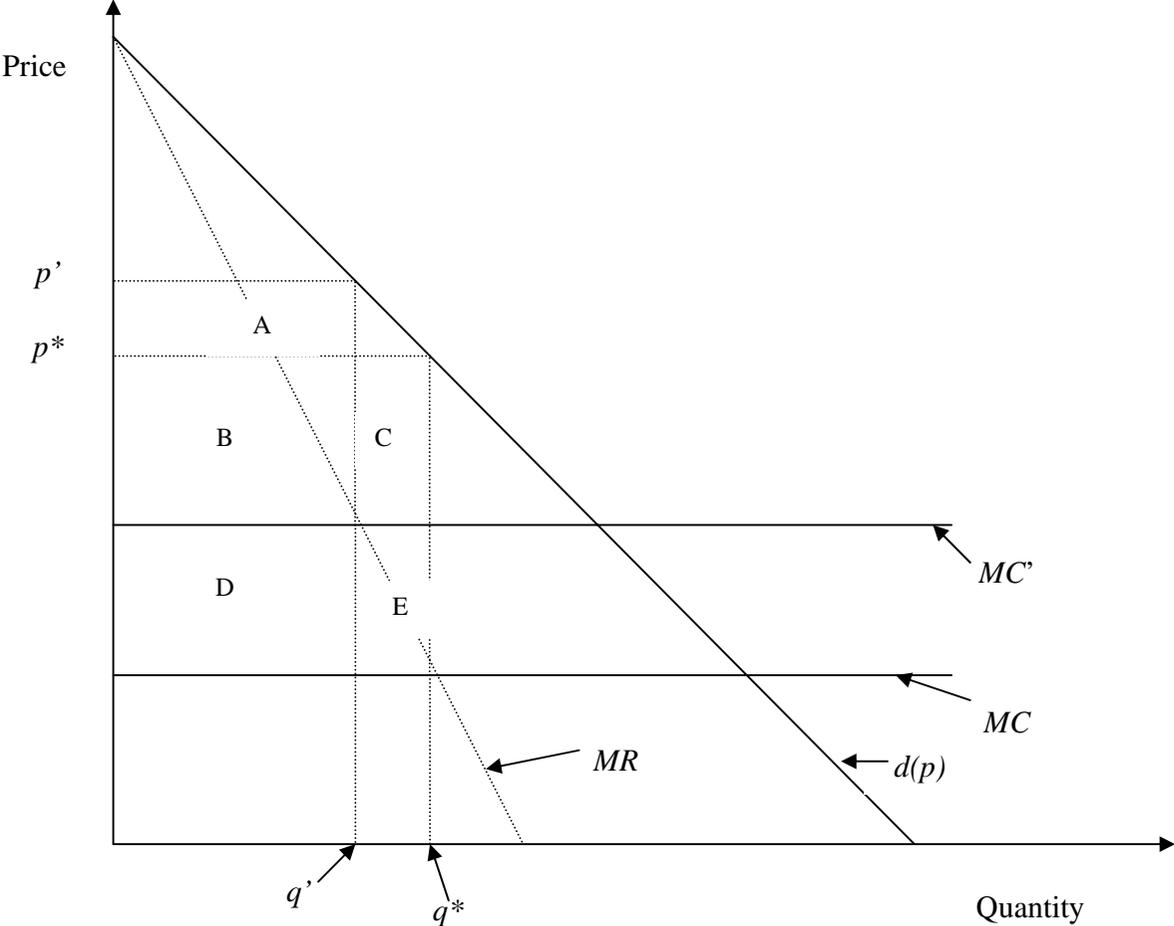
Figure 2: Alternative entry strategies

Market share

Firm 2

Firm 1

Firm 1'

