ORDER OF MARKET ENTRY, MARKET AND TECHNOLOGICAL EVOLUTION AND FIRM COMPETITIVE PERFORMANCE

JAIME GOMEZ
GIANVITO LANZOLLA
JUAN PABLO MAICAS

FUNDACIÓN DE LAS CAJAS DE AHORROS
DOCUMENTO DE TRABAJO
Nº 473/2009

De conformidad con la base quinta de la convocatoria del Programa de Estímulo a la Investigación, este trabajo ha sido sometido a evaluación externa anónima de especialistas cualificados a fin de contrastar su nivel técnico.

ISSN: 1988-8767

La serie **DOCUMENTOS DE TRABAJO** incluye avances y resultados de investigaciones dentro de los programas de la Fundación de las Cajas de Ahorros.
Las opiniones son responsabilidad de los autores.

Order of market entry, market and technological evolution and firm competitive performance

Jaime Gomez[1]

Gianvito Lanzolla[2]

Juan Pablo Maicas[3]

Abstract

In this paper, we seek to shed more light on the relationships between order of market entry, industry evolution, and firms' competitive performance. We identify two industry dynamics – i.e. pace of market change and technological discontinuity – and we elaborate on their impact on the competitive performance of first movers, second movers and third movers. We hypothesize that pace of market change and technological discontinuity negatively affects first movers' performance whereas their impact on followers' performance is positive. We test our hypotheses in the context of the European mobile communications industry and we find substantial support for our predictions. Important strategic and policy implications are derived and discussed.

Keywords: order-of-entry-based-advantages, mobile industry, pioneering, pace of market growth, technological discontinuity

JEL classification: M21, L96

[1,3] University of Zaragoza

[2] Cass Business School

Acknowledgements: Financial support from the Spanish Ministry of Education and Science and FEDER (projects SEJ2005-01856 and SEJ2005-05968) and the Regional Government of Aragón (S09-PM062) is gratefully acknowledged. Juan Pablo Maícas also acknowledges financial aid from the Secretary of State of Universities and Research provided through "Estancias de movilidad en el extranjero "José Castillejo" para jóvenes doctores" (JC2008-00222) and from CAI through "Programa Europa", and the hospitality of the Cass Business School (City University of London)..

[3] Correspondence to: Juan Pablo Maícas, Department of Management and Marketing, Universidad de Zaragoza, Gran Vía 2, 50005, Zaragoza, Spain. E-mail: jpmaicas@unizar.es

1. INTRODUCTION

In recent years, the existence or lack of order-of-market-entry-based and first-mover advantages (FMA) has been a popular topic in management, strategy and economics. Theories seeking to explain the FMA and order of market entry effect on competitive performance have progressed along three conceptual categories. First, the basic "isolating mechanisms" – mechanisms through which first movers can be protected from imitative competition – have been identified and classified (Rumelt, 1987; see Lieberman and Montgomery, 1988 for a review). A second stream of research has explored the firm-level resources and capabilities that allow organizations to exploit their market entry strategy (e.g. Robinson, Fornell, and Sullivan, 1992). Finally, a smaller number of researchers have investigated the relationship between environment and competitive advantage based on order of market entry (e.g. Lambkin, 1988). The empirical FMA literature has been unable to provide conclusive evidence supporting or against the existence of order of market entry advantages. Some empirical studies have provided evidence of a negative relationship between order of entry and firm's performance (Bond and Lean, 1977; Whitten, 1979, Robinson and Fornell, 1985; Robinson, 1988) whereas other studies have questioned the existence of such advantages, finding little or no evidence of a relationship between order of entry and market share (Lilien and Yoon, 1990; Schnaars, 1986; Golder and Tellis, 1993). Lieberman and Montgomery's recent strong claim (1998: 1111) that "many of the fundamental conceptual problems that we discussed [in their seminal 1988 paper on the topic] remain unresolved" is a hard but realistic assessment of progress with theory to date. Recent work by Suarez and Lanzolla (2008, 2007 and 2005) has started addressing some of these "fundamental issues", exploring, for instance, the impact of environmental dynamics on the effectiveness of the isolating mechanisms that drive first mover performance. Other “fundamental issues” remain under investigated and existing literature has been unable to provide managers with coherent guidelines for their market entry strategies.

In this paper, building on Suarez and Lanzolla (2007) we expand upon the role of industry dynamics in the competitive performance of firms that enter a market at different points of time. We define two constructs – i.e. pace of market change and technological discontinuity – and we elaborate on their inter-relationships with the isolating mechanisms that can protect, or undermine, first mover, second mover, and third mover’s competitive performance. By focusing on industry change, we bring a dynamic dimension into the macro side of order of entry theory – that is, the enabling or disabling effect of the environment on first-movers, second movers, and third movers advantages does not only depend on the environmental conditions at time of entry, but on their evolution over time.

We test our hypotheses in the context of the European mobile communications industry by estimating pooled OLS models on a longitudinal panel spanning the period 1998 to 2008. Data refers to the competitive performance of around 65 companies in 19 European markets. Model estimations show that technological discontinuity negatively affects first movers’ profitability whereas its impact on second movers and third movers’ profitability is positive. The role of pace of market growth is more controversial. High pace of market growth are likely to negatively affect the profitability of first movers whereas the relationship between pace of market growth and second and third movers’ profitability appears to be weaker. Overall results point towards a clear trend. In the European mobile communications industry, first movers, irrespective of the technological and market dynamics, tend to always outperform second and third movers. These results have important strategic and policy implications which we describe in the last section of the paper.

The rest of the paper is structured as follows. In the following section, we review the literature on first mover advantages. Section 3 provides a theoretical justification for the two dimensions capturing environmental dynamics. The European mobile communications industry and the variables used are described in Section 4. In Section 5, we provide evidence showing the impact of the pace or market growth and the technological discontinuity on order-of-entry based advantages. We close the paper by discussing its main findings and its managerial and policy implications.

2. EXISTING LITERATURE

Theory development on first-mover and order-of-entry advantages has progressed in three conceptual categories: identification of the "isolating mechanisms" through which first movers can protect themselves from imitative competition; firm-level resources and capabilities that allow organizations to exploit FMA; investigation of the relationship between environment and competitive advantage based on order of market entry. The FMA "isolating mechanisms" have been polished, classified and reclassified several times. Golder and Tellis (1993) proposed producer-based versus consumer-based FMA drivers. Day and Freeman (1990) classified the drivers as resources pre-emption, proprietary experience effects and leadership reputation; Mueller (1997) proposed two broad groups: demand-related or "inertial advantages" and supply-related or "efficiency advantages"; and Kerin, Varadarajan and Peterson (1992) clustered them as economic factors, pre-emption factors, technological factors and behavioural factors. The most widely-accepted classification of FMA-isolating mechanisms is often attributed to Lieberman and Montgomery (1988), who proposed three categories: technology leadership; pre-emption of scarce assets; and switching costs/buyer choice under uncertainty. Given the importance of this latter paper in the FMA literature, we will use this classification as the first building block to develop a FMA theory for service products. Technology leadership first-mover advantages aggregate isolating mechanisms such as learning and experience effects, and R&D patenting that give a firm a technological edge over competitors; pre-emptive mechanisms encompass cost advantages arising from advanced appropriation of scarce input resources, forestalling bids for product characteristic spaces and economies of scale due to pre-emptive investment in plants and equipments; and switching costs arise from habit formation in buyers or from the installed-base effect in the presence of network effects.

At the firm level, to the best of our knowledge, existing literature has exclusively focused on manufactured products. An important group of research studies has investigated the effect of firms' resources and capabilities on competitive advantages based on order of entry into markets. In this literature stream, fuelled largely by researchers in the resource-based view of the firm and in industrial economics, the key to capturing possible benefits is linked to firms' assets and strategic manoeuvring. In their view, a firm's ability to derive order-of-entry advantages should be assessed "with reference to the competence and capabilities which new entrants have, relative to the competitors" (Teece, Pisano, and Shuen, 1997: 529 – see also Robinson and Chiang, 2002; Fuentelsaz, Gomez and Polo, 2002).

Investigating the relationship between a firm's environment and FMA, McArthur and Nystrom (1987) and Covin and Slevin (1989) find environmental munificence to be a significant predictor of the strategy-performance relationship, and Lambkin (1988) provides a set of predictions concerning the order of entry strategies most likely to be successful under three environmental dimensions: variability, grain of the variability and uncertainty. More recently, Suarez and Lanzolla (2007) analyze the role of two environmental dynamics –the pace of market evolution and the pace of technology evolution – and show how these can affect the likelihood of obtaining FMA.

Empirical studies have provided evidence of a negative relationship between order of entry and a firm's performance, measured by market share (Bond and Lean, 1977; Whitten, 1979, Robinson and Fornell, 1985; Robinson, 1988), long-term profitability (Lambkin, 1988) and survival (Robinson and Min, 2002). Other studies question the existence of FMA, finding little or no evidence of a relationship between order of entry and market share (Lilien and Yoon, 1990; Schnaars, 1986; Golder and Tellis, 1993), higher return on investment (Boulding and Christen, 2001) and failure risk (Shepherd, 1999). Several authors have identified important shortcomings in the empirical literature on FMA, which may explain some of the contradictory findings. Among these shortcomings are inconsistencies in the definition of the dependent variables; biased sample selection; and failure to control for entrant capabilities (Anderson and Paine, 1978; Ramanujam and Venkatraman, 1984; Szymansky, Troy, and Bharadwaj, 1995; VanderWerf and Mahon, 1997).

Yet, despite several progresses to date, the relationship between order of market entry and competitive performance remains substantially controversial.

3. HYPOTHESES DEVELOPMENT

Suarez and Lanzolla's (2007) have claimed that to enhance the predictive power of the theory related to the order-of-market-entry-based advantages, scholars should explicitly and formally elaborate on the interlink between environmental variables and isolating mechanisms that underpin these advantages. In this paper, we expand upon this claim. We integrate arguments from economics, consumer behavior, service strategy and technology management to elaborate on the role of industry dynamics in the isolating mechanisms that underpin market entry timing based performance for firms. Building on Suarez and Lanzolla (2007) we identify two such dynamics – i.e. pace of market change and technological change – and we show how they interact with the isolating mechanisms – e.g. resource pre-emption, technology leadership, and buyer's switching costs (Lieberman and Montgomery, 1988) – to affect performance for first movers, second movers and third movers.

Pace of market change, order of market entry and firms' profitability

Market evolution in a given product category, often measured in sales, household penetration, or number of adopters, is influenced by several market-related dynamics: e.g. changes in consumer tastes or preferences (Moore, 1999), emergence of new regulations, degree of market fragmentation, and consumer learning (Agarwal and Bayus, 2002). Our core construct pace of market evolution reflects the combined effect of these market-related dynamics within a product category. Several researchers have studied the impact of market evolution on the relationship between order of entry and performance: Agarwal, Sarkar and Echambadi (2002) study 33 product innovations and find that an industry's growth pattern has a significant "conditioning effect" on the relationship between entry timing and firm survival; Bohlmann, Golder and Mitra (2002) suggest that first mover advantages are more sustainable in markets where horizontal (as opposed to quality-based) product differentiation, predominates – a situation more common in slow-growing (mature) markets (Utterback, 1994). The pace of market growth has important implications for the effectiveness of buyer pre-emption mechanisms. The ability of a firm to pre-empt scarce market resources has been shown to depend on the pace at which an industry is growing. A situation of high market growth implies that, at any point in time, there would always be sufficient market resources – e.g. enough buyers – for new entrants. This is consistent with the findings of theoretical models of industrial organization, where a fast-growing market in the presence of network effects has been found to be key to overcoming a new product's entry-timing advantage (Katz and Shapiro, 1992). Organizational theorists have shown that environmental munificence – the scarcity or abundance of critical resources needed by firms operating within an environment – effectively determines the rate at which new competitors can be effectively added to the population (Pfeffer and Salancik, 1978). Overall, abrupt market dynamics have a high potential to undermine the effectiveness of isolating mechanisms for first movers.

Hypothesis 1a: The higher the pace of market growth the higher the loss in first mover's profitability.

Especially if technology does not change significantly, for later entrants it is easier to come up with higher-quality products, or innovative solutions that can enable powerful vintage effects (Bohlmann, Golder and Mitra, 2002). An abrupt market evolution will make it easier for later entrants to find market spaces that have not yet been exploited by incumbents in which to grow and survive (Christensen, 1997). Katz and Shapiro (1992) have shown that "excess inertia" – a bias towards the competitive advantage achieved by an earlier entrant – can be overcome under the assumption of fast market growth.

Hypothesis 1b: The higher the pace of market growth, the higher the gain in second mover's profitability.

Hypothesis 1c: The higher the pace of market growth, the higher the gain in third mover's profitability.

Technological discontinuity, order of market entry and firms' profitability

The pace at which technology evolves directly affects the possibility of deriving first-mover advantages through technology leadership. For instance, the advantage derived from entering first into a market can be linked to a firm's ability to keep up with the evolution of knowledge within the industry. Technology evolution may render a firm's knowledge obsolete, destroy existing competences (Leonard-Barton, 1992; Henderson and Clark, 1990; Tushman and Anderson, 1986; Schilling, 2002), and negate possible "experience curve" advantages (Lieberman, 1989). Bohlmann, Golder and Mitra (2002) provide theoretical and empirical evidence to show that first mover advantages are difficult to sustain in product categories with high "vintage effects" – i.e. where product quality significantly improves over time. Christensen, Suarez and Utterback (1998) find that, in the fast-changing rigid disk drive industry, “the notion of first mover advantage is not applicable” (p. S207). Christensen (1997) shows how technological change allows for a new breed of late entrants in the steel and disk drive industries. Technology evolution also impacts on the effectiveness of patents and other forms of intellectual property protection. The economics literature on patenting has shown that a firm’s ability to protect its underlying product technology varies across industries with technology being a main moderator (Levin, Klevorick, Nelson and Winter, 1987). Empirical evidence suggests that about 60% of successful innovations are imitated within four years (Mansfield, Schawarts, and Wagner, 1991). A technological discontinuity may give latecomers plenty of opportunities to “invent around” a patent and come up with improved products that do not necessarily infringe on patent rights. These technology-driven options or gateways (Bain, 1956) to the market reduce the effectiveness of intellectual protection and provide more opportunities for later entrants to challenge first movers’ technology leadership. Technological evolution also affects key antecedents of buyers’ switching costs, such as domain expertise (Wernerfelt, 1985), or consumer preferences formation (Carpenter and Nakamoto, 1989). As has already been stated, technological discontinuity tends to result in a succession of different technology generations or “vintages” – each of which makes the previous one obsolete. When buyers perceive this “technological uncertainty”, they tend not to commit themselves to product-specific learning (Schmalensee, 1982; Carpenter and Nakamoto, 1989) – a phenomenon particularly relevant for experience goods that can be evaluated only after purchase (Nelson, 1980) and to standards-war situations where two or more incompatible technologies compete for market dominance (Suarez 2004). First movers who risk introducing an “underdeveloped” product also incur the risk that “negative word of mouth” will make final customers more willing to switch to alternative products (Kalish and Lilien, 1986; Cady, 1985).

