A STRATEGIC APPROACH TO NETWORK VALUE IN INFORMATION MARKETS

LUCIO FUENTELSAZ
ELISABET GARRIDO
JUAN PABLO MAICAS

FUNDACIÓN DE LAS CAJAS DE AHORROS
DOCUMENTO DE TRABAJO
Nº 552/2010

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

A STRATEGIC APPROACH TO NETWORK VALUE IN INFORMATION MARKETS♣

Lucio Fuentelsaz[1]
Elisabet Garrido[2]
Juan Pablo Maicas[3]

Abstract

This paper extends previous research on network effects by proposing a theoretical model that studies the role that firm strategy plays in markets where network effects are important. We suggest that, instead of the exogenous character usually attributed to network effects, firms can influence them through their strategies. Moreover, we develop a causal relationship between network effects and network value, understanding that the latter is a better approach to the value the firm may generate in information markets. Our premise is that companies, by influencing users' expectations, users' coordination and perceived compatibility, can leverage network effects and network value. The strategies for increasing network value that we empirically test in the mobile telecommunications industry are entry timing, internationalization and switching costs management. Finally, this study not only seeks to understand the impact of firm strategy on network value, but also analyzes its subsequent impact on firm performance. Our main conclusion is that, in markets with network effects, strategy matters.

Key words: network value, network effects, time in the market, internationalization, switching costs, performance.

JEL classification: M21, L96

[1] Generes Research Group, University of Zaragoza, Gran Vía 2, 50.005 Zaragoza, lfuente@unizar.es
[2] Generes Research Group, University of Zaragoza, Gran Vía 2, 50.005 Zaragoza, egarrido@unizar.es
[3] Generes Research Group, University of Zaragoza, Gran Vía 2, 50.005 Zaragoza, jpmaicas@unizar.es

Acknowledgements: Financial support from the Spanish Ministry of Education and Science and FEDER (projects ECO2008-04129) and the Regional Government of Aragón (PI 138/08; S09-PM062) is gratefully acknowledged.

1. INTRODUCTION

In recent years, the study of information markets has emerged as an important research theme in the management literature. They are governed by a unique set of features and characteristics that may render some well-established models and previous findings invalid. In these markets, where network effects are important, the installed base can be considered a key strategic asset for firms to assess their competitive position (McIntyre and Subramaniam, 2009; Shankar and Bayus, 2003). However, although recent literature recognizes that the foundations of network effects have received an increasing amount of attention from researchers (Varian and Shapiro, 1998; Farrell and Klemperer, 2007), a deeper understanding of the role that firm strategy plays in network industries is needed.

So far, previous attempts to link strategy and information markets have been limited to theoretical works aimed at studying how firms should develop strategies for competing in information markets (Hill, 1992; Shapiro and Varian, 1998; Farrell and Klemperer, 2007). However, few empirical studies have explored strategies for exploiting network effects. Therefore, there is a clear mismatch between theoretical and empirical research (Stango, 2002; Viard, 2007; Chen and Hitt, 2007).

The limited empirical work that can be found in the literature focuses on technological standards competition (Cowan, 1990; David, 1985; Garud and Kumaraswamy, 1993) and only a few papers have examined strategies to increase installed base in markets with network effects, such as entry timing and learning orientation (Schilling, 2002), product diversification (Tanriverdy and Lee, 2008), or pioneer's advantages (Eisenman, 2006). These previous studies tend to establish direct connections between firms' strategies and performance without designing a model that shows the specific elements that interplay in presence of network effects. Additionally, network effects are present in these studies but they do not provide any specific measure that captures them.

Building on the premise that understanding the drivers of network effects will allow firms to adopt a more proactive position to leverage them in their industries, this paper proposes a theoretical model that analyses the determinants of network effects that the firm can control. We extend previous research by suggesting that network value, defined as "the value stemming from other consumers already using the product" (McIntyre and Subramaniam, 2009:1496), is more accurate than network effects for assessing a firm's competitive position. Our rationale is that network value is what eventually influences firm performance.

The literature on network effects (Katz and Shapiro, 1994) has identified three elements that act as antecedents of the intensity of network effects, namely, users' expectations, users' coordination and compatibility among competing networks. We believe that firms, by managing these elements through their strategy, can leverage network effects and network value in the industries they operate in. In particular, we study how the entry timing strategy followed by firms, their internationalization and the level of switching costs are related to users' expectations, users' coordination and compatibility among competing networks and, eventually, to network value.