t_0 t_1 t_2 t_3 t_4 t_5 t_6 t_7

Time
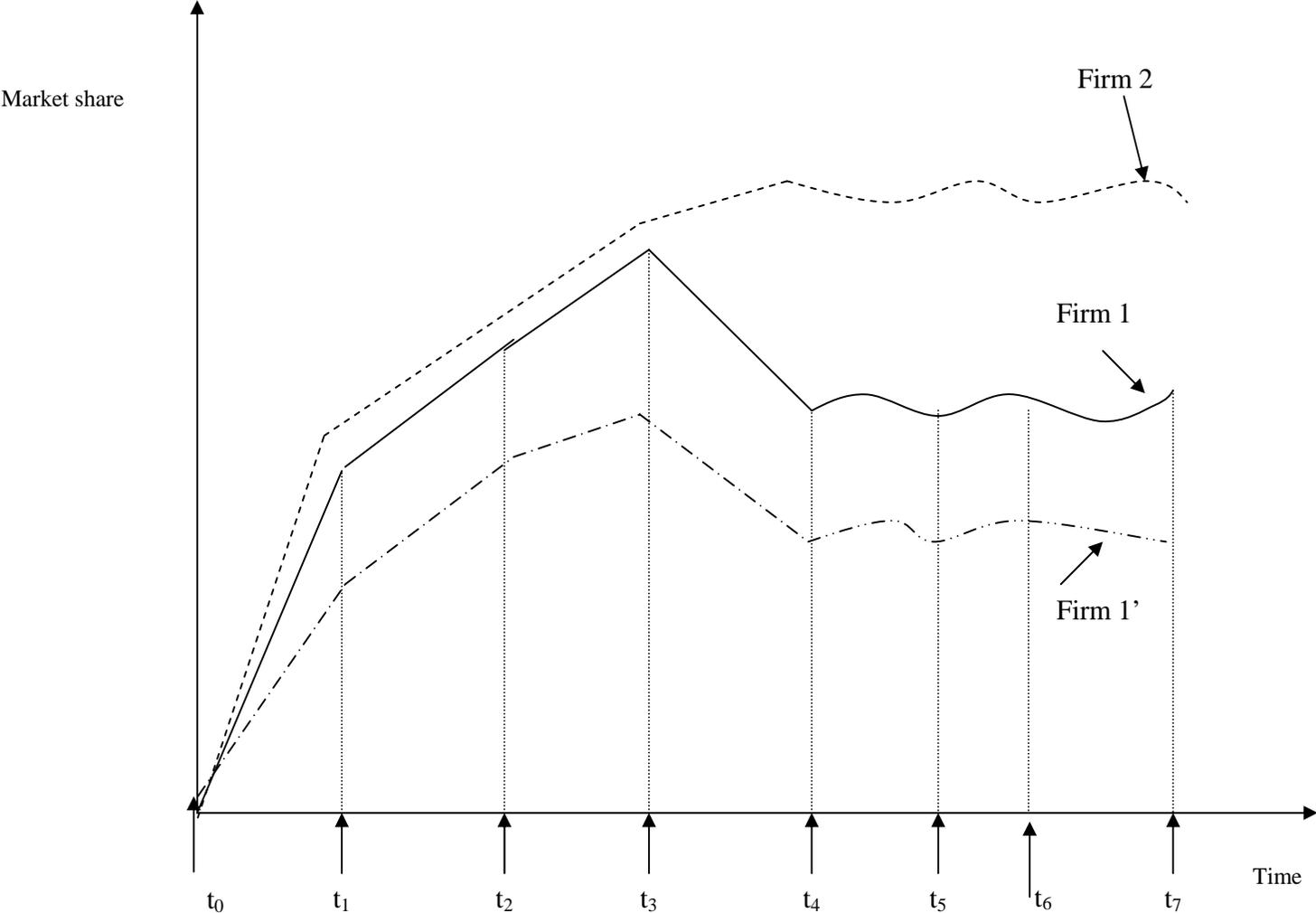
Figure 3: Situation faced by an entrant subject to forced quality deterioration (QD) and facing inflated costs (RRDC)
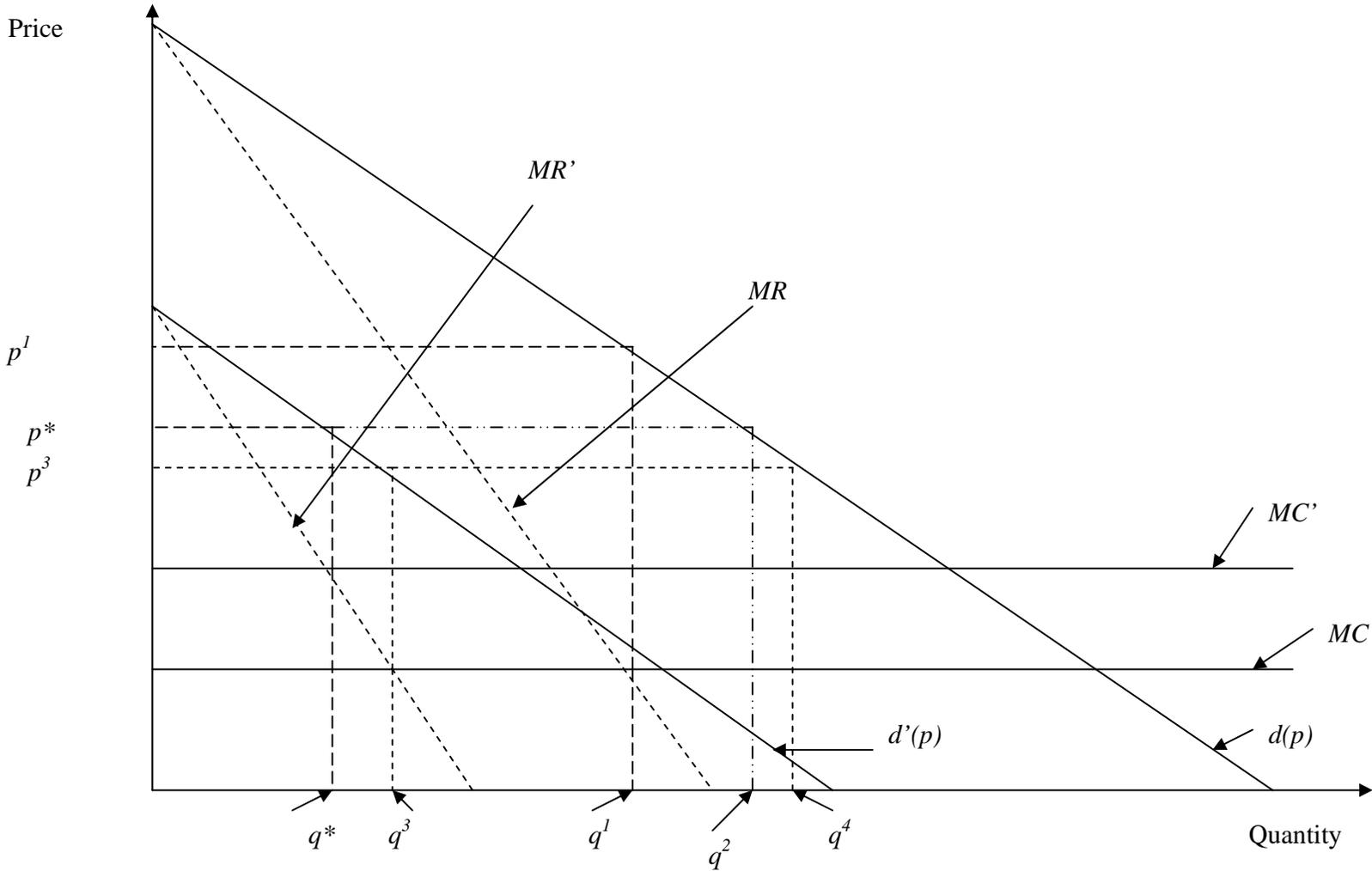
**Graph 1: The entrant's market share in the UK and Spain, end April 2003 - October 2004.**