Hypothesis 2a: Technological discontinuity decreases first mover's profitability.

Hypothesis 2b: Technological discontinuity increases second mover's profitability.

Hypothesis 2c: Technological discontinuity increases third mover's profitability.

4. RESEARCH SETTING, SAMPLE AND VARIABLES

Research setting: the European mobile communication industry

To test our hypotheses we focused on the mobile communication industry. Mobile communications industry has had an impressive growth in the last two decades and it has been the focus of attention on an increasing number of researches (Kim and Kwon, 2003; Birke and Swann, 2006; Lee *et al.*, 2006; Doganoglu and Grzybowski, 2007; Grzybowski, 2007; Gomez and Maicas, 2008). Mobile communications industry constitutes an appealing laboratory for testing and analyzing order of market entry advantages for several reasons.

First, entry into the mobile telecommunication industry has taken place in a number of waves, most of times clashing with the introduction of a new generation of technology (GSM or UMTS). Therefore, we can properly identify different groups of operators depending on their entry timing - e.g. first entrants, second movers, late followers. Regarding entry, Boulding and Christen (2003) maintain that the conceptual issue of endogenous entry order has become one of the classic empirical issues. Entry in mobile communications industry is completely exogenous (Usero and Fernandez, 2008), as long as the national Governments have to decide when they want to put into the market new licences. The most accepted argument to defend Government intervention in this industry in terms of entry is that the radio spectrum is considered a scarce resource, so that entry is regulated by the Governments through licensing to a better allocation of this scarce resource. Therefore, companies must acquire a licence to operate in a particular market.[1] These licences usually imply certain commitments in terms of infrastructure development and coverage. As a result of the previous discussion, some of the problems that arise with the endogenous nature of the entry (Vanderwef and Mahon, 1997) are avoided in our case.

Second, in spite of the existence of some exceptions (see, for example, Mascarenhas, 1998 or Song, Di Benedetto and Zhao, 1999), most of the empirical research on first mover advantages refers to just one country. Our paper, on the contrary, is based on the analysis of order of entry advantages across different countries. The significance of countries in explaining differences on order of entry advantages would give an important role to the context in a deeper understanding of FMA as a strategic management theory (Hitt *et al*., 2007; Bamberger, 2008). Having the possibility of comparing a group of countries, important implications for regulatory policy could emerge.

Third, Lieberman (2007) suggests that first mover advantages are more likely to occur in markets with network effects. Telecommunications in general and mobile communications in particular are paradigmatic examples of the truly operation of network effects (Maicas, Polo and Sese, 2009).

Fourth, it is important to note that the European mobile communications industry has grown impressively in recent years. Its average penetration rate has increased from around 30% at the end of 1998 to slightly over 100% at the end of 2007. Gruber and Verboven (2001a, 2001b) have analyzed this process all over the world and postulate that this rapid diffusion can be attributed to the setting of one single digital standard (which implies a substantial reduction in costs, with the subsequent effect on prices) and to the introduction of competition in the second generation technology. Doganoglu and Grzybowski (2007) complement this view, pointing out that this fast development has had an additional driver:

[1] Auction or by beauty contest are the most common systems to allocate licences in mobile communications. See Klemperer (2002) for a more detailed review of these two alternatives.

the presence of a technology with significant network effects. To sum up, the period in which we have carried out our empirical research is characterized by an abrupt market growth during the late 90s' and the first years of 00s', following by a period in which the growth rate has considerably decreased – i.e. smooth pace of market evolution (see Table 1 for more details). Thus, the variable market growth has enough variability to test the hypotheses described above.

TABLE 1. MARKET GROWTH BY YEAR AND COUNTRY

Country	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Austria	0.87	0.60	0.22	0.02	0.06	0.09	0.08	0.09	0.08	0.09
Belgium	0.81	0.75	0.56	0.11	0.02	0.09	0.06	0.05	0.08	0.09
Czech Republic	--	1.22	0.61	0.39	0.15	0.12	0.09	0.06	0.07	0.06
Denmark	--	0.33	0.33	0.08	0.18	0.11	0.00	0.06	0.14	0.10
Finland	0.14	0.11	0.14	0.09	0.04	0.05	0.11	0.08	0.06	0.11
France	--	0.64	0.33	0.12	0.06	0.07	0.07	0.06	0.06	0.07
Germany	0.87	0.97	0.51	0.04	0.09	0.10	0.10	0.10	0.11	0.13
Greece	0.89	0.64	0.41	0.22	0.19	0.04	0.10	0.13	0.16	0.13
Hungary	--	0.47	0.39	0.54	0.23	0.12	0.05	0.08	0.10	0.14
Irland	--	--	0.36	0.11	0.07	0.11	0.12	0.10	0.09	0.09
Italy	0.50	0.44	0.29	0.10	0.05	0.09	0.12	0.14	0.12	0.07
Netherlands	1.03	0.71	0.29	0.03	0.06	0.17	0.11	0.01	0.06	0.08
Norway	--	0.18	0.16	0.10	0.07	0.10	0.08	0.06	0.02	0.02
Poland	--	--	--	0.40	0.31	0.29	0.30	0.26	0.18	0.08
Portugal	0.60	0.41	0.40	0.17	0.10	0.04	0.07	0.10	0.10	0.11
Spain	0.99	0.89	0.31	0.17	0.12	0.06	0.09	0.10	0.07	0.06
Sweden	0.23	0.23	0.16	0.12	0.09	0.10	0.06	0.04	0.02	0.09
Switzerland	--	0.75	0.20	0.14	0.04	0.07	0.06	0.09	0.09	0.08
United Kingdom	0.84	0.77	0.39	0.09	0.07	0.12	0.11	0.06	0.05	0.04
Average	0.74	0.59	0.33	0.14	0.10	0.10	0.10	0.09	0.09	0.09

Fifth, we can observe a clear technological discontinuity during our window of observations with the introduction of UMTS technology (see Table 2 to follow the evolution of operators that implement UMTS). In fact, this is not a firm specific technological change. So that, it cannot be understood as a strategic weapon through which firms can either innovate or differentiate themselves. As long as the technology is standardized, it is rather a common shift available for all the operators in the same conditions. However, the implementation of UMTS has mainly allowed the introduction of new operators in the market. Therefore, this technological improvement has had important implications in terms of market structure.

TABLE 2. NUMBER OF FIRMS OPERATING IN UMTS BY YEAR

Quarter	First Movers	Second Movers	Third Movers
2003-2	1	--	--
2003-3	1	--	--
2003-4	1	--	--
2004-1	2	1	1
2004-2	10	3	2
2004-3	12	4	4
2004-4	16	5	6
2005-1	21	6	7
2005-2	21	7	8
2005-3	23	7	8
2005-4	25	9	9
2006-1	27	10	11
2006-2	27	10	11
2006-3	27	12	11
2006-4	29	14	11
2007-1	30	14	13

Sample characteristics

We have conducted our empirical application on the European mobile communications industry. The available data belong to mobile telecommunications operators in 19 European markets between 1998 and 2008.[2] Our data contains the entire census of firms during the 1998-2008 period. Therefore, our sample does not suffer from survival bias for the period under analysis. The data for the sample was gathered from multiple sources, but the principal one is the Merrill Lynch Global Wireless Matrix. This publication yields quarterly

[2] The European countries considered in our research are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

information on several of the variables of interest such as the name of the operators, the number of subscribers, the number of operators per market and its performance. We have collected information about the date of entry of the operators and their status as a former state monopolist mainly from their websites and other industry reports. These data have been complemented with information from other sources such as the International Telecommunications Union (ITU).

Table 3 shows the evolution of the number of operators by period and number of years in the market from the last quarter of 1998, the first period for which data is available, to the second quarter of 2008. The number of firms ranges from 54 at the beginning of our observation period to 64 at the end.[3] Similarly, the number of operators in our time horizon ranges from 2 to 5 depending on the country analyzed. The distribution of the number of firms per country is relatively stable, with few entries and exits during the period considered. In particular, it is almost impossible to find operators exiting the market in our window. However, some entries took place coinciding with the licensing of the 3G technology. It is also important to note that network operators may sell services to consumers directly or indirectly through mobile virtual network operators (MVNO). However, the availability of data does not allow us to consider MVNO as individual entities. In fact, they are embedded in the operator to whom they purchase the radio spectrum.

[3] It should be noted that this analysis does not take into account those firms for which we do not have information about the dependent variable (EBITDA). Overall, the number of operators in the market is slightly higher.

TABLE 3. NUMBER OF OPERATORS BY QUARTER AND YEARS IN THE MARKET

Term	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
1998-4	10	3	7	3	6	9	14	2	--	--	--	--	--	--	--	--	--	54
1999-1	10	5	8	3	3	10	14	4	--	--	--	--	--	--	--	--	--	57
1999-2	11	5	6	5	--	9	14	8	--	--	--	--	--	--	--	--	--	58
1999-3	7	9	1	8	2	7	11	13	--	--	--	--	--	--	--	--	--	58
1999-4	6	9	3	7	3	6	9	14	2	--	--	--	--	--	--	--	--	59
2000-1	3	10	5	8	3	3	10	14	4	--	--	--	--	--	--	--	--	60
2000-2	4	11	5	6	5	--	9	14	8	--	--	--	--	--	--	--	--	62
2000-3	4	7	9	1	8	2	7	11	13	--	--	--	--	--	--	--	--	62
2000-4	3	6	9	3	7	3	6	9	14	2	--	--	--	--	--	--	--	62
2001-1	4	3	10	5	8	3	3	10	14	4	--	--	--	--	--	--	--	64
2001-2	2	4	11	5	6	5	--	9	14	8	--	--	--	--	--	--	--	64
2001-3	2	4	7	9	1	8	2	7	11	13	--	--	--	--	--	--	--	64
2001-4	2	3	6	9	3	7	3	6	9	14	2	--	--	--	--	--	--	64
2002-1	--	4	3	10	5	8	3	3	10	14	4	--	--	--	--	--	--	64
2002-2	--	2	4	11	5	6	5	--	9	14	8	--	--	--	--	--	--	64
2002-3	1	2	4	7	9	1	8	2	7	11	13	--	--	--	--	--	--	65
2002-4	1	2	2	6	9	3	7	3	6	9	14	2	--	--	--	--	--	64
2003-1	2	--	3	3	10	5	8	3	3	10	14	4	--	--	--	--	--	65
2003-2	3	1	2	3	11	4	6	5	--	9	14	8	--	--	--	--	--	66
2003-3	3	1	2	3	7	8	1	8	2	7	11	13	--	--	--	--	--	66
2003-4	5	1	2	2	6	8	3	7	3	6	9	14	2	--	--	--	--	68
2004-1	3	3	--	3	3	10	4	8	3	3	10	14	4	--	--	--	--	68
2004-2	2	3	1	2	3	11	4	6	5	--	9	14	8	--	--	--	--	68
2004-3	1	4	1	2	3	7	8	1	8	2	7	11	13	--	--	--	--	68
2004-4	1	4	1	2	2	6	8	2	7	3	6	9	14	2	--	--	--	67
2005-1	1	2	3	--	3	3	10	3	8	3	3	10	14	4	--	--	--	67
2005-2	1	1	3	1	2	3	11	3	6	5	--	9	14	8	--	--	--	67
2005-3	1	--	4	1	2	3	7	7	1	8	2	7	11	13	--	--	--	67
2005-4	1	--	4	1	2	2	6	7	2	7	3	6	9	14	2	--	--	66
2006-1	1	--	2	3	--	3	3	9	3	8	3	4	9	14	4	--	--	66
2006-2	1	--	1	3	1	2	2	10	3	6	5	1	8	14	8	--	--	65
2006-3	1	--	--	4	1	2	2	7	6	1	8	3	6	11	13	--	--	65
2006-4	1	--	--	4	1	2	1	6	7	2	7	4	5	9	14	2	--	65
2007-1	1	--	--	2	3	--	2	3	9	3	8	4	3	9	14	4	--	65
2007-2	2	--	--	1	3	--	2	2	10	3	6	6	--	8	14	8	--	65
2007-3	2	--	--	--	4	--	2	2	7	6	1	9	2	6	11	13	--	65
2007-4	2	--	--	--	4	--	2	1	5	7	2	8	3	5	9	14	2	64
2008-1	1	1	--	--	2	2	--	2	3	8	3	9	3	3	9	14	4	64
2008-2	1	1	--	--	1	3	--	2	2	9	3	7	5	--	8	14	8	64

Descriptive statistics and correlations among the variables that will be included in the analysis are reported in the Appendix. As it can be observed, our resulting panel contains 1,934 observations.

Dependent variable

Most empirical literature on first mover advantages uses market share as the dependent variable. According to previous research, this increases the likelihood of finding them and could strongly bias the results (VanderWerf and Mahon, 1997). Recently, Lieberman (2009) suggests that FMA's benefits *pertain to economic profit; however, many studies focus on market share, which is easier to measure*. For this reason, profitability is recommended as a more adequate proxy of performance when testing for first mover advantages (Lieberman and Montgomery, 1998). In our empirical setting the profitability of firm is measured through the margin EBITDA (Earnings Before Interests, Tax, Depreciation and Amortization) divided by Total Revenues of the firm. The availability of data allows us to use quarterly information.

Independent variables

Order of market entry. Different concepts of pioneering have been used when modelling first mover advantages. Brown and Lattin (1994) point out that there has been some disagreement about what exactly pioneering means. Whereas some researchers only use the order of entry as their main variable, other authors combine it with complementary variables. For example, Urban *et al*. (1986), in their model of relative market share, use what they call the lag between entries, measured as the number of years elapsed between the entries of two different brands. In a similar vein, Brown and Lattin (1994) introduce the ratio between the time in the market of a late entrant and the time in the market of the pioneer in a market share attraction model. Our identification of first movers take into account the idea we have 19 independent markets and the first mover advantage should be related to the order of entry in each of these markets. Accordingly, we define a set of dummy variables which takes into account whether the firm is the pioneer, the second entrant, the third entrant or a late follower, with the last category serving as the base case. To define pioneer we consider the first firm or the first two firms -when the lead time that separates both is negligible- to enter in a particular market.[4]

Pace of market growth. The theoretical development exposed above mentions the path of market evolution of a particular industry as one of the environmental enablers or disablers of order of market entry advantages. Market evolution is usually characterized by an initial period of slow growth, followed by an increase or "sales takeoff" and a later phase of market maturity or decline. This market evolution has been previously analyzed in the context of mobile communications industry in terms of its diffusion (Gruber and Verboven, 2001a, 2001b; Doganoglu and Grzybowski, 2007). We have calculated pace of market growth, using the population of users per market on a yearly basis. In this way, our market growth variable measures the increase in the number of users on a yearly basis.

Technology discontinuity. The pace of technology evolution has been also defined as an environmental enabler or disabler of first mover advantages. As Suarez and Lanzolla (2007:382) suggest *different product categories may experience very different paces of technology evolution up to OM*. In particular, European mobile communications has a very specific "guided" technology evolution. As we previously mentioned, technological change in mobile communications is not firm specific. More specifically, the development of the industry has been managed in supranational arenas. This has provided homogeneity and favoured, for instance, roaming agreements across European countries. Characterizing technology evolution in mobile communications, GSM and UMTS were established as

[4] There is no case with three or more operators entering the market at the same time.

technology standards in the Euro zone.[5] We account for technology evolution introducing a dummy variable called UMTS which takes value 1 from the moment in which the first company in a market adopts this technology and 0 previously to this moment. With this we assume that once a firm adopts a particular technology, this technology is available in the market.