By focusing on endogenous or firm-initiated efforts that shape the firm's competitive destinies in information industries, we bring a strategy dimension into research in this field. We also contribute to the existing literature by discussing the relationship between network effects and network value by proposing a measure of network value that tries to overcome some of the weakness that previous literature has identified on Metcalfe's law. Finally, this study not only seeks to shed light on prior findings by including the effect of firm strategy on network value, but also analyzes its subsequent impact on firm performance.

We empirically illustrate the conceptual model with an application to the European mobile communications industry using a longitudinal panel spanning the period 1998 to 2008. The data refers to the network value and competitive performance of 65 companies in 20 European markets. We find that entry timing is positively related to network value, while the level of switching costs is negative, by affecting users' expectations, users' coordination and compatibility among competing networks. On the contrary, the international firm scope seems not to have any significant influence on network value. Our results also reveal that network value is a critical determinant of firms' profitability. Thus, in the European mobile communications industry, operators leverage network effects in their respective markets, which reinforces the idea that network effects can be understood as endogenous.

The paper is organized as follows. In Section 2, we develop our theoretical model paying special attention to the relationship between network effects and network value and between the latter with its main antecedents: expectations, coordination and compatibility. Section 3 provides a theoretical explanation of the three determinants that capture firm strategy. In particular, we explore the effect of entry timing, internationalization, and switching costs on network value. We also analyze the relationship between network value and the competitive performance of firms. The estimation procedure is described in Section 4, while Section 5 describes the data from the European mobile communications industry and the variables used. In Section 6, we provide evidence of the impact of entry timing, internationalization and switching costs on network value and the influence of the latter on firm performance. We close the paper by discussing its main findings and its managerial and policy implications.

2. LITERATURE REVIEW

Installed base, network effects and network value

The installed base is "the cumulative number of users at any given time in the product's life" (McIntyre and Subramaniam, 2009:1495). In the specific context of information industries, the installed base is the number of users who can interchange information, for example, by fax, mobile phone or e-mail. A growth in the number of users consuming the service also increases the possibilities of communication among them and, thus, the utility they receive. This situation, in which the utility of a user increases with the installed base, is what the literature calls network effects or network externalities.[1]

Network effects exist when "the utility that a user derives from consumption of the good increases with the number of other agents consuming the good" (Katz and Shapiro, 1985: 424). The installed base as the key element that produces network effects has been highlighted by different authors (Shapiro and Varian, 1998; Suárez, 2005). Farrell and Klemperer (2007) distinguish between total and marginal network effects. The former refer to the increase in the utility of current customers when an additional user is incorporated into the network, while the latter refer to the increase in the incentives

[1] Although several authors have distinguished between them (Chou and Shy, 1996; Liebowitz and Margolis, 1994), we will use both terms indistinctly.

of potential users to adopt the technology when the installed base grows. Due to possible economic and technological incompatibility between two firms' services or products (García-Mariñoso, 2001; Grajek, 2009), network effects often appear linked to the users of each firm instead of being linked to the installed base of the industry as a whole. As a consequence, this study will limit the scope of the network to the firm's installed base because the products or services of different firms do not necessarily facilitate interchanges of information. So, the larger the number of users of a firm, the stronger the network effects (Shankar and Bayus, 2003) and the more possibilities the firm has to maintain its current users and to increase the incentives of potential adopters to join its network.

Due to the existence of network effects, both current and potential users incorporate network size into their utility function. This has a clear influence on customers' willingness to pay, which implies that the installed base of a company is a key asset in order to be able to compete in this kind of markets (Shapiro and Varian, 1998; Shankar and Bayus, 2003). Accordingly, we can speak about network value as "the value stemming from other consumers already using the product" and it "is a reflection of the benefits associated with a large cohort of fellow adopters (installed base) for the product" (McIntyre and Subramaniam, 2009:1496). Network value depends on the installed base and users' utility in the presence of network effects. When the installed base grows, so does the network value as a result of network effects.

A firm with a larger network value will also have a better competitive position, not only because of its current market share, but also because the probability of future dominance is higher. In this context, current users' will have incentives to stay within the firm's network and the incentives of potential users will also increase, which enhances both the total and marginal network effects. The literature has referred to this process by which firms achieve increasing returns over time as path dependence, positive feedback or as a winner-takes-all process (Arthur, 1990). The strengthening of the network value may guarantee future performance and increase competitive advantage when firms display stronger network effects than their rivals.

Expectations, coordination and compatibility in network markets

It is important to identify the circumstances under which network effects lead to a reinforcement of network value over time. The literature on network industries has highlighted the existence of three main elements in information markets that interplay with network effects: users' expectations, users' coordination and compatibility among competing networks (Katz and Shapiro, 1994).