Entrant's Market Share, Spain and UK (end month)
(the vertical axis has been re-scaled)
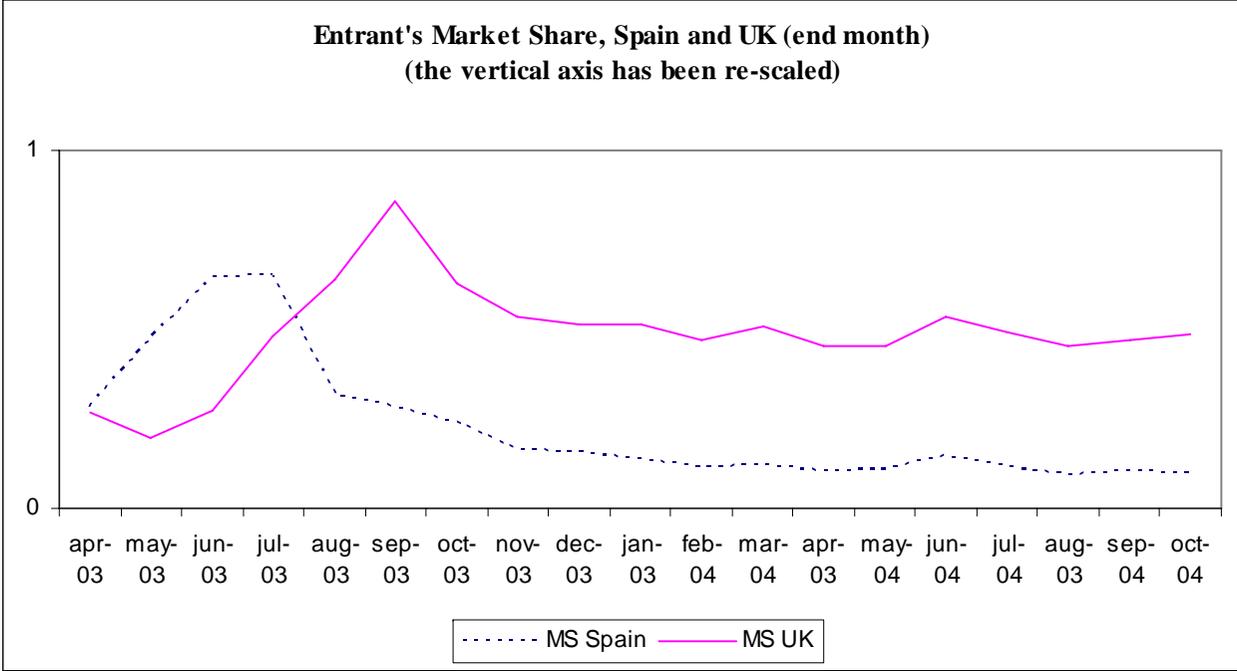
Graph 2: Entrant's market share in the UK and estimated market share, smoothed daily data, model [I]