Control variables

In addition to the variables used to test the hypotheses proposed above and the order of entry, we also control for other factors. First, we control for the fact that the operator was the former landline state monopolist. Former monopolists may have advantages in terms of market knowledge or they may be better able to cope with the specificities of the institutional context in which the activities are going to be developed. Additionally, there is evidence that shows that some governments could have chosen the timing of deregulation of their mobile markets according to the productivity of their national firms (Duso and Roller, 2003), which suggests the convenience of distinguishing between first mover advantages and other explanations of profitability differences. Despite the fact that monopolists were, in many instances, the pioneers, there are, at least, two differences with the variable accounting for the pioneer. On the one hand, in some countries the monopolist was not the first firm to enter the market. On the other hand, the way in which pioneers have been defined (the first firms entering the market in a window of six months) opens the possibility of having more than one "pioneer" for the same country. The expected sign is that former monopolists better perform than the rest of competitors, that is, we expect a positive and significant sign. We also calculate a measure for country specific rivalry counting the number of firms operating in each market. Our expectation is that less concentrated countries should show lower

[5] Gandal (2002) discusses the implications of setting a common standard vs. leaving the market to determine one (or several) of them.

profitability, that is, we expect negative and significant sign. Finally, we also define country and year time dummies in order to control for country and time specific influences respectively.

5. RESULTS

Table 4 shows robust estimates (pooled OLS) of the impact of pace of market change and technological discontinuity in order-of-market-entry-based firms' profitability. To test our hypotheses, we run six models. In Model 1 we only introduce the control variables. In Model 2 we add the dummy variables accounting for order of market entry. Model 3 introduces the direct effects of pace of market growth and technological discontinuity. The interaction variables in Models 4 to 6 show the impact of pace of market growth and technological discontinuities on the competitive performance of first, second and third movers. Model 4 show the role of these variables on pioneer's performance. Model 5 introduces the interaction between pace of market growth and technological discontinuity and second and third entrants' performance. In Model 6, we introduce dummy variables to account for time as long with all the other variables defined in this study.

TABLE 4. THE EFFECT OF PIONEERING ON PROFITABILITY

Dependent variable	EBITDA (1)	EBITDA (2)	EBITDA (3)	EBITDA (4)	EBITDA (5)	EBITDA (6)
Pioneer		0,394*** (7,67)	0,398*** (8,37)	0,471*** (8,43)	0,691*** (4,75)	0,690*** (4,79)
Second entrant		0,258*** (4,83)	0,265*** (5,31)	0,278*** (5,92)	0,447*** (2,98)	0,449*** (3,02)
Third entrant		0,174*** (3,27)	0,173*** (3,24)	0,182*** (3,92)	0,473*** (3,19)	0,474*** (3,23)
Market growth			-0,305*** (-6,90)	-0,379*** (-5,08)	-0,306** (-1,96)	-0,095 (-0,60)
Technological discontinuity			0,048*** (4,72)	0,149*** (7,80)	0,470*** (3,49)	0,433*** (3,25)
Pioneer*MG				0,185** (2,39)	0,112 (0,71)	0,157 (1,03)
Pioneer*TD				-0,189*** (-9,01)	-0,510*** (-3,80)	-0,519*** (-3,90)
Second entrant*MG					0,198 (1,18)	0,234 (1,43)
Second entrant*TD					-0,309*** (-2,25)	-0,315** (-2,32)
Third entrant*MG					-0,287 (-1,44)	-0,251 (-1,30)
Third entrant*TD					-0,375*** (-2,77)	-0,385*** (-2,87)
Former state monopolist	0,159*** (16,68)	0,038*** (5,76)	0,041*** (5,74)	0,038*** (5,29)	0,039*** (5,32)	0,039*** (5,25)
Number of operators	-0,010 (-0,80)	0,008 (0,72)	-0,049*** (-3,91)	-0,052*** (-4,38)	-0,054*** (-4,63)	-0,078*** (-6,07)
Constant	0,271*** (5,05)	-0,013 (-0,21)	0,270*** (4,32)	0,239*** (3,67)	0,039 (0,28)	-0,033 (-0,23)
Year dummies	No	No	No	No	No	Yes***
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1934	1934	1934	1934	1934	1934
Adjusted R-Squared	0.18	0.28	0.36	0.41	0.43	0.46
F-test vs. 1		96.64***	63.49***	54.54***	50.90***	33.24***
F-test vs. 2			57.30***	46.83***	35.04***	19.68***
F-test vs. 3				71.38***	32.62***	15.96***
F-test vs. 4					9.19***	6.27***
F-test vs. 5						5.60***

Focusing on the global fit of our estimations, we can observe that the adjusted R-squared varies between 0.18 and 0.46, depending on the model chosen. Importantly, the nested models present an increasing (and significant) fit, with the full model (Model 6) having the highest value (0.46) and being preferred to the other ones. This can be also inferred from the F-tests. In Model 2, as expected, the variables capturing the order of market entry are positive and highly significant. In other words, the order of market entry explains profitability differences between mobile telecommunication firms. Specifically, pioneers have a higher profitability than second and third entrants. Model 3 introduces the direct effects of pace of market growth and technological discontinuity. Surprisingly, the overall effect of pace of market growth on firms' profitability is negative, pointing out that firms are not able to benefit from the fact that new consumers use telecommunication services. Conversely, the overall impact of technological discontinuity on profitability is positive. Therefore, the changes in the technology that supports the telecommunication services provided are positive in terms of the profitability earned by the firms operating in the market. Hypotheses 1a, 1b and 1c focus on the role of pace of market growth and, jointly, Models 4 and 5 allow us to assess its net effect on order-of-market-entry-based firms' profitability. Model 4 and Model 5 show the moderating effect of pace of market growth and technological discontinuity distinguishing between the pioneer and its followers. Several of these interactions are significant and help us to explain profitability differences in the European telecommunication industry. The net effect of pace of market growth on first mover, second mover and third movers' profitability is negative. The interaction coefficients pioneer*MG, second entrant*MG and third entrant*MG are either not significant or, in the case of the pioneer (in Model 4), unable to compensate for the negative net direct effect. Overall, we can conclude that the pace of market growth negatively affects first, second and third movers' profitability.

Thus, based on Model 5, hypothesis 1a is confirmed whereas hypotheses 1b and 1c are not corroborated.

Hypotheses 2a, 2b and 2c focus on the role of technological discontinuity. In all models, the direct effect of technological discontinuity on the profitability of firms is positive whereas the net effect on the pioneer is negative. Given that our definition of the different types of entrants includes four categories, the estimation of column 5 adds the moderating effect of both pace of market growth and technological discontinuity for the second and third mover. Both direct effects remain significant and maintain their signs. A number of interaction effects between pace of market growth and technological discontinuity and order of market entry dummies are significant. The net effect of this variable is negative only in the case of the pioneer, with the second, third and subsequent entrants enjoying the benefits of changes in the technology that underlies the service provided. Consequently, hypotheses 2a, 2b and 2c are supported.

Model 6 presents the full model, with the introduction of time dummies. The results of the F-test, which compares the nested models, lead us to conclude that this is the preferred model. The reason to delay the introduction of the time dummies up to this point has to do with their potential to capture the effects of market growth. In Model 6 we consider the possibility that the significance of market growth may be partially driven by the passage of time. In order to avoid any confounding effects– i.e. to disentangle the effect of market growth from other time related factors– we also control for time effects. In fact, the observation of the coefficients corresponding to this variable (both the ones accounting for direct and moderating effects) reveal that the introduction of time dummies in the model slightly modify some of our previous results. More precisely, the direct effect of market growth becomes non-significant whereas no change is observed for the effect of technical discontinuity on profitability. Pioneers' profitability is reduced with technology changes, whereas all the followers (specially the last entrants) do benefit from them. Hypotheses 2a, 2b and 2c are confirmed. Conversely, nothing can be said about Hypotheses 1a, 1b and 1c.

A way to ease the interpretation of our results is to estimate average profitability via-a-vis order of market entry. Based on Model 6's coefficients and assuming average values for all the variables different from "order of entry" and its interactions. In Table 5 we calculate the average predicted profitability for first, second and third movers, in the case with technological discontinuity and without technological discontinuity. As it can be observed, pioneers do have a profitability advantage regardless of the technological context. Yet, pioneers' advantage is clearly eroded in the case in which technological discontinuities do occur. More precisely, a change in the technology supporting telecommunication services reduces their profitability from 0.40 to 0.32. Contrarily, second and third entrants seem to obtain clear benefits from technological discontinuities: the profitability of the second entrant increases from 0.18 to 0.30, whereas the one of the third entrant changes from 0.12 to 0.17.

TABLE 5. PROFITABILITY PREDICTIONS (EBITDA)

Full Sample (1998-2008)

No tech discontinuity	Pioneer	Second	Third
	0.4	0.18	0.12

Tech discontinuity	Pioneer	Second	Third
	0.32	0.30	0.17

Sample 1 (1998-2001)

	Pioneer	Second	Third
Mean + St.	0.29	0.24	-0.20
Mean	0.40	0.10	-0.08
Mean - St.	0.51	-0.04	0.04

Sample 2 (2002-2008)

No tech discontinuity	Pioneer	Second	Third
Mean + St.	0.45	0.30	0.27
Mean	0.44	0.30	0.24
Mean - St.	0.43	0.30	0.22

Tech discontinuity	Pioneer	Second	Third
Mean + St.	0.41	0.36	0.32
Mean	0.40	0.36	0.29
Mean - St.	0.39	0.37	0.26

Additional results

In order to test for the robustness of our results, we then ran the same models shown in Table 4 by breaking down the sample into two subsamples. Figure 1 shows that two different periods can be clearly detected in the evolution of this industry. In the first one, from 1998 to 2001, market growth is abrupt and averages a 45%/year. In the second one, from 2002 to 2008, market growth stabilizes and averages a 10%/year. Based on these observations, we broke our samples into two separate periods: 1998 to 2001 and 2001 to 2008.

FIGURE 1. AVERAGE MARKET GROWTH (1998-2008)

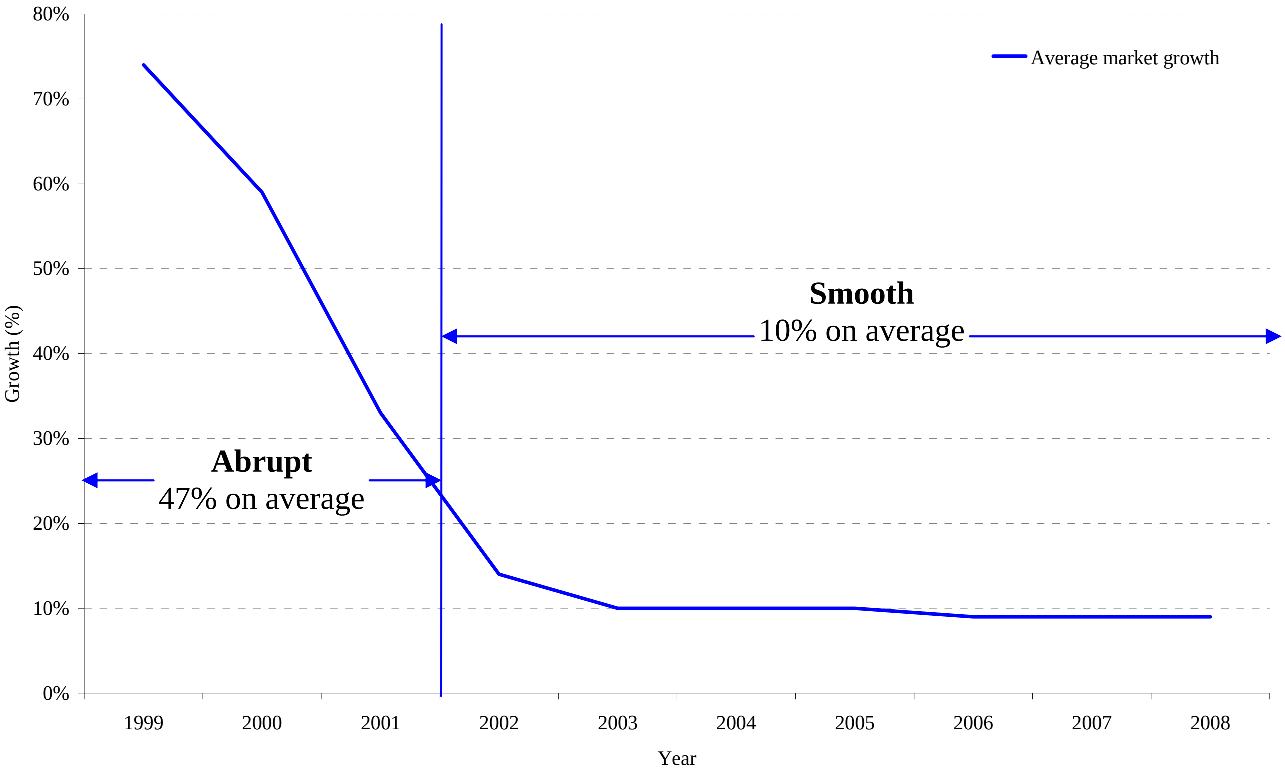

Table 6 shows model estimations for the first period (1998-2001). In this period, there is no possibility of analyzing the impact of technological discontinuity on performance, as UMTS was not in use in any of the countries analysed. Several points are noteworthy. First, we can observe a slight increase in the global adjustment of the model. Second, the full model (Model 6) presents the highest R-squared (0.49), although the improvement over Model 5 is not significant. Third, some of the control variables lose their significance. The condition of former state monopolist positively affects profitability but it is only significant in three over the six models we estimate. On the contrary, the number of firms operating in the market is not significant in any of the estimations. The pattern of influences of the dummies accounting for the order of entry is respected in models 2 and 3. In both cases pioneers have a higher profitability than followers, reinforcing the idea that pioneers advantages are important in our setting.