The current installed base of a firm affects *users' expectations* about which firm will dominate the market in the future (Brynjolfsson and Kemerer, 1996; Farrell and Saloner, 1986). Users prefer to consume goods and services from a firm with a larger installed base (Kim and Kwon, 2003; Birke and Swann, 2006). As a consequence, expectations are important because, if consumers believe that a firm will dominate the market, then it will (Katz and Shapiro, 1985).

Given that expectations condition the size of the installed base and the network value, firms have strong incentives to launch signals to influence user expectations about their future dominance of their network. These signals can be quantitative or qualitative. Among the former, we can mention the size of the installed base (Brynjolfsson and Kemerer, 1996; Farrell and Saloner, 1986) or the early achievement of a large market share (Suárez, 2005). Qualitative signals include brand value or reputation (Katz and Shapiro, 1994) or the preannouncement of a new product or service that is not yet on the market, as in the case of the battle between Div-X and DVD (Dranove and Gandal, 2003).

While expectations have an individualist orientation, coordination requires a plural action. *Users' coordination* implies that several users join a system that allows them to exchange information with one another (Katz and Shapiro, 1994). Coordination is difficult for several reasons: confusion about what other people will do, different expectations about the dominant network, fear of taking the first decision, etc. Farrell and Klemperer (2007) suggest inertia as a possible instrument that drives coordination. Inertia arises because later adopters choose a firm with a larger installed base even though there are better options. The literature has also referred to inertia as bandwagon effects, which assumes that users enjoy doing the same thing that other people do (Leibenstein, 1950; Rohlfs, 2001). This means that consumers are conformists because they have a "desire to join the crowd" (Grajek, 2009). As a consequence, a firm with a larger network value will increase its probability of being selected by users through inertia. Examples of how inertia can determine the standard chosen by the industry even though it is not the best option are the QWERTY keyboard (David, 1985) or the light power technology for power reactors (Cowan, 1990).

The third element in markets with network effects is *compatibility*. Compatibility arises when the products of different firms can be used together (Katz and Shapiro, 1985). In these situations, the scope of the users' network includes the installed base of the reference firm as well as the base of compatible industry competitors (Grajek, 2009). Thus, users will prefer compatibility because it offers them greater communications possibilities. Incompatibility prevents firms from achieving a maximum network size since users are fragmented in different networks and are not able to interchange information. In the presence of incompatibility, the network value will be lower and the user's perceived utility will be suboptimal (Katz and Shapiro, 1994; Lee and Mendelson, 2007).

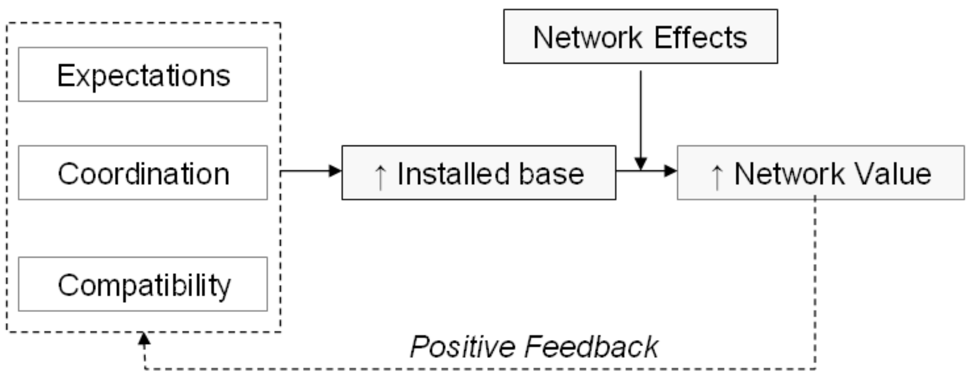
Compatibility is also preferred by small rivals. It is a less risky option for entering into a market and allows them to exploit the network effects that come from the larger installed bases of their rivals. Therefore, compatibility often neutralizes the competitive advantage of a large network (Farrell and Klemperer, 2007) and so larger competitors with a good reputation or a high brand value choose incompatibility to deter the entry of new rivals (Katz and Shapiro, 1994). However, incompatibility is also a risky option because users' trust in a new network will be lower (Katz and Shapiro, 1985).

An example of the trade-off between large and small companies with respect to compatibility can be found in the competition between Microsoft and Apple. In recent years, Apple has designed a strategy based on increasing the compatibility between its computers and Windows applications. Apple has opted for compatibility to increase users' utility and reduce the obstacles they perceive if they choose its network. The increase in network value derived from being able to exchange compatible information with other Macintosh users has put Apple in a better competitive position. Microsoft, on the contrary, has made no effort to be compatible with other operating systems because it has the largest network value and the positive feedback helps it to continue growing.