Actual and estimated market shares, UK, smoothed daily data, additive model [I]
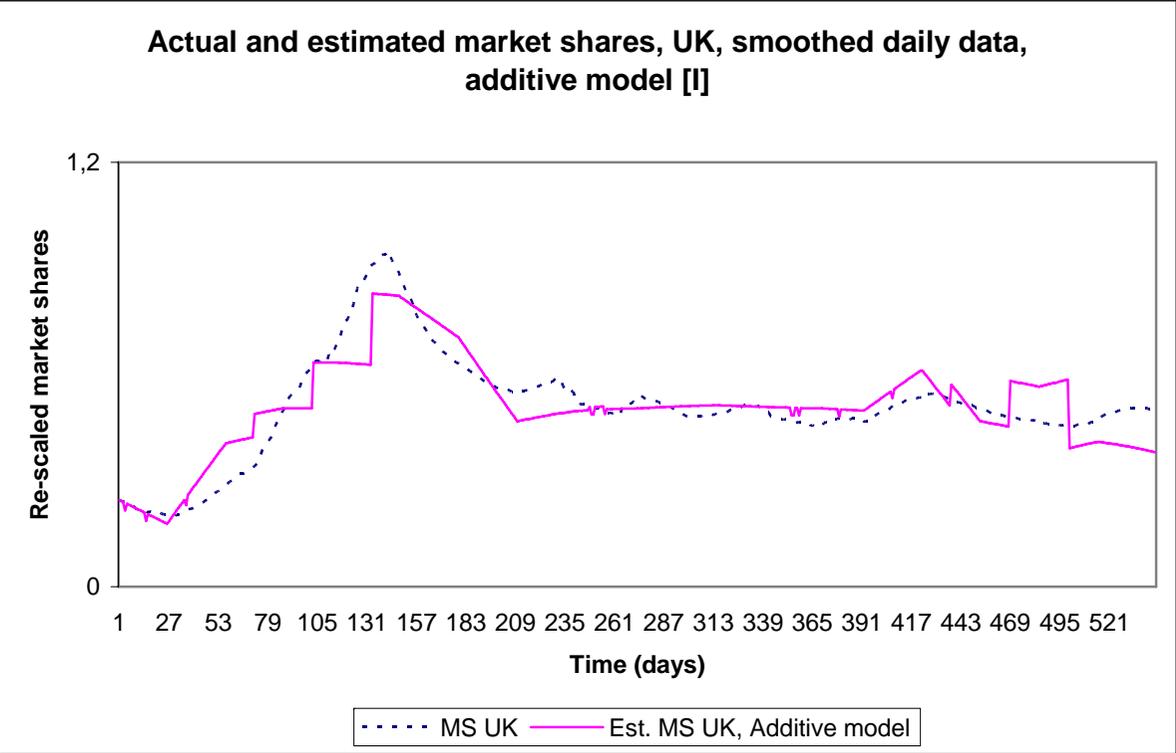
**Graph 3: Entrant's market share in the UK and estimated market share, smoothed daily data, model [IV]**
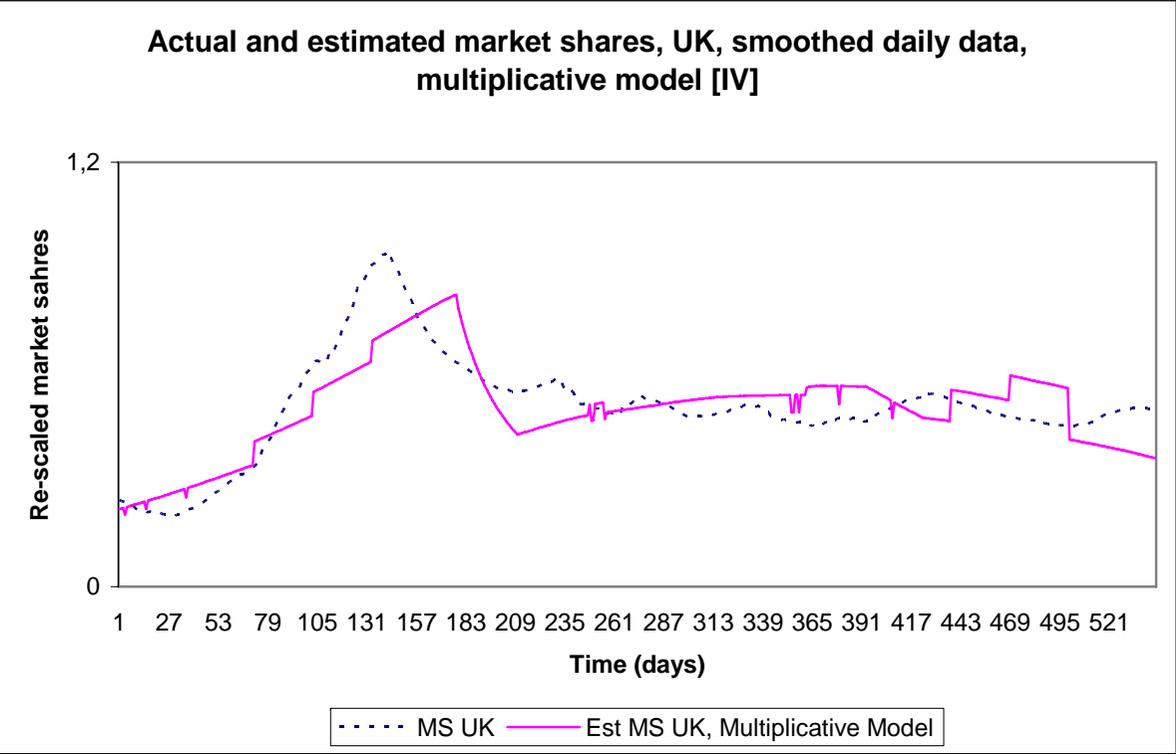
Actual and estimated market shares, UK, smoothed daily data, multiplicative model [IV]