TABLE 6. THE EFFECT OF PIONEERING ON PROFITABILITY
1998-2001

Dependent variable	EBITDA (1)	EBITDA (2)	EBITDA (3)	EBITDA (4)	EBITDA (5)	EBITDA (6)
Pioneer		0.778*** (10.14)	0.779*** (-11.32)	1.065*** (7.86)	0.806*** (8.10)	0.786*** (8.00)
Second entrant		0.452*** (4.71)	0.454*** (-5.06)	0.540*** (6.33)	0.067 (0.52)	0.049 (0.38)
Third entrant		0.260*** (3.07)	0.254*** (3.30)	0.322*** (3.87)	0.336*** (3.06)	0.312*** (2.81)
Market growth			-0.206*** (-2.98)	-0.031 (-0.28)	-0.351*** (-2.87)	-0.257* (-1.93)
Pioneer*MG				-0.425*** (-2.69)	-0.055 (-0.36)	-0.029 (-0.20)
Second entrant*MG					0.881*** (4.19)	0.905*** (4.31)
Third entrant*MG					-0.095 (-0.47)	-0.064 (-0.33)
Former state monopolist	0.319*** (-9.48)	0.036 (1.05)	0.040 (1.15)	0.039 (1.20)	0.058* (1.82)	0.060* (1.83)
Number of operators	0.251 (1.00)	0.246 (1.08)	0.248 (1.09)	0.250 (1.20)	0.249 (1.33)	0.171 (0.88)
Constant	-0.969 (-0.96)	-1.330 (-1.46)	-1.184 (-1.29)	-1.322 (-1.53)	-1.076 (-1.43)	-0.844 (-1.11)
Year dummies	No	No	No	No	No	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	405	405	405	405	405	405
Adjusted R-Squared	0.28	0.43	0.44	0.45	0.48	0.49
F-test vs. 1		54.66***	46.11***	34.53***	33.64***	29.07***
F-test vs. 2			8.88***	10.95***	9.97***	7.24***
F-test vs. 3				7.24***	7.79***	4.79***
F-test vs. 4					10.60***	5.46***
F-test vs. 5						1.11

The estimations presented in Models 3 to 6 assess the influence of pace of market growth on order of market entry performance. Model 3 analyzes the direct impact of pace of market growth on the profitability of market participants. The coefficient is negative and highly significant, meaning that, overall, market growth negatively affects performance. Model 4 introduces the moderating effect of market growth on pioneers. The result shows that the pace of market evolution negatively affects pioneers' profitability. Finally, Models 5 and 6 introduce the moderating effect of pace of market growth on the second and third entrants and leads to a similar conclusion: pioneers are worse off with an abrupt pace of market evolution. However, second movers benefit from an abrupt pace of market growth whereas third movers' profitability is negatively affected by an abrupt pace of market growth. Overall, these results provide some support for Hypothesis 1a and Hypothesis 1b, whereas Hypothesis 1c is not confirmed.

Also in this case, to make the interpretation of our results more immediate, in Table 5 we show the predictions on profitability for the period 1998 to 2001 (Sample 1). The sequence followed for predicting profitability for the sample between 1998 and 2001 is analogous to the one followed for the full sample. We evaluate our profitability coefficients for three scenarios to account for the variability in pace of market growth in this period. Therefore, along with the profitability coefficients calculated in correspondence of the average pace of market growth – i.e. 45%/year – we also estimated coefficients for cases of even higher market growth – please refer to the line "mean + St.Dev." in Table 5– and for cases of lower market growth - please refer to line "mean - St.Dev." in table 5. Pioneers obtain a higher performance regardless of the pace of market growth. However, their advantage is strongly eroded in the case of very high pace of market growth is considered and pioneer's profitability is reduced by 11%. Conversely, second entrants obtain clear benefits from high rates of market growth: in this case the profitability of the second entrant increases from 0.10 to 0.24. Third entrants' profitability is also reduced by the effect of market growth (-12% when a change in one standard deviation in market growth rates is considered).

The results for the second period estimations (2002-2008) can be seen in Table 7. The fit of the 6 models ranges from 0.29 to 0.57, with Model 6 being the preferred, according to the F-test. Control variables are highly significant for all the models and present the expected signs. Order of entry has, again, a positive effect on the profitability of the operator, reinforcing the conclusion that pioneering is important in this industry. Turning to Model 6, it can be observed that market growth has a slightly positive and significant impact on first mover profitability. Therefore, in a scenario with a smooth market growth, the effect of this variable changes, being slightly beneficial for the competitive performance of the first mover. This small impact of the pace of market growth on profitability also affects second and third entrants, although with different signs. In this case, second entrants' profitability is almost unaffected by the pace of market evolution, while third entrants' profitability slightly benefits from it. Regarding technological discontinuity, the results are consistent with the full sample estimations. Regardless of the scenario considered, the pioneer is always worse off with a change in the technology supporting the services. In contrast, all the followers benefit from it. Overall these estimations provide support for hypotheses 2a, 2b and 2c whereas no clear evidence is provided for hypotheses 1a and 1b.

TABLE 7. THE EFFECT OF PIONEERING ON PROFITABILITY
2002-2008

Dependent variable	EBITDA (1)	EBITDA (2)	EBITDA (3)	EBITDA (4)	EBITDA (5)	EBITDA (6)
Pioneer		0.328***	0.327***	0.401***	0.323***	0.311***
		(6.24)	(6.35)	(7.96)	(3.27)	(3.23)
Second entrant		0.246***	0.245***	0.255***	0.192*	0.188*
		(4.61)	(4.69)	(4.96)	(1.92)	(1.93)
Third entrant		0.180***	0.178***	0.181***	0.091	0.088
		(3.33)	(3.37)	(3.57)	(0.91)	(0.91)
Market growth			0.059	-0.064	-3.300**	-3.331**
			(0.94)	(-0.57)	(-2.11)	(-2.16)
Technological discontinuity			0.038***	0.103***	0.441***	0.422***
			(4.44)	(6.76)	(3.78)	(3.84)
Pioneer*MG				0.117	3.344**	3.450**
				(1.00)	(2.13)	(2.22)
Pioneer*TD				-0.127***	-0.466***	-0.461***
				(-8.18)	(-4.00)	(-4.10)
Second entrant*MG					3.227**	3.305**
					(2.06)	(2.13)
Second entrant*TD					-0.361***	-0.361***
					(-3.06)	(-3.16)
Third entrant*MG					3.629**	3.708**
					(2.29)	(2.37)
Third entrant*TD					-0.372***	-0.375***
					(-3.17)	(-3..30)
Former state monopolist	0.118***	0.036***	0.035***	0.037***	0.037***	0.038***
	(15.96)	(6.86)	(6.65)	(5.90)	(6.62)	(6.68)
Number of operators	-0.045***	-0.027***	-0.036***	-0.035***	-0.037***	-0.052***
	(-3.57)	(-2.45)	(-3.17)	(-3.16)	(-3.49)	(-4.26)
Constant	0.473***	0.215***	0.221***	0.183***	0.274**	0.292***
	(9.24)	(3.62)	(4.01)	(3.34)	(2.42)	(2.65)
Year dummies	No	No	No	No	No	Yes***
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1529	1529	1529	1529	1529	1529
Adjusted R-Squared	0.29	0.43	0.44	0.48	0.55	0.57
F-test vs. 1		111.83***	71.67***	74.53***	52.76***	35.08***
F-test vs. 2			10.20***	23.23***	14.97***	10.41***
F-test vs. 3				33.69***	15.39***	11.11***
F-test vs. 4					3.43***	5.37***
F-test vs. 5						4.72***

Profitability predictions for pioneers, second and third entrants for the period 2002-2008 can be also found in Table 5. Consistently with our previous conclusions, pioneers always perform better than followers, reinforcing the intuition that FMA not only exist, but they are highly sustainable in the mobile telecommunications industry. As mentioned above pioneers slightly benefit from a higher pace of market growth when this variable evolves smoothly. More precisely, a higher pace of market evolution increases their profitability from 0.44 to 0.45 in a context of no technological discontinuities (from 0.40 to 0.41 with technological discontinuity). The pace of market growth seems to be almost irrelevant for second movers, given that it always presents values around 0.30 in a scenario with no technological discontinuity and 0.36 with technological discontinuity. Third entrants clearly take advantage from a higher pace of market growth. Their profitability increases from 0.24 to 0.27 when there is no technological discontinuity and from 0.29 to 0.32 when the technological discontinuity occurs. Apparently, the pace of market growth has a negligible impact on the profitability of pioneers and second movers and only third movers obtain a slightly significant advantage from it. The impact of technological discontinuity on performance presents a clearly defined pattern: it penalizes first movers' performance and benefits the followers' position. Importantly, technological discontinuities erode pioneers' profitability regardless of the sign of market growth, decreasing their performance. Consistently with the previous findings, our results show that a technological discontinuity serves as a weapon through which followers could see the advantage of the pioneer eroded.

6. DISCUSSION AND CONCLUSIONS

In this paper, we have sought to shed more light on the relationships between pace of market evolution, technological discontinuity, order of market entry, and firms' profitability.

Our paper contributes to the existing literature along several dimensions. First, we formally bring in existing literature the role of environmental dynamics in order-of-market-entry-based advantages. We have hypothesized that pace of market evolution and technological discontinuity affect the performance of first mover, second movers and third movers in a different way. Building upon industrial economics and technological management literature, we have hypothesized that technological discontinuity decreases first mover's profitability whereas it has the potential to increase second mover and third mover's profitability. We have tested our hypotheses in the context of the European mobile communication industry and model estimations provide very strong support for our hypotheses. Our results confirm that, overall, technological changes serve as a mechanism through which followers can decrease their profitability gap via-a-vis first movers. As mentioned above, this supports our hypothesis and the conclusions of Suarez and Lanzolla (2007). We have then elaborated on the role of pace of market growth and hypothesized that it negatively affects first mover's profitability whereas its impact on second movers' and third movers' profitability is positive. Model estimations point to mixed results.

In terms of the effect of market growth our results are somewhat ambiguous. Although they tend to support the assertion that the higher the pace of market growth, the higher the loss in first mover's profitability, they present variations depending on the model estimated and the sample used. Therefore, a conservative assessment of our results should lead us to conclude that the effect of this variable should be further investigated.

Second, we provide an empirical test of order of market entry based advantages in the service sector context – i.e. mobile communications. One of the most surprising gaps in the literature is the absence of evidence for service firms. Virtually existing theory to date has been developed, implicitly or explicitly, with respect to manufactured products (Song, Di Benedetto and Zhao 1999). Manufactured products and service products cannot be equated (e.g. Lovelock 1983; Bharawaj, Varadarajan and Fahy, 1993) and generalizations of applying existing FMA theory to services are likely to be misleading. The lack of a FMA theory for service products is even more surprising if we consider the growing importance of the service industry. Services now account for more than 50% of the labour force in Brazil, Russia, Japan and Germany, as well as 75% of the labour force in the United States and the United Kingdom.

Third, the additional results we have run trigger some important considerations. The analysis of market growth clearly shows two different periods: in the period 1998 to 2001 market growth was abrupt when compared to the period 2002-2008. We have used this breakdown to split the sample. As expected the hypotheses on the role of technological discontinuity are confirmed in both samples. Conversely, the pace of market growth behaves differently, and in an opposite way, in the two samples. This prompts us to induce that the relationship between pace of market change and competitive performance might be non linear. Specifically, we hypothesize that it should have an inverted U-shape. This consideration opens up an avenue for further investigation.

With respect to the managerial and policy implications, our results clearly show that, irrespective of market and technology dynamics, overall, first movers are more profitable and that only the pace of technological discontinuity can clearly decrease the extent of this advantage. While this is good news for first movers, it opens up concerns for followers. For the latter, focusing on technological innovation should be the strategic priority.

Our results show that former state monopolists seem to have an inherited advantage from their previous position. Similarly, they show that the lower the number of competitors in a particular market, the higher their average profitability. Jointly, these results might have very strong policy implications. The circumstance that first movers seem to enjoy constantly higher profitability than their followers, prompts us to argue that policy makers may try to create more favourable conditions for the latter. Some of these measures have already been taken, for example, in terms of mobile number portability or the concession of new licensees. However, in light of our results they seem not to have been effective enough.

REFERENCES

Agarwal, R., and Bayus, B.L. (2002). “The market evolution and sales takeoff of product innovation”. *Management Science*, 48 (8), pp. 1021-1041.

Agarwal, R., Sarkar, MB., and Echambadi, R. (2002). “The conditioning effect of time on firm survival: An industry life cycle approach”. *Academy of Management Journal*, 45(5), pp. 971-994.

Anderson, C. R., and Paine, F. T. (1978). “PIMS: A Reexamination”. *Academy of Management Review*, 3, pp. 602-612.

Bain, J. S. (1956). “Barriers to New Competition”. Cambridge, MA: Harvard University Press.

Bamberger, P. (2008). “Beyond Contextualization: Using Context Theories to Narrow the Micro-Macro Gap in Management Research”. *Academy of Management Journal*, Vol. 51, No. 5, pp. 839-846.

Bharadwaj, S. G., Varadarajan, P. R., and Fahy, J. (1993). “Sustainable competitive advantage in service industries: A conceptual model and research propositions”. *Journal of Marketing*, 57(4), pp. 83-99.

Birke, D. and Swann, P. (2006). “Network Effects and the Choice of Mobile Phone Operator”. *Journal of Evolutionary Economics*, Vol. 16, No 1-2, pp. 65-84.

Bohlmann, J.D., Golder, P.N., and Mitra, D. (2002). “Deconstructing the pioneer’s advantage: Examining vintage effects and consumer valuations of quality and variety”. *Management Science*, 48 (9), pp. 1175-1195.

Bond, R. S., and Lean, D.F. (1977). “Sales, promotion and product differentiation in two prescriptive drug markets”. Washington D.C.: U.S. Federal Trade Commission.

Boulding W., and Christen, M. (2001). “First-mover disadvantage”. *Harvard Business Review*, October: 79, pp. 20-21.

Boulding, W. and Christen, M. (2003). “Sustainable pioneering advantage? Profit implications of market entry order”. *Marketing Science*, Vol. 22, No. 3, pp. 371-392.

Brown, C.L. and Lattin, J.M. (1994). “Investigating the Relationship Between Time in Market and Pioneering Advantage”. *Management Science*, 40(10), pp. 1361-1369.

Cady, J.F. (1985). “Marketing strategies in the information industries”. In R.D. Buzzell (ed.), *Marketing in an Electronic Age*, Harvard Business School Press, Boston.

Carpenter, G. S., and Nakamoto, K. (1989). “Consumer preference formation and pioneering advantage”. *Journal of Marketing Research*, 26(3), pp. 285-298.

Christensen, C. M (1997). “The innovator’s dilemma”. Boston, MA: Harvard Business School Press.

Christensen, C. M., Suarez, F. F., and Utterback, J. M. (1998). “Strategies for survival in fast changing industries”. *Management Science*, 44(12S), pp. S207-S220.

Covin, J. G., and Slevin, D. P. (1989). “Strategic management of small firms in hostile and benign environments”. *Strategic Management Journal*, 10(1) pp. 75-87.

Day, G. S. and Freeman, J. S. (1990). “Burnout or fadeout: the risks of early entry into high technology markets”. In M. W. Lawless & L. R. Gomez Mejia (Eds.), Strategic Management in High Technology Firms. Greenwich, CT: JAI Press Inc.

Doganoglu, T. and Gryzbowski, L. (2007). “Estimating Network Effects in the Mobile Telephony in Germany”. *Information Economics and Policy*, 19(1), pp.65-79.

Duso, T. and Roller, L.H. (2003). “Endogenous Deregulation: Evidence from OECD Countries”. *Economics Letters*, Vol. 81, issue 1, pp. 67-71.

Fuentelsaz, L., Gomez, J., and Polo, Y. (2002). “Followers’ entry timing: Evidence from the Spanish banking sector after deregulation”. *Strategic Management Journal*, 23(3), pp. 245 – 264.

Gandal, N. (2002). “Compatibility, Standardization and Network Effects: Some Policy Implications”. *Oxford Review of Economic Policy*, Vol. 18, No 1, pp. 80-91.

Golder, P. N., and Tellis, G. J. (1993). “Pioneer advantage: Marketing logic or marketing legend?” *Journal of Marketing Research*, 30(2), pp. 158 –170.

Gomez, J. and Maicas, J.P. (2008) “An empirical assessment of the impact of switching costs and first mover advantages on firm performance”. *FUNCAS working paper series*, No. 389.

Gruber, H. y Verboven F. (2001a) “The Diffusion of Mobile Telecommunications services in the European Union”. *European Economic Review*, 45(3), pp. 577-588.

Gruber, H. y Verboven, F. (2001b) “The Evolution of Markets under Entry Standards and Regulation. The Case of Global Mobile Telecommunications”. *International Journal of Industrial Organization*, 19(7), pp. 1189-1212.

Gryzbowski, L. (2007). “Estimating Switching Costs in Mobile Telephony in the UK”. *Journal of Industry, Competition and Trade*, Vol. 8 (2), 113–132.

Henderson, M. R., and Clark, K. B. (1990). “Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms”. *Administrative Science Quarterly*, 35, pp. 9-31.

Hitt, M.A., Beamish, P.W., Jackson, S.E. and Mathieu, J.E. (2007). “Building Theoretical and Empirical Bridges Across Levels: Multilevel Research in Management”. *Academy of Management Journal*, Vol. 50, No. 6, pp. 1385-1399.

Kalish, S., and Lilien, G. (1986). “A market entry timing model for new technologies”. *Management Science*. 32(2), pp. 194-205.

Katz, M., and Shapiro, C. (1992). “Product introduction with network externalities”. *The Journal of Industrial Economics*, 40(1), pp. 55-83.

Kerin, R. A., Varadarajan, P. R., and Peterson, R. A. (1992). “First-mover advantage: A synthesis, conceptual framework, and research propositions”. *Journal of Marketing*, 56, pp. 33-52.

Kim, H. and Kwon, N. (2003). “The Advantage of Network Size in Acquiring New Subscribers: A Condicional Logit Análisis of the Korean Telephony Market”. *Information Economics and Policy*, 15(1), pp. 17-33.

Klemperer, P. (2002). “How (Not) to Run Auctions: the European 3G Telecom Auctions”. *European Economic Review*, 46 (4-5), 829-845.

Lambkin, M. (1988). “Order of entry and performance in new markets”. *Strategic Management Journal*, 9(S1), pp. 127-140.

Lee, J., Kim, Y., Lee, J.D. and Park, Y. (2006). “Estimating the Extent of Potential Competition in the Korean Mobile Telecommunications Market: Switching Costs and Number Portability”. *International Journal of Industrial Organization*, Vol. 24, issue 1, pp. 107-124.

Leonard-Barton, D. (1992). “Core capabilities and core rigidities: A paradox in managing new product development”. *Strategic Management Journal*, 13(S1), pp. 111-125.

Levin, R.G., Klevorick, A.K., Nelson, R.R., and Winter, S.G. (1987). “Appropriating the returns from industrial research and development”. *Brookings Papers on Economic Activity*, 3: pp. 783-831.

Lieberman, M. B. (1989). “The learning curve, technology barriers to entry, and competitive survival in the chemical processing industries”. *Strategic Management Journal*, 10(5), pp. 431-447.

Lieberman, M. (2007). “Did First-Mover Advantage Survive the Dot-Com Crash?”. UCLA Working Paper.

Lieberman, M.B. and Montgomery, D.B. (1988). “First-Mover Advantages”. *Strategic Management Journal*, 9, Special Issue, pp. 41-58.

Lieberman, M.B. and Montgomery, D.B. (1998). “First-mover (dis)advantages: Retrospective and link with the resource-based view”. *Strategic Management Journal,* Vol. 19, issue 12, pp. 1111-1125.

Lilien, G., and Yoon, L. (1990). “The timing of competitive market entry: An explanatory study of new industrial products”. *Management Science*, 36(5), pp. 568 – 585.

Lovelock, C. H. (1983). “Classifying services to gain strategic marketing insights”. *Journal of Marketing*, 47(3), pp. 9-20.

Maicas, J.P., Polo, Y. and Sese, F.J. (2009). “The Role of (Personal) Network Effects and Switching Costs in Determining Mobile Users’ Choice”. *Journal of Information Technology,* in press.

Mansfield, E., Schwartz, M., and Wagner, S. (1991). “Imitation costs and patent: An empirical study”. *The Economic Journal*, 91(364), pp. 907-918.

Mascarenhas B. (1992). "Order of entry and performance in international markets". *Strategic Management Journal*, Vol. 13, issue 7, pp. 499-510.

McArthur, A. W., and Nystrom, P.C. (1987). “Environmental dynamism, complexity, and munificence as moderators of strategy performance relationships”. *Journal of Business Research*, 23(4), pp. 349 – 361.

Moore, G.A. (1999). “Crossing the Chasm”. Oxford, UK: Capstone.

Mueller, D. C. (1997). “First-mover advantages and path dependence”. *International Journal of Industrial Organization*, 15(6), pp. 827-850.

Nelson, P. (1980). “Comments on the economics of consumer information acquisition”. *Journal of Business*, 53(3), pp. S163-S165.

Pfeffer, J., and Salancik, G. R. (1978). “The external control of organizations”. New York: Harper and Row.

Ramanujam, V., and Venkatraman, N. (1984). “An inventory and critique of strategy research using the PIMS data”. *Academy of Management Review*, 9(1), pp. 138-151.

Robinson, W. T. (1988). “Sources of market pioneer advantages: The case of industrial goods industries”. *Journal of Marketing Research*, 25(1), pp. 87-94.

Robinson, W. T., and Chiang, J. (2002). “Product development strategies for established market pioneers, early followers, and late entrants”. *Strategic Management Journal*, 23(9), pp. 855-866.

Robinson, W. T., and Fornell, C. (1985). “Sources of market pioneer advantage in consumer goods industries”. *Journal of Marketing Research*, 22(3), pp. 305–317.

Robinson, W. T., and Min, S. (2002). “Is the first to market the first to fail?: Empirical evidence for industrial goods businesses”. *Journal of Marketing Research*, 39(1), pp. 120-128.

Robinson, W. T., Fornell, C., and Sullivan, M. (1992). “Are market pioneers intrinsically stronger than later entrants”. *Strategic Management Journal*, 13(8), pp. 609-624.

Rumelt, R. P. 1987. “Theory, strategy and entrepreneurship”. In D. J. Teece (Eds.), *The competitive challenge: Strategies for industrial innovation and renewal,* Cambridge, MA: Ballinger Publishing, pp. 137-158.

Schilling, M., (2002). “Technology success and failure in winner takes all markets: The impact of learning orientation, timing, and network externalities”. *Academy of Management Journal*, 45(2), pp. 387-398.

Schmalensee, R. (1982). “Product differentiation advantages of pioneering Brands”. *American Economic Review*, 72(3), pp. 349-368.

Schnaars, S.P. (1986). “When entering growth markets, are pioneers better than poachers?” *Business Horizons*, 29(2) pp. 349-365.

Shepherd, D. (1999). “Venture capitalists’ assessment of new venture survival”. *Management Science*, 45(5), pp. 621-632.

Song, X.M., Di Benedetto, C.A. and Zhao, Y.L. (1999). “Pioneering Advantages in Manufacturing and Service Industries: Empirical Evidence from Nine Countries”. *Strategic Management Journal*, 20, 811-836.

Suarez, F. (2004). “Battles for technological dominance: An integrated framework”. *Research Policy*, 33(2), pp. 271-286.

Suarez, F. and Lanzolla G. (2005). “The half truth of First Mover Advantage”. *Harvard Business Review*, 83(4), pp. 121 – 127.

Suárez, F. and Lanzolla, G. (2007). “The Role of Environmental Dynamics in Building a First Mover Advantage Theory”. *Academy of Management Review*, Vol. 32, No. 2, pp. 377-392.

Suarez, F. and Lanzolla G. (2008). “Towards a better FMA Theory”. *Academy of Management Review*, 33(1), pp. 267 -270.

Szymansky, D., Troy, L., and Bharadwaj, S. (1995). “Order of entry and business performance: An empirical synthesis and reexamination”. *Journal of Marketing*, 59(July), pp. 17-33.

Teece, D. J., Pisano, G., and Shuen, A. (1997). “Dynamic capabilities and strategic management”. *Strategic Management Journal*, 18(7), pp. 509–533.

Tushman, M. L. and Anderson, P. (1986). “Technological discontinuities and organizational environments”. *Administrative Science Quarterly*, 31, pp. 439-465.

Urban, G.L., Carter, T., Gaskin, S. and Mucha, Z. (1986). “Market Share Rewards to Pioneering Brands: An Empirical Analysis and Strategic Implications”. *Management Science*, 32(6), pp. 645-659.

Usero, B. and Fernández, Z. (2008). “First come, first served: How market and non-market actions influence pioneer market share”. *Journal of Business Research*, in press.

Utterback, J.M. (1994). “Mastering the dynamics of innovation”. Boston, Massachusetts: Harvard Business School Press.

VanderWerf, P.A. and Mahon, J.F. (1997). “Meta-Analysis of the Impact of Research Methods on Findings of First Mover Advantage”. *Management Science*, 43(11), pp. 1501-1519.

Wernerfelt, B. (1985). “Brand loyalty and user skills”. *Journal of Economic Behavior and Organizations*, 6(4), p. 381-385.

Whitten, I.T. (1979). “Brand performance in the Cigarette industry and the advantage to early entry, 1913-1974”. Staff report to the Federal Trade Commission.

APPENDIX

TABLE 8. DESCRIPTIVE STATISTICS (FULL SAMPLE)

Variable	Obs	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7	8
EBITDA (1)	1,934	0.29	0.26	-3.57	0.58	1.00							
Pioneer (2)	1,934	0.51	0.50	0	1	0.38	1.00						
Second entrant (3)	1,934	0.21	0.41	0	1	-0.10	-0.53	1.00					
Third entrant (4)	1,934	0.24	0.43	0	1	-0.26	-0.58	-0.30	1.00				
Market growth (5)	1,934	0.18	0.20	-0.13	1.22	-0.23	-0.02	0.00	0.01	1.00			
Technological discontinuity (6)	1,934	0.51	0.50	0	1	0.17	-0.02	-0.02	0.02	-0.44	1.00		
Former state monopolist (7)	1,934	0.36	0.48	0	1	0.31	0.60	-0.32	-0.34	0.02	-0.03	1.00	
Average market share (8)	1,934	3.54	0.76	2	5	-0.17	-0.21	0.02	0.17	-0.06	0.22	-0.14	1

TABLE 9. DESCRIPTIVE STATISTICS (1998-2001)

Variable	Obs	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7
EBITDA (1)	405	0.16	0.44	-3.57	0.58	1						
Pioneer (2)	405	0.51	0.50	0	1	0.50	1					
Second entrant (3)	405	0.21	0.41	0	1	-0.18	-0.53	1				
Third entrant (4)	405	0.25	0.43	0	1	-0.34	-0.60	-0.30	1			
Market growth (5)	405	0.47	0.27	0.07	1.22	-0.09	-0.15	0.00	0.12	1		
Former state monopolist (6)	405	0.37	0.48	0	1	0.37	0.65	-0.40	-0.34	0.00	1	
Average market share (7)	405	3.39	0.70	2	5	-0.20	-0.20	0.05	0.14	0.18	-0.14	1

TABLE 10. DESCRIPTIVE STATISTICS (2002-2008)

Variable	Obs	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7	8
EBITDA (1)	1,529	0.32	0.16	-1.8	0.57	1							
Pioneer (2)	1,529	0.51	0.50	0	1	0.41	1						
Second entrant (3)	1,529	0.21	0.41	0	1	-0.07	-0.53	1					
Third entrant (4)	1,529	0.24	0.43	0	1	-0.27	-0.57	-0.30	1				
Market growth (5)	1,529	0.10	0.07	-0.1	0.59	0.02	0.08	0.02	-0.10	1			
Technological discontinuity (6)	1,529	0.64	0.48	0	1	0.06	-0.03	-0.03	0.04	-0.21	1		
Former state monopolist (7)	1,529	0.35	0.48	0	1	0.35	0.59	-0.30	-0.34	0.06	-0.03	1	
Average market share (8)	1,529	3.58	0.77	2	5	-0.26	-0.21	0.01	0.17	-0.11	0.21	-0.13	1

FUNDACIÓN DE LAS CAJAS DE AHORROS

DOCUMENTOS DE TRABAJO

Últimos números publicados

159/2000 Participación privada en la construcción y explotación de carreteras de peaje
Ginés de Rus, Manuel Romero y Lourdes Trujillo

160/2000 Errores y posibles soluciones en la aplicación del *Value at Risk*
Mariano González Sánchez

161/2000 Tax neutrality on saving assets. The spahish case before and after the tax reform
Cristina Ruza y de Paz-Curbera

162/2000 Private rates of return to human capital in Spain: new evidence
F. Barceinas, J. Oliver-Alonso, J.L. Raymond y J.L. Roig-Sabaté

163/2000 El control interno del riesgo. Una propuesta de sistema de límites riesgo neutral
Mariano González Sánchez

164/2001 La evolución de las políticas de gasto de las Administraciones Públicas en los años 90
Alfonso Utrilla de la Hoz y Carmen Pérez Esparrells

165/2001 Bank cost efficiency and output specification
Emili Tortosa-Ausina

166/2001 Recent trends in Spanish income distribution: A robust picture of falling income inequality
Josep Oliver-Alonso, Xavier Ramos y José Luis Raymond-Bara

167/2001 Efectos redistributivos y sobre el bienestar social del tratamiento de las cargas familiares en el nuevo IRPF
Nuria Badenes Plá, Julio López Laborda, Jorge Onrubia Fernández

168/2001 The Effects of Bank Debt on Financial Structure of Small and Medium Firms in some European Countries
Mónica Melle-Hernández

169/2001 La política de cohesión de la UE ampliada: la perspectiva de España
Ismael Sanz Labrador

170/2002 Riesgo de liquidez de Mercado
Mariano González Sánchez

171/2002 Los costes de administración para el afiliado en los sistemas de pensiones basados en cuentas de capitalización individual: medida y comparación internacional.
José Enrique Devesa Carpio, Rosa Rodríguez Barrera, Carlos Vidal Meliá

172/2002 La encuesta continua de presupuestos familiares (1985-1996): descripción, representatividad y propuestas de metodología para la explotación de la información de los ingresos y el gasto.
Llorenc Pou, Joaquín Alegre

173/2002 Modelos paramétricos y no paramétricos en problemas de concesión de tarjetas de credito.
Rosa Puertas, María Bonilla, Ignacio Olmeda

174/2002 Mercado único, comercio intra-industrial y costes de ajuste en las manufacturas españolas.
José Vicente Blanes Cristóbal

175/2003 La Administración tributaria en España. Un análisis de la gestión a través de los ingresos y de los gastos.
Juan de Dios Jiménez Aguilera, Pedro Enrique Barrilao González

176/2003 The Falling Share of Cash Payments in Spain.
Santiago Carbó Valverde, Rafael López del Paso, David B. Humphrey
Publicado en "Moneda y Crédito" nº 217, pags. 167-189.