Graph 4: Entrant's market share in Spain and predicted market share, smoothed daily data, model [I]

Actual and predicted market shares, Spain, smoothed daily data, additive model [I]
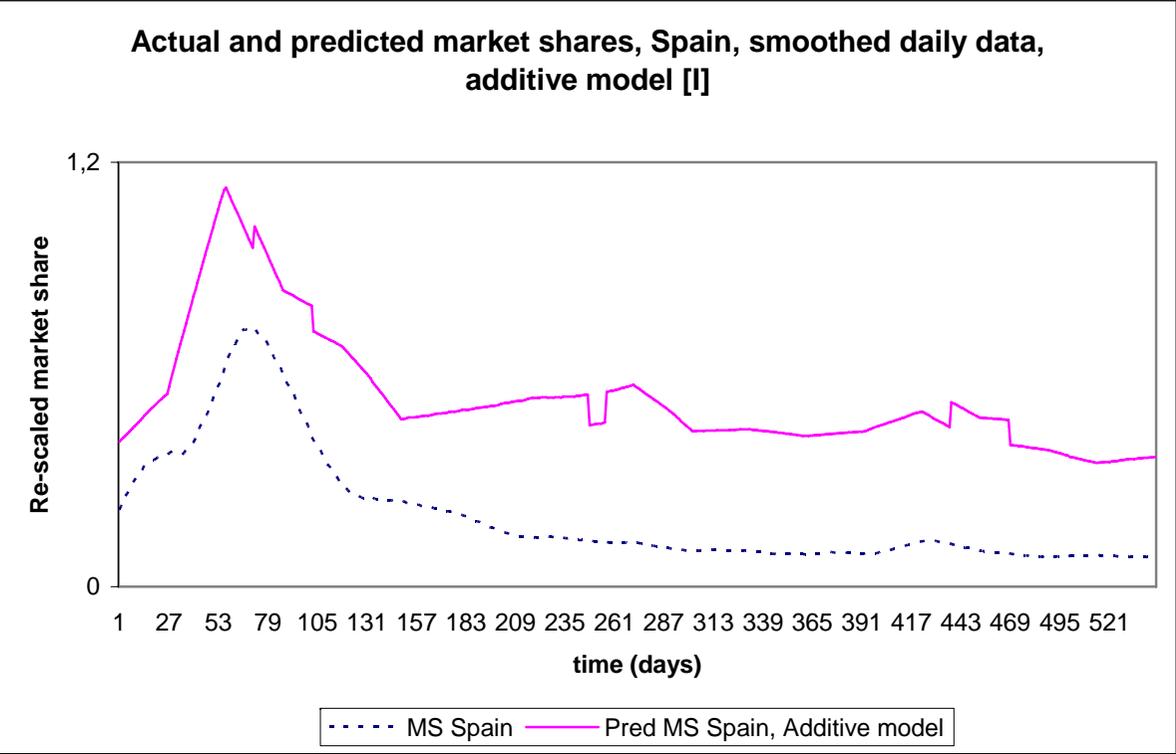
Graph 5: Entrant's market share in Spain and predicted market share, smoothed daily data, model [IV]


Actual and predicted market shares, Spain, smoothed daily data, multiplicative model [IV]

Re-scaled market shares

Time (days)