177/2003 Effects of ATMs and Electronic Payments on Banking Costs: The Spanish Case.
Santiago Carbó Valverde, Rafael López del Paso, David B. Humphrey

178/2003 Factors explaining the interest margin in the banking sectors of the European Union.
Joaquín Maudos y Juan Fernández Guevara

179/2003 Los planes de stock options para directivos y consejeros y su valoración por el mercado de valores en España.
Mónica Melle Hernández

180/2003 Ownership and Performance in Europe and US Banking – A comparison of Commercial, Co-operative & Savings Banks.
Yener Altunbas, Santiago Carbó y Phil Molyneux

181/2003 The Euro effect on the integration of the European stock markets.
Mónica Melle Hernández

182/2004 In search of complementarity in the innovation strategy: international R&D and external knowledge acquisition.
Bruno Cassiman, Reinhilde Veugelers

183/2004 Fijación de precios en el sector público: una aplicación para el servicio municipal de suministro de agua.
Mª Ángeles García Valiñas

184/2004 Estimación de la economía sumergida es España: un modelo estructural de variables latentes.
Ángel Alañón Pardo, Miguel Gómez de Antonio

185/2004 Causas políticas y consecuencias sociales de la corrupción.
Joan Oriol Prats Cabrera

186/2004 Loan bankers' decisions and sensitivity to the audit report using the belief revision model.
Andrés Guiral Contreras and José A. Gonzalo Angulo

187/2004 El modelo de Black, Derman y Toy en la práctica. Aplicación al mercado español.
Marta Tolentino García-Abadillo y Antonio Díaz Pérez

188/2004 Does market competition make banks perform well?.
Mónica Melle

189/2004 Efficiency differences among banks: external, technical, internal, and managerial
Santiago Carbó Valverde, David B. Humphrey y Rafael López del Paso

190/2004 Una aproximación al análisis de los costes de la esquizofrenia en españa: los modelos jerárquicos bayesianos
F. J. Vázquez-Polo, M. A. Negrín, J. M. Cavasés, E. Sánchez y grupo RIRAG

191/2004 Environmental proactivity and business performance: an empirical analysis
Javier González-Benito y Óscar González-Benito

192/2004 Economic risk to beneficiaries in notional defined contribution accounts (NDCs)
Carlos Vidal-Meliá, Inmaculada Domínguez-Fabian y José Enrique Devesa-Carpio

193/2004 Sources of efficiency gains in port reform: non parametric malmquist decomposition tfp index for Mexico
Antonio Estache, Beatriz Tovar de la Fé y Lourdes Trujillo

194/2004 Persistencia de resultados en los fondos de inversión españoles
Alfredo Ciriaco Fernández y Rafael Santamaría Aquilué

195/2005 El modelo de revisión de creencias como aproximación psicológica a la formación del juicio del auditor sobre la gestión continuada
Andrés Guiral Contreras y Francisco Esteso Sánchez

196/2005 La nueva financiación sanitaria en España: descentralización y prospectiva
David Cantarero Prieto

197/2005 A cointegration analysis of the Long-Run supply response of Spanish agriculture to the common agricultural policy
José A. Mendez, Ricardo Mora y Carlos San Juan

198/2005 ¿Refleja la estructura temporal de los tipos de interés del mercado español preferencia por la liquidez?
Magdalena Massot Perelló y Juan M. Nave

199/2005 Análisis de impacto de los Fondos Estructurales Europeos recibidos por una economía regional: Un enfoque a través de Matrices de Contabilidad Social
M. Carmen Lima y M. Alejandro Cardenete

200/2005 Does the development of non-cash payments affect monetary policy transmission?
Santiago Carbó Valverde y Rafael López del Paso

201/2005 Firm and time varying technical and allocative efficiency: an application for port cargo handling firms
Ana Rodríguez-Álvarez, Beatriz Tovar de la Fe y Lourdes Trujillo

202/2005 Contractual complexity in strategic alliances
Jeffrey J. Reuer y Africa Ariño

203/2005 Factores determinantes de la evolución del empleo en las empresas adquiridas por opa
Nuria Alcalde Fradejas y Inés Pérez-Soba Aguilar

204/2005 Nonlinear Forecasting in Economics: a comparison between Comprehension Approach versus Learning Approach. An Application to Spanish Time Series
Elena Olmedo, Juan M. Valderas, Ricardo Gimeno and Lorenzo Escot

205/2005 Precio de la tierra con presión urbana: un modelo para España
Esther Decimavilla, Carlos San Juan y Stefan Sperlich

206/2005 Interregional migration in Spain: a semiparametric analysis
Adolfo Maza y José Villaverde

207/2005 Productivity growth in European banking
Carmen Murillo-Melchor, José Manuel Pastor y Emili Tortosa-Ausina

208/2005 Explaining Bank Cost Efficiency in Europe: Environmental and Productivity Influences.
Santiago Carbó Valverde, David B. Humphrey y Rafael López del Paso

209/2005 La elasticidad de sustitución intertemporal con preferencias no separables intratemporalmente: los casos de Alemania, España y Francia.
Elena Márquez de la Cruz, Ana R. Martínez Cañete y Inés Pérez-Soba Aguilar

210/2005 Contribución de los efectos tamaño, book-to-market y momentum a la valoración de activos: el caso español.
Begoña Font-Belaire y Alfredo Juan Grau-Grau

211/2005 Permanent income, convergence and inequality among countries
José M. Pastor and Lorenzo Serrano

212/2005 The Latin Model of Welfare: Do 'Insertion Contracts' Reduce Long-Term Dependence?
Luis Ayala and Magdalena Rodríguez

213/2005 The effect of geographic expansion on the productivity of Spanish savings banks
Manuel Illueca, José M. Pastor and Emili Tortosa-Ausina

214/2005 Dynamic network interconnection under consumer switching costs
Ángel Luis López Rodríguez

215/2005 La influencia del entorno socioeconómico en la realización de estudios universitarios: una aproximación al caso español en la década de los noventa
Marta Rahona López

216/2005 The valuation of spanish ipos: efficiency analysis
Susana Álvarez Otero

217/2005 On the generation of a regular multi-input multi-output technology using parametric output distance functions
Sergio Perelman and Daniel Santin

218/2005 La gobernanza de los procesos parlamentarios: la organización industrial del congreso de los diputados en España
Gonzalo Caballero Miguez

219/2005 Determinants of bank market structure: Efficiency and political economy variables
Francisco González

220/2005 Agresividad de las órdenes introducidas en el mercado español: estrategias, determinantes y medidas de performance
David Abad Díaz

221/2005 Tendencia post-anuncio de resultados contables: evidencia para el mercado español
Carlos Forner Rodríguez, Joaquín Marhuenda Fructuoso y Sonia Sanabria García

222/2005 Human capital accumulation and geography: empirical evidence in the European Union
Jesús López-Rodríguez, J. Andrés Faíña y Jose Lopez Rodríguez

223/2005 Auditors' Forecasting in Going Concern Decisions: Framing, Confidence and Information Processing
Waymond Rodgers and Andrés Guiral

224/2005 The effect of Structural Fund spending on the Galician region: an assessment of the 1994-1999 and 2000-2006 Galician CSFs
José Ramón Cancelo de la Torre, J. Andrés Faíña and Jesús López-Rodríguez

225/2005 The effects of ownership structure and board composition on the audit committee activity: Spanish evidence
Carlos Fernández Méndez and Rubén Arrondo García

226/2005 Cross-country determinants of bank income smoothing by managing loan loss provisions
Ana Rosa Fonseca and Francisco González

227/2005 Incumplimiento fiscal en el irpf (1993-2000): un análisis de sus factores determinantes
Alejandro Estellér Moré

228/2005 Region versus Industry effects: volatility transmission
Pilar Soriano Felipe and Francisco J. Climent Diranzo

229/2005 Concurrent Engineering: The Moderating Effect Of Uncertainty On New Product Development Success
Daniel Vázquez-Bustelo and Sandra Valle

230/2005 On zero lower bound traps: a framework for the analysis of monetary policy in the 'age' of central banks
Alfonso Palacio-Vera

231/2005 Reconciling Sustainability and Discounting in Cost Benefit Analysis: a methodological proposal
M. Carmen Almansa Sáez and Javier Calatrava Requena

232/2005 Can The Excess Of Liquidity Affect The Effectiveness Of The European Monetary Policy?
Santiago Carbó Valverde and Rafael López del Paso

233/2005 Inheritance Taxes In The Eu Fiscal Systems: The Present Situation And Future Perspectives.
Miguel Angel Barberán Lahuerta

234/2006 Bank Ownership And Informativeness Of Earnings.
Víctor M. González

235/2006 Developing A Predictive Method: A Comparative Study Of The Partial Least Squares Vs Maximum Likelihood Techniques.
Waymond Rodgers, Paul Pavlou and Andres Guiral.

236/2006 Using Compromise Programming for Macroeconomic Policy Making in a General Equilibrium Framework: Theory and Application to the Spanish Economy.
Francisco J. André, M. Alejandro Cardenete y Carlos Romero.

237/2006 Bank Market Power And Sme Financing Constraints.
Santiago Carbó-Valverde, Francisco Rodríguez-Fernández y Gregory F. Udell.

238/2006 Trade Effects Of Monetary Agreements: Evidence For Oecd Countries.
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano.

239/2006 The Quality Of Institutions: A Genetic Programming Approach.
Marcos Álvarez-Díaz y Gonzalo Caballero Miguez.

240/2006 La interacción entre el éxito competitivo y las condiciones del mercado doméstico como determinantes de la decisión de exportación en las Pymes.
Francisco García Pérez.

241/2006 Una estimación de la depreciación del capital humano por sectores, por ocupación y en el tiempo.
Inés P. Murillo.

242/2006 Consumption And Leisure Externalities, Economic Growth And Equilibrium Efficiency.
Manuel A. Gómez.

243/2006 Measuring efficiency in education: an analysis of different approaches for incorporating non-discretionary inputs.
Jose Manuel Cordero-Ferrera, Francisco Pedraja-Chaparro y Javier Salinas-Jiménez

244/2006 Did The European Exchange-Rate Mechanism Contribute To The Integration Of Peripheral Countries?.
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano

245/2006 Intergenerational Health Mobility: An Empirical Approach Based On The Echp.
Marta Pascual and David Cantarero

246/2006 Measurement and analysis of the Spanish Stock Exchange using the Lyapunov exponent with digital technology.
Salvador Rojí Ferrari and Ana Gonzalez Marcos

247/2006 Testing For Structural Breaks In Variance Withadditive Outliers And Measurement Errors.
Paulo M.M. Rodrigues and Antonio Rubia

248/2006 The Cost Of Market Power In Banking: Social Welfare Loss Vs. Cost Inefficiency.
Joaquín Maudos and Juan Fernández de Guevara

249/2006 Elasticidades de largo plazo de la demanda de vivienda: evidencia para España (1885-2000).
Desiderio Romero Jordán, José Félix Sanz Sanz y César Pérez López

250/2006 Regional Income Disparities in Europe: What role for location?.
Jesús López-Rodríguez and J. Andrés Faíña

251/2006 Funciones abreviadas de bienestar social: Una forma sencilla de simultanear la medición de la eficiencia y la equidad de las políticas de gasto público.
Nuria Badenes Plá y Daniel Santín González

252/2006 “The momentum effect in the Spanish stock market: Omitted risk factors or investor behaviour?”.
Luis Muga and Rafael Santamaría

253/2006 Dinámica de precios en el mercado español de gasolina: un equilibrio de colusión tácita.
Jordi Perdiguero García

254/2006 Desigualdad regional en España: renta permanente versus renta corriente.
José M.Pastor, Empar Pons y Lorenzo Serrano

255/2006 Environmental implications of organic food preferences: an application of the impure public goods model.
Ana Maria Aldanondo-Ochoa y Carmen Almansa-Sáez

256/2006 Family tax credits versus family allowances when labour supply matters: Evidence for Spain.
José Felix Sanz-Sanz, Desiderio Romero-Jordán y Santiago Álvarez-García

257/2006 La internacionalización de la empresa manufacturera española: efectos del capital humano genérico y específico.
José López Rodríguez

258/2006 Evaluación de las migraciones interregionales en España, 1996-2004.
María Martínez Torres

259/2006 Efficiency and market power in Spanish banking.
Rolf Färe, Shawna Grosskopf y Emili Tortosa-Ausina.

260/2006 Asimetrías en volatilidad, beta y contagios entre las empresas grandes y pequeñas cotizadas en la bolsa española.
Helena Chuliá y Hipòlit Torró.

261/2006 Birth Replacement Ratios: New Measures of Period Population Replacement.
José Antonio Ortega.

262/2006 Accidentes de tráfico, víctimas mortales y consumo de alcohol.
José Mª Arranz y Ana I. Gil.

263/2006 Análisis de la Presencia de la Mujer en los Consejos de Administración de las Mil Mayores Empresas Españolas.
Ruth Mateos de Cabo, Lorenzo Escot Mangas y Ricardo Gimeno Nogués.

264/2006 Crisis y Reforma del Pacto de Estabilidad y Crecimiento. Las Limitaciones de la Política Económica en Europa.
Ignacio Álvarez Peralta.

265/2006 Have Child Tax Allowances Affected Family Size? A Microdata Study For Spain (1996-2000).
Jaime Vallés-Giménez y Anabel Zárate-Marco.

266/2006 Health Human Capital And The Shift From Foraging To Farming.
Paolo Rungo.

267/2006 Financiación Autonómica y Política de la Competencia: El Mercado de Gasolina en Canarias.
Juan Luis Jiménez y Jordi Perdiguero.

268/2006 El cumplimiento del Protocolo de Kyoto para los hogares españoles: el papel de la imposición sobre la energía.
Desiderio Romero-Jordán y José Félix Sanz-Sanz.