MS Spain ---- Pred MS Spain, Multiplicative Model
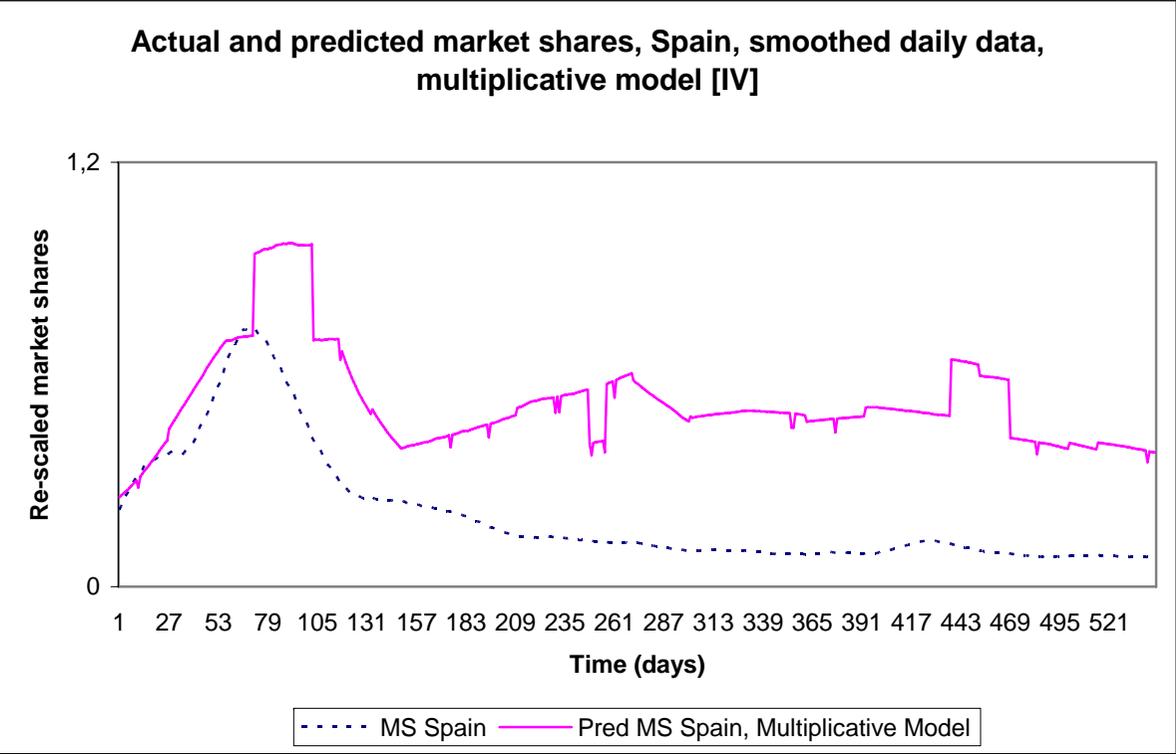
Graph 6: Entrant's market share in Spain and predicted market shares, monthly data

Actual and predicted market shares, Spain, monthly data

Re-scaled market shares

1

0

April 03   July 03   Oct. 03   Jan. 03   Apr. 03   July 03   Oct. 03

——— MS Spain   – – – Pred MS Spain, Additive model   ‑ ‑ ‑ Pred MS Spain, Multiplicative Model
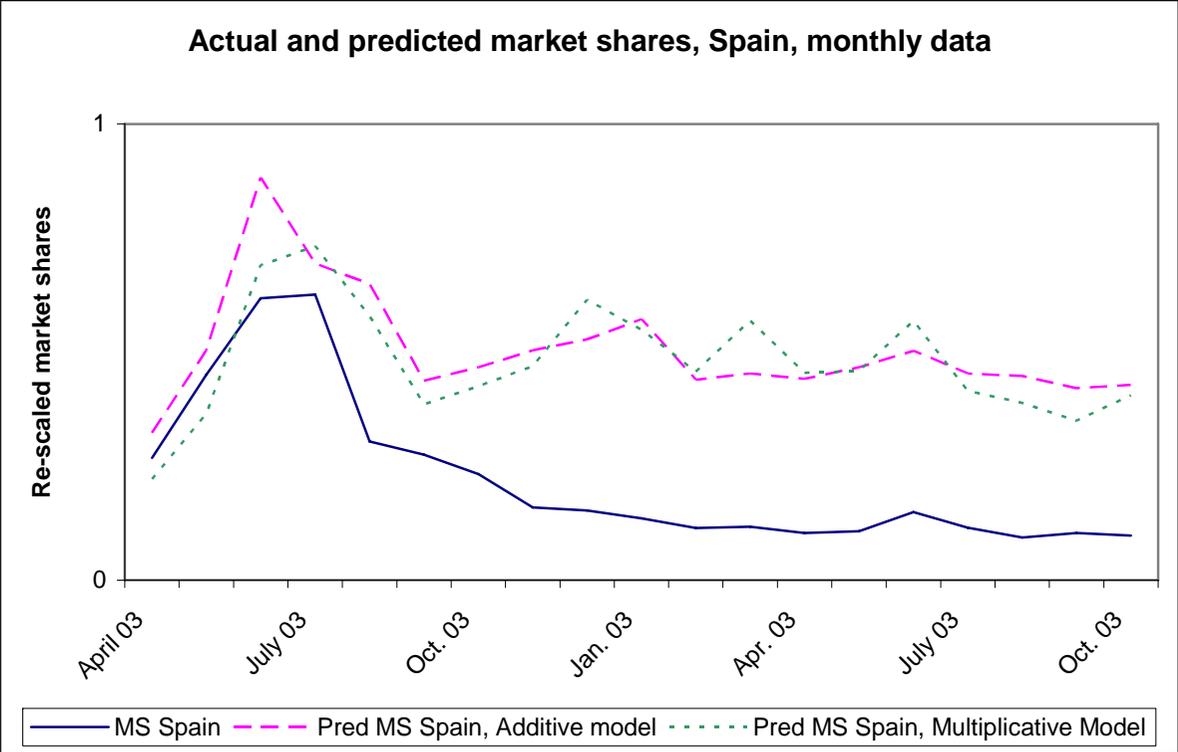
Graph 7: actual and predicted market shares, additive model, operator 1

Operator 1, actual and predicted shares (re-scaled), additive model
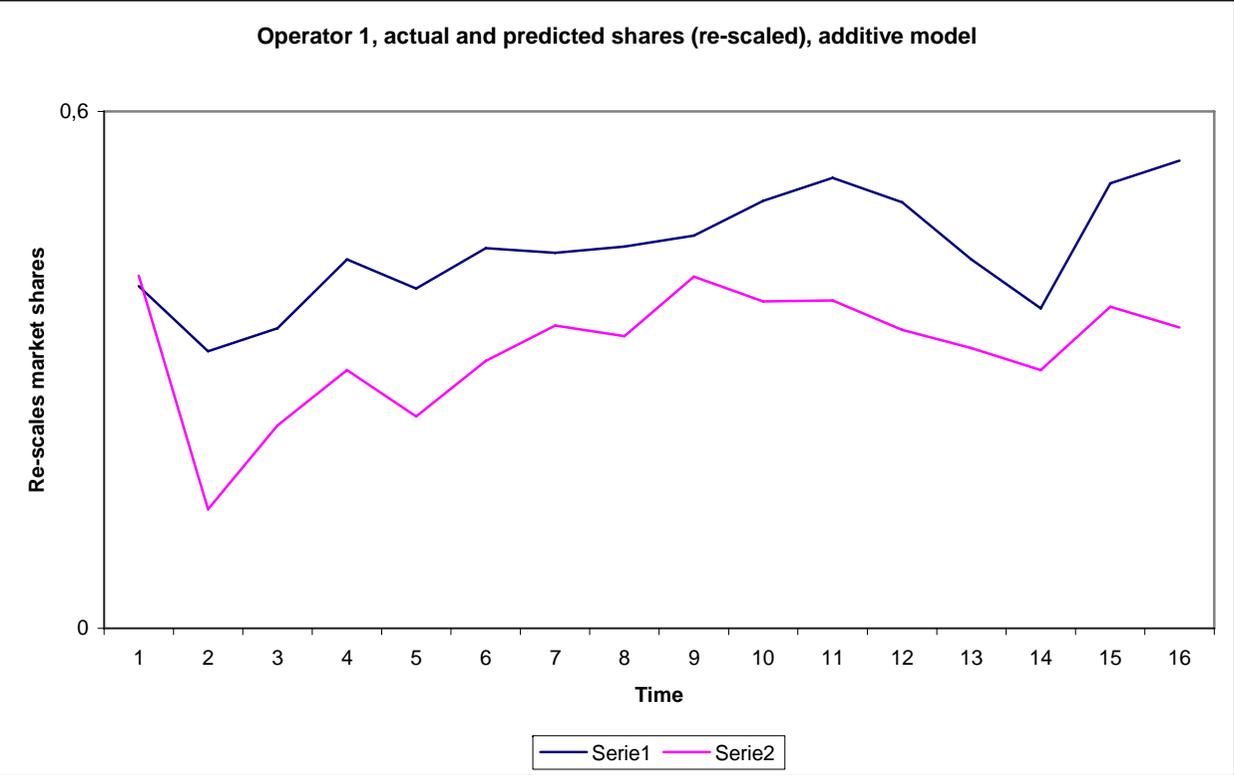
Graph 8: actual and predicted market shares, additive model, operator 2