269/2006 Banking competition, financial dependence and economic growth
Joaquín Maudos y Juan Fernández de Guevara

270/2006 Efficiency, subsidies and environmental adaptation of animal farming under CAP
Werner Kleinhanß, Carmen Murillo, Carlos San Juan y Stefan Sperlich

271/2006 Interest Groups, Incentives to Cooperation and Decision-Making Process in the European Union
A. Garcia-Lorenzo y Jesús López-Rodríguez

272/2006 Riesgo asimétrico y estrategias de momentum en el mercado de valores español
Luis Muga y Rafael Santamaría

273/2006 Valoración de capital-riesgo en proyectos de base tecnológica e innovadora a través de la teoría de opciones reales
Gracia Rubio Martín

274/2006 Capital stock and unemployment: searching for the missing link
Ana Rosa Martínez-Cañete, Elena Márquez de la Cruz, Alfonso Palacio-Vera and Inés Pérez-Soba Aguilar

275/2006 Study of the influence of the voters' political culture on vote decision through the simulation of a political competition problem in Spain
Sagrario Lantarón, Isabel Lillo, Mª Dolores López and Javier Rodrigo

276/2006 Investment and growth in Europe during the Golden Age
Antonio Cubel and Mª Teresa Sanchis

277/2006 Efectos de vincular la pensión pública a la inversión en cantidad y calidad de hijos en un modelo de equilibrio general
Robert Meneu Gaya

278/2006 El consumo y la valoración de activos
Elena Márquez y Belén Nieto

279/2006 Economic growth and currency crisis: A real exchange rate entropic approach
David Matesanz Gómez y Guillermo J. Ortega

280/2006 Three measures of returns to education: An illustration for the case of Spain
María Arrazola y José de Hevia

281/2006 Composition of Firms versus Composition of Jobs
Antoni Cunyat

282/2006 La vocación internacional de un holding tranviario belga: la Compagnie Mutuelle de Tramways, 1895-1918
Alberte Martínez López

283/2006 Una visión panorámica de las entidades de crédito en España en la última década.
Constantino García Ramos

284/2006 Foreign Capital and Business Strategies: a comparative analysis of urban transport in Madrid and Barcelona, 1871-1925
Alberte Martínez López

285/2006 Los intereses belgas en la red ferroviaria catalana, 1890-1936
Alberte Martínez López

286/2006 The Governance of Quality: The Case of the Agrifood Brand Names
Marta Fernández Barcala, Manuel González-Díaz y Emmanuel Raynaud

287/2006 Modelling the role of health status in the transition out of malthusian equilibrium
Paolo Rungo, Luis Currais and Berta Rivera

288/2006 Industrial Effects of Climate Change Policies through the EU Emissions Trading Scheme
Xavier Labandeira and Miguel Rodríguez

289/2006 Globalisation and the Composition of Government Spending: An analysis for OECD countries
Norman Gemmell, Richard Kneller and Ismael Sanz

290/2006 La producción de energía eléctrica en España: Análisis económico de la actividad tras la liberalización del Sector Eléctrico
Fernando Hernández Martínez

291/2006 Further considerations on the link between adjustment costs and the productivity of R&D investment: evidence for Spain
Desiderio Romero-Jordán, José Félix Sanz-Sanz and Inmaculada Álvarez-Ayuso

292/2006 Una teoría sobre la contribución de la función de compras al rendimiento empresarial
Javier González Benito

293/2006 Agility drivers, enablers and outcomes: empirical test of an integrated agile manufacturing model
Daniel Vázquez-Bustelo, Lucía Avella and Esteban Fernández

294/2006 Testing the parametric vs the semiparametric generalized mixed effects models
María José Lombardía and Stefan Sperlich

295/2006 Nonlinear dynamics in energy futures
Mariano Matilla-García

296/2006 Estimating Spatial Models By Generalized Maximum Entropy Or How To Get Rid Of W
Esteban Fernández Vázquez, Matías Mayor Fernández and Jorge Rodriguez-Valez

297/2006 Optimización fiscal en las transmisiones lucrativas: análisis metodológico
Félix Domínguez Barrero

298/2006 La situación actual de la banca online en España
Francisco José Climent Diranzo y Alexandre Momparler Pechuán

299/2006 Estrategia competitiva y rendimiento del negocio: el papel mediador de la estrategia y
las capacidades productivas
Javier González Benito y Isabel Suárez González

300/2006 A Parametric Model to Estimate Risk in a Fixed Income Portfolio
Pilar Abad and Sonia Benito

301/2007 Análisis Empírico de las Preferencias Sociales Respecto del Gasto en Obra Social de las Cajas de Ahorros
Alejandro Esteller-Moré, Jonathan Jorba Jiménez y Albert Solé-Ollé

302/2007 Assessing the enlargement and deepening of regional trading blocs: The European Union case
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano

303/2007 ¿Es la Franquicia un Medio de Financiación?: Evidencia para el Caso Español
Vanesa Solís Rodríguez y Manuel González Díaz

304/2007 On the Finite-Sample Biases in Nonparametric Testing for Variance Constancy
Paulo M.M. Rodrigues and Antonio Rubia

305/2007 Spain is Different: Relative Wages 1989-98
José Antonio Carrasco Gallego

306/2007 Poverty reduction and SAM multipliers: An evaluation of public policies in a regional framework
Francisco Javier De Miguel-Vélez y Jesús Pérez-Mayo

307/2007 La Eficiencia en la Gestión del Riesgo de Crédito en las Cajas de Ahorro
Marcelino Martínez Cabrera

308/2007 Optimal environmental policy in transport: unintended effects on consumers' generalized price
M. Pilar Socorro and Ofelia Betancor

309/2007 Agricultural Productivity in the European Regions: Trends and Explanatory Factors
Roberto Ezcurra, Belen Iráizoz, Pedro Pascual and Manuel Rapún

310/2007 Long-run Regional Population Divergence and Modern Economic Growth in Europe: a Case Study of Spain
María Isabel Ayuda, Fernando Collantes and Vicente Pinilla

311/2007 Financial Information effects on the measurement of Commercial Banks' Efficiency
Borja Amor, María T. Tascón and José L. Fanjul

312/2007 Neutralidad e incentivos de las inversiones financieras en el nuevo IRPF
Félix Domínguez Barrero

313/2007 The Effects of Corporate Social Responsibility Perceptions on The Valuation of Common Stock
Waymond Rodgers , Helen Choy and Andres Guiral-Contreras

314/2007 Country Creditor Rights, Information Sharing and Commercial Banks' Profitability Persistence across the world
Borja Amor, María T. Tascón and José L. Fanjul

315/2007 ¿Es Relevante el Déficit Corriente en una Unión Monetaria? El Caso Español
Javier Blanco González y Ignacio del Rosal Fernández

316/2007 The Impact of Credit Rating Announcements on Spanish Corporate Fixed Income Performance: Returns, Yields and Liquidity
Pilar Abad, Antonio Díaz and M. Dolores Robles

317/2007 Indicadores de Lealtad al Establecimiento y Formato Comercial Basados en la Distribución del Presupuesto
Cesar Augusto Bustos Reyes y Óscar González Benito

318/2007 Migrants and Market Potential in Spain over The XXth Century: A Test Of The New Economic Geography
Daniel A. Tirado, Jordi Pons, Elisenda Paluzie and Javier Silvestre

319/2007 El Impacto del Coste de Oportunidad de la Actividad Emprendedora en la Intención de los Ciudadanos Europeos de Crear Empresas
Luis Miguel Zapico Aldeano

320/2007 Los belgas y los ferrocarriles de vía estrecha en España, 1887-1936
Alberte Martínez López

321/2007 Competición política bipartidista. Estudio geométrico del equilibrio en un caso ponderado
Isabel Lillo, Mª Dolores López y Javier Rodrigo

322/2007 Human resource management and environment management systems: an empirical study
Mª Concepción López Fernández, Ana Mª Serrano Bedia and Gema García Piqueres

323/2007 Wood and industrialization. evidence and hypotheses from the case of Spain, 1860-1935.
Iñaki Iriarte-Goñi and María Isabel Ayuda Bosque

324/2007 New evidence on long-run monetary neutrality.
J. Cunado, L.A. Gil-Alana and F. Perez de Gracia

325/2007 Monetary policy and structural changes in the volatility of us interest rates.
Juncal Cuñado, Javier Gomez Biscarri and Fernando Perez de Gracia

326/2007 The productivity effects of intrafirm diffusion.
Lucio Fuentelsaz, Jaime Gómez and Sergio Palomas

327/2007 Unemployment duration, layoffs and competing risks.
J.M. Arranz, C. García-Serrano and L. Toharia

328/2007 El grado de cobertura del gasto público en España respecto a la UE-15
Nuria Rueda, Begoña Barruso, Carmen Calderón y Mª del Mar Herrador

329/2007 The Impact of Direct Subsidies in Spain before and after the CAP'92 Reform
Carmen Murillo, Carlos San Juan and Stefan Sperlich

330/2007 Determinants of post-privatisation performance of Spanish divested firms
Laura Cabeza García and Silvia Gómez Ansón

331/2007 ¿Por qué deciden diversificar las empresas españolas? Razones oportunistas versus razones económicas
Almudena Martínez Campillo

332/2007 Dynamical Hierarchical Tree in Currency Markets
Juan Gabriel Brida, David Matesanz Gómez and Wiston Adrián Risso

333/2007 Los determinantes sociodemográficos del gasto sanitario. Análisis con microdatos individuales
Ana María Angulo, Ramón Barberán, Pilar Egea y Jesús Mur

334/2007 Why do companies go private? The Spanish case
Inés Pérez-Soba Aguilar

335/2007 The use of gis to study transport for disabled people
Verónica Cañal Fernández

336/2007 The long run consequences of M&A: An empirical application
Cristina Bernad, Lucio Fuentelsaz and Jaime Gómez

337/2007 Las clasificaciones de materias en economía: principios para el desarrollo de una nueva clasificación
Valentín Edo Hernández

338/2007 Reforming Taxes and Improving Health: A Revenue-Neutral Tax Reform to Eliminate Medical and Pharmaceutical VAT
Santiago Álvarez-García, Carlos Pestana Barros y Juan Prieto-Rodriguez

339/2007 Impacts of an iron and steel plant on residential property values
Celia Bilbao-Terol

340/2007 Firm size and capital structure: Evidence using dynamic panel data
Víctor M. González and Francisco González

341/2007 ¿Cómo organizar una cadena hotelera? La elección de la forma de gobierno
Marta Fernández Barcala y Manuel González Díaz

342/2007 Análisis de los efectos de la decisión de diversificar: un contraste del marco teórico “Agencia-Stewardship”
Almudena Martínez Campillo y Roberto Fernández Gago

343/2007 Selecting portfolios given multiple eurostoxx-based uncertainty scenarios: a stochastic goal programming approach from fuzzy betas
Enrique Ballestero, Blanca Pérez-Gladish, Mar Arenas-Parra and Amelia Bilbao-Terol

344/2007 “El bienestar de los inmigrantes y los factores implicados en la decisión de emigrar”
Anastasia Hernández Alemán y Carmelo J. León

345/2007 Governance Decisions in the R&D Process: An Integrative Framework Based on TCT and Knowledge View of The Firm.
Andrea Martínez-Noya and Esteban García-Canal

346/2007 Diferencias salariales entre empresas públicas y privadas. El caso español
Begoña Cueto y Nuria Sánchez- Sánchez

347/2007 Effects of Fiscal Treatments of Second Home Ownership on Renting Supply
Celia Bilbao Terol and Juan Prieto Rodríguez

348/2007 Auditors’ ethical dilemmas in the going concern evaluation
Andres Guiral, Waymond Rodgers, Emiliano Ruiz and Jose A. Gonzalo

349/2007 Convergencia en capital humano en España. Un análisis regional para el periodo 1970-2004
Susana Morales Sequera y Carmen Pérez Esparrells

350/2007 Socially responsible investment: mutual funds portfolio selection using fuzzy multiobjective programming
Blanca Mª Pérez-Gladish, Mar Arenas-Parra , Amelia Bilbao-Terol and Mª Victoria Rodríguez-Uría

351/2007 Persistencia del resultado contable y sus componentes: implicaciones de la medida de ajustes por devengo
Raúl Iñiguez Sánchez y Francisco Poveda Fuentes

352/2007 Wage Inequality and Globalisation: What can we Learn from the Past? A General Equilibrium Approach
Concha Betrán, Javier Ferri and Maria A. Pons

353/2007 Eficacia de los incentivos fiscales a la inversión en I+D en España en los años noventa
Desiderio Romero Jordán y José Félix Sanz Sanz

354/2007 Convergencia regional en renta y bienestar en España
Robert Meneu Gaya

355/2007 Tributación ambiental: Estado de la Cuestión y Experiencia en España
Ana Carrera Poncela

356/2007 Salient features of dependence in daily us stock market indices
Luis A. Gil-Alana, Juncal Cuñado and Fernando Pérez de Gracia

357/2007 La educación superior: ¿un gasto o una inversión rentable para el sector público?
Inés P. Murillo y Francisco Pedraja

358/2007 Effects of a reduction of working hours on a model with job creation and job destruction
Emilio Domínguez, Miren Ullibarri y Idoya Zabaleta

359/2007 Stock split size, signaling and earnings management: Evidence from the Spanish market
José Yagüe, J. Carlos Gómez-Sala and Francisco Poveda-Fuentes

360/2007 Modelización de las expectativas y estrategias de inversión en mercados de derivados
Begoña Font-Belaire

361/2008 Trade in capital goods during the golden age, 1953-1973
Mª Teresa Sanchis and Antonio Cubel

362/2008 El capital económico por riesgo operacional: una aplicación del modelo de distribución de pérdidas
Enrique José Jiménez Rodríguez y José Manuel Feria Domínguez

363/2008 The drivers of effectiveness in competition policy
Joan-Ramon Borrell and Juan-Luis Jiménez

364/2008 Corporate governance structure and board of directors remuneration policies:
evidence from Spain
Carlos Fernández Méndez, Rubén Arrondo García and Enrique Fernández Rodríguez

365/2008 Beyond the disciplinary role of governance: how boards and donors add value to Spanish foundations
Pablo De Andrés Alonso, Valentín Azofra Palenzuela y M. Elena Romero Merino

366/2008 Complejidad y perfeccionamiento contractual para la contención del oportunismo en los acuerdos de franquicia
Vanesa Solís Rodríguez y Manuel González Díaz

367/2008 Inestabilidad y convergencia entre las regiones europeas
Jesús Mur, Fernando López y Ana Angulo

368/2008 Análisis espacial del cierre de explotaciones agrarias
Ana Aldanondo Ochoa, Carmen Almansa Sáez y Valero Casanovas Oliva

369/2008 Cross-Country Efficiency Comparison between Italian and Spanish Public Universities in the period 2000-2005
Tommaso Agasisti and Carmen Pérez Esparrells

370/2008 El desarrollo de la sociedad de la información en España: un análisis por comunidades autónomas
María Concepción García Jiménez y José Luis Gómez Barroso

371/2008 El medioambiente y los objetivos de fabricación: un análisis de los modelos estratégicos para su consecución
Lucía Avella Camarero, Esteban Fernández Sánchez y Daniel Vázquez-Bustelo

372/2008 Influence of bank concentration and institutions on capital structure: New international evidence
Víctor M. González and Francisco González

373/2008 Generalización del concepto de equilibrio en juegos de competición política
Mª Dolores López González y Javier Rodrigo Hitos

374/2008 Smooth Transition from Fixed Effects to Mixed Effects Models in Multi-level regression Models
María José Lombardía and Stefan Sperlich

375/2008 A Revenue-Neutral Tax Reform to Increase Demand for Public Transport Services
Carlos Pestana Barros and Juan Prieto-Rodriguez

376/2008 Measurement of intra-distribution dynamics: An application of different approaches to the European regions
Adolfo Maza, María Hierro and José Villaverde

377/2008 Migración interna de extranjeros y ¿nueva fase en la convergencia?
María Hierro y Adolfo Maza

378/2008 Efectos de la Reforma del Sector Eléctrico: Modelización Teórica y Experiencia Internacional
Ciro Eduardo Bazán Navarro