Operator 2, actual and predicted shares (re-scaled), additive model
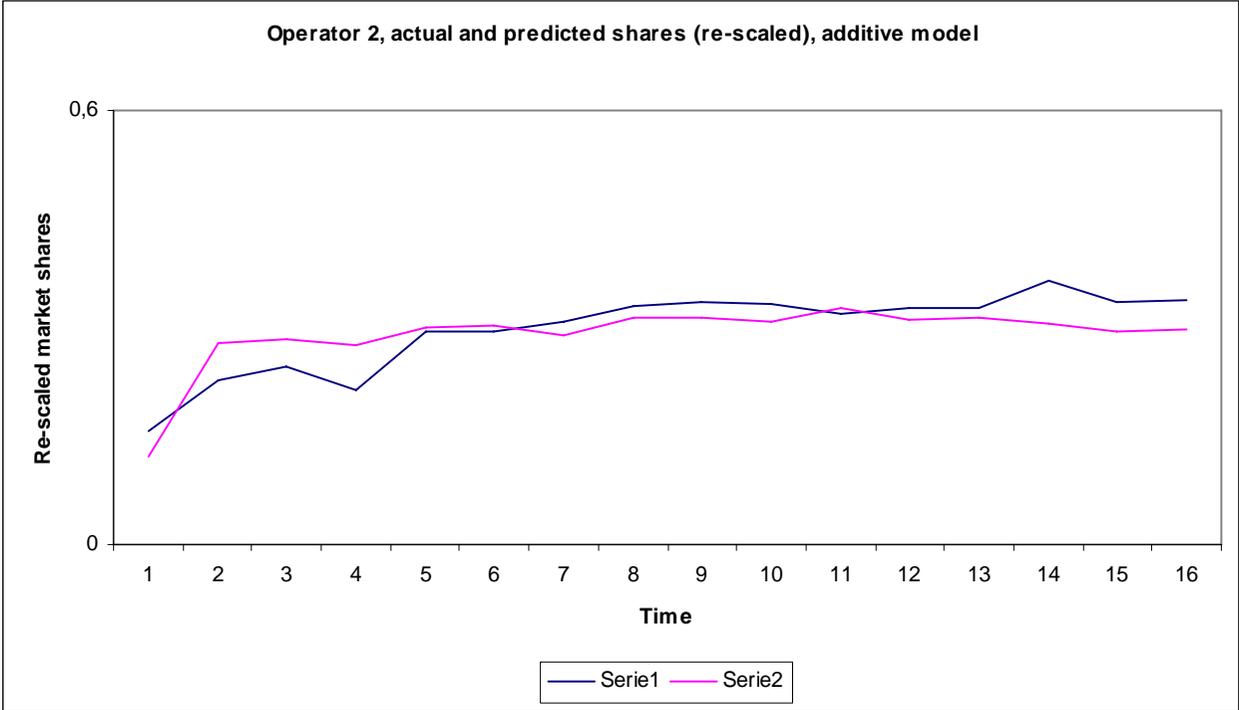
Graph 9: actual and predicted market shares, additive model, operator 3

Operator 3, actual and predicted market shares (re-scaled), additive model
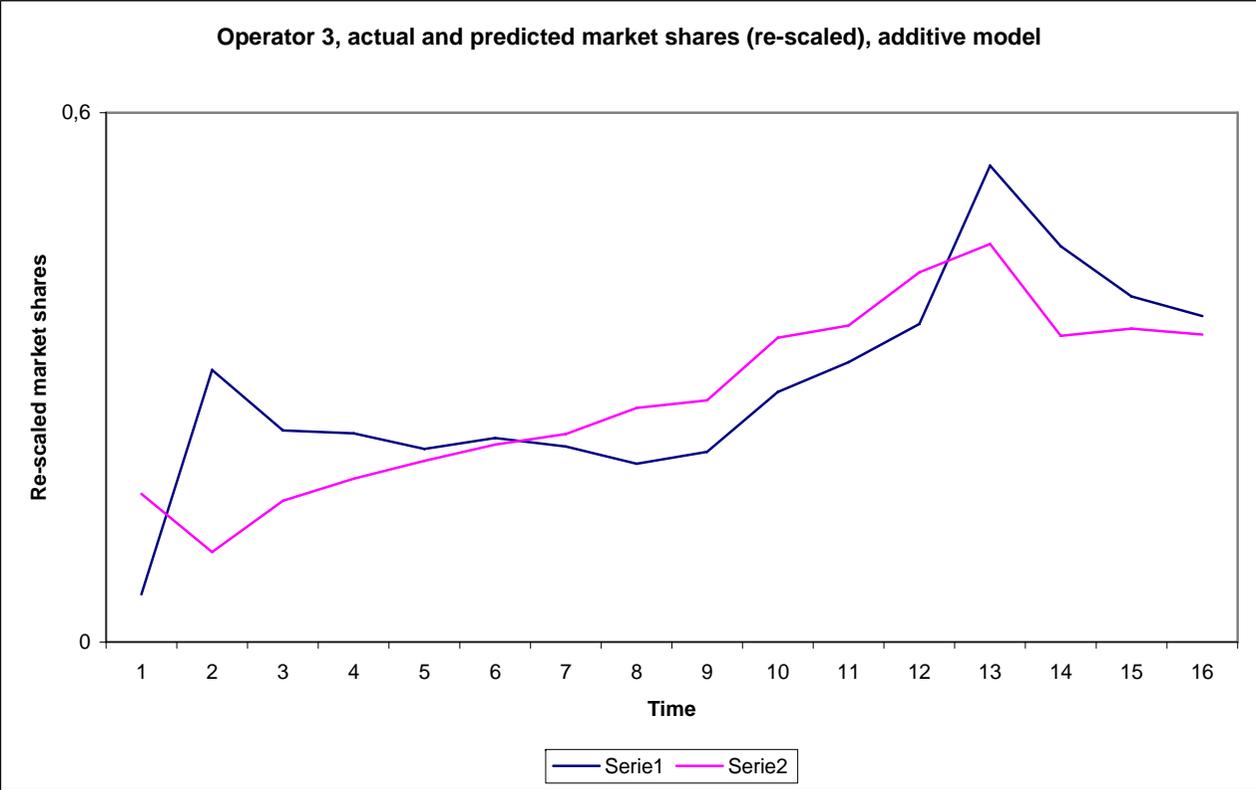
Graph 10: actual and predicted market shares, additive model, operator 4

Operator 4, actual and predicted market shares (re-scaled), additive model