379/2008 A Non-Parametric Independence Test Using Permutation Entropy
Mariano Matilla-García and Manuel Ruiz Marín

380/2008 Testing for the General Fractional Unit Root Hypothesis in the Time Domain
Uwe Hassler, Paulo M.M. Rodrigues and Antonio Rubia

381/2008 Multivariate gram-charlier densities
Esther B. Del Brio, Trino-Manuel Ñíguez and Javier Perote

382/2008 Analyzing Semiparametrically the Trends in the Gender Pay Gap - The Example of Spain
Ignacio Moral-Arce, Stefan Sperlich, Ana I. Fernández-Saínz and Maria J. Roca

383/2008 A Cost-Benefit Analysis of a Two-Sided Card Market
Santiago Carbó Valverde, David B. Humphrey, José Manuel Liñares Zegarra and Francisco Rodriguez Fernandez

384/2008 A Fuzzy Bicriteria Approach for Journal Deselection in a Hospital Library
M. L. López-Avello, M. V. Rodríguez-Uría, B. Pérez-Gladish, A. Bilbao-Terol, M. Arenas-Parra

385/2008 Valoración de las grandes corporaciones farmaceúticas, a través del análisis de sus principales intangibles, con el método de opciones reales
Gracia Rubio Martín y Prosper Lamothe Fernández

386/2008 El marketing interno como impulsor de las habilidades comerciales de las pyme españolas: efectos en los resultados empresariales
Mª Leticia Santos Vijande, Mª José Sanzo Pérez, Nuria García Rodríguez y Juan A. Trespalacios Gutiérrez

387/2008 Understanding Warrants Pricing: A case study of the financial market in Spain
David Abad y Belén Nieto

388/2008 Aglomeración espacial, Potencial de Mercado y Geografía Económica: Una revisión de la literatura
Jesús López-Rodríguez y J. Andrés Faíña

389/2008 An empirical assessment of the impact of switching costs and first mover advantages on firm performance
Jaime Gómez, Juan Pablo Maícas

390/2008 Tender offers in Spain: testing the wave
Ana R. Martínez-Cañete y Inés Pérez-Soba Aguilar

391/2008 La integración del mercado español a finales del siglo XIX: los precios del trigo entre 1891 y 1905
Mariano Matilla García, Pedro Pérez Pascual y Basilio Sanz Carnero

392/2008 Cuando el tamaño importa: estudio sobre la influencia de los sujetos políticos en la balanza de bienes y servicios
Alfonso Echazarra de Gregorio

393/2008 Una visión cooperativa de las medidas ante el posible daño ambiental de la desalación
Borja Montaño Sanz

394/2008 Efectos externos del endeudamiento sobre la calificación crediticia de las Comunidades Autónomas
Andrés Leal Marcos y Julio López Laborda

395/2008 Technical efficiency and productivity changes in Spanish airports: A parametric distance functions approach
Beatriz Tovar & Roberto Rendeiro Martín-Cejas

396/2008 Network analysis of exchange data: Interdependence drives crisis contagion
David Matesanz Gómez & Guillermo J. Ortega

397/2008 Explaining the performance of Spanish privatised firms: a panel data approach
Laura Cabeza Garcia and Silvia Gomez Anson

398/2008 Technological capabilities and the decision to outsource R&D services
Andrea Martínez-Noya and Esteban García-Canal

399/2008 Hybrid Risk Adjustment for Pharmaceutical Benefits
Manuel García-Goñi, Pere Ibern & José María Inoriza

400/2008 The Team Consensus–Performance Relationship and the Moderating Role of Team Diversity
José Henrique Dieguez, Javier González-Benito and Jesús Galende

401/2008 The institutional determinants of CO_2 emissions: A computational modelling approach using Artificial Neural Networks and Genetic Programming
Marcos Álvarez-Díaz , Gonzalo Caballero Miguez and Mario Soliño

402/2008 Alternative Approaches to Include Exogenous Variables in DEA Measures: A Comparison Using Monte Carlo
José Manuel Cordero-Ferrera, Francisco Pedraja-Chaparro and Daniel Santín-González

403/2008 Efecto diferencial del capital humano en el crecimiento económico andaluz entre 1985 y 2004: comparación con el resto de España
Mª del Pópulo Pablo-Romero Gil-Delgado y Mª de la Palma Gómez-Calero Valdés

404/2008 Análisis de fusiones, variaciones conjeturales y la falacia del estimador en diferencias
Juan Luis Jiménez y Jordi Perdiguero

405/2008 Política fiscal en la uem: ¿basta con los estabilizadores automáticos?
Jorge Uxó González y Mª Jesús Arroyo Fernández

406/2008 Papel de la orientación emprendedora y la orientación al mercado en el éxito de las empresas
Óscar González-Benito, Javier González-Benito y Pablo A. Muñoz-Gallego

407/2008 La presión fiscal por impuesto sobre sociedades en la unión europea
Elena Fernández Rodríguez, Antonio Martínez Arias y Santiago Álvarez García

408/2008 The environment as a determinant factor of the purchasing and supply strategy: an empirical analysis
Dr. Javier González-Benito y MS Duilio Reis da Rocha

409/2008 Cooperation for innovation: the impact on innovatory effort
Gloria Sánchez González and Liliana Herrera

410/2008 Spanish post-earnings announcement drift and behavioral finance models
Carlos Forner and Sonia Sanabria

411/2008 Decision taking with external pressure: evidence on football manager dismissals in argentina and their consequences
Ramón Flores, David Forrest and Juan de Dios Tena

412/2008 Comercio agrario latinoamericano, 1963-2000: aplicación de la ecuación gravitacional para flujos desagregados de comercio
Raúl Serrano y Vicente Pinilla

413/2008 Voter heuristics in Spain: a descriptive approach elector decision
José Luís Sáez Lozano and Antonio M. Jaime Castillo

414/2008 Análisis del efecto área de salud de residencia sobre la utilización y acceso a los servicios sanitarios en la Comunidad Autónoma Canaria
Ignacio Abásolo Alessón, Lidia García Pérez, Raquel Aguiar Ibáñez y Asier Amador Robayna

415/2008 Impact on competitive balance from allowing foreign players in a sports league: an analytical model and an empirical test
Ramón Flores, David Forrest & Juan de Dios Tena

416/2008 Organizational innovation and productivity growth: Assessing the impact of outsourcing on firm performance
Alberto López

417/2008 Value Efficiency Analysis of Health Systems
Eduardo González, Ana Cárcaba & Juan Ventura

418/2008 Equidad en la utilización de servicios sanitarios públicos por comunidades autónomas en España: un análisis multinivel
Ignacio Abásolo, Jaime Pinilla, Miguel Negrín, Raquel Aguiar y Lidia García

419/2008 Piedras en el camino hacia Bolonia: efectos de la implantación del EEES sobre los resultados académicos
Carmen Florido, Juan Luis Jiménez e Isabel Santana

420/2008 The welfare effects of the allocation of airlines to different terminals
M. Pilar Socorro and Ofelia Betancor

421/2008 How bank capital buffers vary across countries. The influence of cost of deposits, market power and bank regulation
Ana Rosa Fonseca and Francisco González

422/2008 Analysing health limitations in spain: an empirical approach based on the european community household panel
Marta Pascual and David Cantarero

423/2008 Regional productivity variation and the impact of public capital stock: an analysis with spatial interaction, with reference to Spain
Miguel Gómez-Antonio and Bernard Fingleton

424/2008 Average effect of training programs on the time needed to find a job. The case of the training schools program in the south of Spain (Seville, 1997-1999).
José Manuel Cansino Muñoz-Repiso and Antonio Sánchez Braza

425/2008 Medición de la eficiencia y cambio en la productividad de las empresas distribuidoras de electricidad en Perú después de las reformas
Raúl Pérez-Reyes y Beatriz Tovar

426/2008 Acercando posturas sobre el descuento ambiental: sondeo Delphi a expertos en el ámbito internacional
Carmen Almansa Sáez y José Miguel Martínez Paz

427/2008 Determinants of abnormal liquidity after rating actions in the Corporate Debt Market
Pilar Abad, Antonio Díaz and M. Dolores Robles

428/2008 Export led-growth and balance of payments constrained. New formalization applied to Cuban commercial regimes since 1960
David Matesanz Gómez, Guadalupe Fugarolas Álvarez-Ude and Isis Mañalich Gálvez

429/2008 La deuda implícita y el desequilibrio financiero-actuarial de un sistema de pensiones. El caso del régimen general de la seguridad social en España
José Enrique Devesa Carpio y Mar Devesa Carpio

430/2008 Efectos de la descentralización fiscal sobre el precio de los carburantes en España
Desiderio Romero Jordán, Marta Jorge García-Inés y Santiago Álvarez García

431/2008 Euro, firm size and export behavior
Silviano Esteve-Pérez, Salvador Gil-Pareja, Rafael Llorca-Vivero and José Antonio Martínez-Serrano

432/2008 Does social spending increase support for free trade in advanced democracies?
Ismael Sanz, Ferran Martínez i Coma and Federico Steinberg

433/2008 Potencial de Mercado y Estructura Espacial de Salarios: El Caso de Colombia
Jesús López-Rodríguez y Maria Cecilia Acevedo

434/2008 Persistence in Some Energy Futures Markets
Juncal Cunado, Luis A. Gil-Alana and Fernando Pérez de Gracia

435/2008 La inserción financiera externa de la economía francesa: inversores institucionales y nueva gestión empresarial
Ignacio Álvarez Peralta

436/2008 ¿Flexibilidad o rigidez salarial en España?: un análisis a escala regional
Ignacio Moral Arce y Adolfo Maza Fernández

437/2009 Intangible relationship-specific investments and the performance of r&d outsourcing agreements
Andrea Martínez-Noya, Esteban García-Canal & Mauro F. Guillén

438/2009 Friendly or Controlling Boards?
Pablo de Andrés Alonso & Juan Antonio Rodríguez Sanz

439/2009 La sociedad Trenor y Cía. (1838-1926): un modelo de negocio industrial en la España del siglo XIX
Amparo Ruiz Llopis

440/2009 Continental bias in trade
Salvador Gil-Pareja, Rafael Llorca-Vivero & José Antonio Martínez Serrano

441/2009 Determining operational capital at risk: an empirical application to the retail banking
Enrique José Jiménez-Rodríguez, José Manuel Feria-Domínguez & José Luis Martín-Marín

442/2009 Costes de mitigación y escenarios post-kyoto en España: un análisis de equilibro general para España
Mikel González Ruiz de Eguino

443/2009 Las revistas españolas de economía en las bibliotecas universitarias: ranking, valoración del indicador y del sistema
Valentín Edo Hernández

444/2009 Convergencia económica en España y coordinación de políticas económicas. un estudio basado en la estructura productiva de las CC.AA.
Ana Cristina Mingorance Arnáiz

445/2009 Instrumentos de mercado para reducir emisiones de co2: un análisis de equilibrio general para España
Mikel González Ruiz de Eguino

446/2009 El comercio intra e inter-regional del sector Turismo en España
Carlos Llano y Tamara de la Mata

447/2009 Efectos del incremento del precio del petróleo en la economía española: Análisis de cointegración y de la política monetaria mediante reglas de Taylor
Fernando Hernández Martínez

448/2009 Bologna Process and Expenditure on Higher Education: A Convergence Analysis of the EU-15
T. Agasisti, C. Pérez Esparrells, G. Catalano & S. Morales

449/2009 Global Economy Dynamics? Panel Data Approach to Spillover Effects
Gregory Daco, Fernando Hernández Martínez & Li-Wu Hsu

450/2009 Pricing levered warrants with dilution using observable variables
Isabel Abínzano & Javier F. Navas

451/2009 Information technologies and financial prformance: The effect of technology diffusion among competitors
Lucio Fuentelsaz, Jaime Gómez & Sergio Palomas

452/2009 A Detailed Comparison of Value at Risk in International Stock Exchanges
Pilar Abad & Sonia Benito

453/2009 Understanding offshoring: has Spain been an offshoring location in the nineties?
Belén González-Díaz & Rosario Gandoy

454/2009 Outsourcing decision, product innovation and the spatial dimension: Evidence from the Spanish footwear industry
José Antonio Belso-Martínez

455/2009 Does playing several competitions influence a team's league performance? Evidence from Spanish professional football
Andrés J. Picazo-Tadeo & Francisco González-Gómez

456/2009 Does accessibility affect retail prices and competition? An empirical application
Juan Luis Jiménez and Jordi Perdiguero

457/2009 Cash conversion cycle in smes
Sonia Baños-Caballero, Pedro J. García-Teruel and Pedro Martínez-Solano

458/2009 Un estudio sobre el perfil de hogares endeudados y sobreendeudados: el caso de los hogares vascos
Alazne Mujika Alberdi, Iñaki García Arrizabalaga y Juan José Gibaja Martíns

459/2009 Imposing monotonicity on outputs in parametric distance function estimations: with an application to the spanish educational production
Sergio Perelman and Daniel Santin

460/2009 Key issues when using tax data for concentration analysis: an application to the Spanish wealth tax
José Mª Durán-Cabré and Alejandro Esteller-Moré

461/2009 ¿Se está rompiendo el mercado español? Una aplicación del enfoque de feldstein –horioka
Saúl De Vicente Queijeirọ, José Luis Pérez Riverọ y María Rosalía Vicente Cuervọ

462/2009 Financial condition, cost efficiency and the quality of local public services
Manuel A. Muñiẓ & José L. Zafrạ

463/2009 Including non-cognitive outputs in a multidimensional evaluation of education production: an international comparison
Marián García Valiñas & Manuel Antonio Muñiz Pérez

464/2009 A political look into budget deficits.The role of minority governments and oppositions
Albert Falcó-Gimeno & Ignacio Jurado

465/2009 La simulación del cuadro de mando integral. Una herramienta de aprendizaje en la materia de contabilidad de gestión
Elena Urquía Grande, Clara Isabel Muñoz Colomina y Elisa Isabel Cano Montero

466/2009 Análisis histórico de la importancia de la industria de la desalinización en España
Borja Montaño Sanz

467/2009 The dynamics of trade and innovation: a joint approach
Silviano Esteve-Pérez & Diego Rodríguez

468/2009 Measuring international reference-cycles
Sonia de Lucas Santos, Inmaculada Álvarez Ayuso & Mª Jesús Delgado Rodríguez

469/2009 Measuring quality of life in Spanish municipalities
Eduardo González Fidalgo, Ana Cárcaba García, Juan Ventura Victoria & Jesús García García

470/2009 ¿Cómo se valoran las acciones españolas: en el mercado de capitales doméstico o en el europeo?
Begoña Font Belaire y Alfredo Juan Grau Grau

471/2009 Patterns of e-commerce adoption and intensity. evidence for the european union-27
María Rosalía Vicente & Ana Jesús López

472/2009 On measuring the effect of demand uncertainty on costs: an application to port terminals
Ana Rodríguez-Álvarez, Beatriz Tovar & Alan Wall

473/2009 Order of market entry, market and technological evolution and firm competitive performance
Jaime Gomez, Gianvito Lanzolla & Juan Pablo Maicas