It is important to note that compatibility is not always a decision of the firm. For instance, in regulated markets such as mobile communications, the European Union decided to impose compatibility in supranational arenas, establishing a common technological standard among networks (Fuentelsaz, Maicas and Polo, 2008). This proactive regulation tries to avoid a less efficient technology being imposed as the standard in a market due to path dependency (David, 1985; Park, 1997).

Expectations and coordination has to do with users' behavior whereas compatibility is a firm or external agent decision that influences network choice. In a context of compatibility, incentives to join the network will be higher and, consequently, network effects will be stronger. A firm has to take decisions that influence the expectations and coordination of potential users of its network. A firm also has to decide (when the legal framework allows the possibility) about the compatibility or incompatibility of its product. All these choices will have a direct impact on its installed base and network value as result of network effects. These relationships are summarized in Figure 1.

FIGURE 1. NETWORK VALUE AND EXPECTATIONS, COORDINATION AND COMPATIBILITY



Our next step is to develop the hypotheses that will be empirically tested. We analyze three possible determinants that, through their influence on expectations, coordination and perceived compatibility, would reinforce the action of network effects and the achievement of a higher network value. Finally, we aim to test the effect of network value on performance to determine its strategic significance.

3. HYPOTHESES

Determinants of network value

First Mover Advantages (FMA). The study of FMA has been one of the cornerstones of the strategy and management literatures (Carpenter and Nakamoto, 1989; Kalyanaram and Urban, 1992; Lambkin, 1988; Lieberman and Montgomery, 1988). FMA have also played an important role in a more specific context: research into network effects (Farrell and Klemperer, 2007; Katz and Shapiro, 1994; Maicas and Sese, 2008; Srinivasan, Lilien and Ragaswamy, 2004).

In markets with network effects, firms will try to build a large installed base as an indicator of future dominance (Brynjolfsson and Kemerer, 1996). These efforts will be especially important in the early stages of competition in these markets, since an early superiority becomes a signal to users about the future dominance of the firm and increases the probability of its survival in the market (Arthur, 1990). As a result of early entry, the firm would be able to determine the dominant design (Arthur, 1989) and influence the formation of users' preferences (Carpenter and Nakamoto, 1986) since pioneers usually receive disproportionate attention from consumers because of the newness of their product (Lieberman and Montgomery, 1988). Thus, we propose that a firm with a longer time in the market has a larger network value because of having more time to make efforts in the expectations' management of users through the achievement of an early installed base before the entry of rivals in the market.

It is also important to note that the inertia that we have discussed above will lead late users to choose the firms with a larger installed base. If a pioneer is able to convince early users about its dominance, late consumers will prefer to follow them into the same network and the pioneers' product will become the standard in the industry (Schmalensee, 1982; Carpenter and Nakamoto, 1986; Farrell and Klemperer, 2007). Having achieved a leading position, the pioneers' installed base will persist because of the difficulty of modifying users' preferences (Lieberman and Montgomery, 1988). This is the main idea of the *bandwagon effects* we have previously referred to.

Accordingly, we expect that time in the market increases the firms' opportunities to influence user expectations about their networks. As a result of inertia, the network value of a firm that has been in the market a long time will be higher.

> ***H1.*** *The time that a firm has been operating in the market has a positive effect on its network value*

Internationalization. The literature has tended to study markets with indirect network effects in which diversification on complementary products plays an important role (Hill, 1992; Schilling, 2002; Tanriverdi and Lee, 2008). However, less attention has been kept to other kind of growth strategies in markets with direct network effects such as international diversification, especially when international network effects operate (Gruber and Verboven, 2001).

International diversification is defined as "expansion across the borders of global regions and countries into different geographic locations, or markets" (Hitt, Hoskisson and Kim, 1997: 767). Internationalization is, nowadays, an important topic of discussion because many industries are trying to compete globally (Barkema and Drogendijk, 2007; Grant, 2005). As a result of these global strategies, not only are firms present in several countries, but customers also "think" globally. National and regional preferences are disappearing as a consequence of a process of homogenization derived from technology, communication and travel (Grant, 2005). This means that customers are becoming more and more familiar with international firms and their brands. The internationalization of firms could be a means of attracting the interest of users in different countries since users value established brands (Lane and Jacobson, 1995). We expect that the internationalization of a firm will have a clear influence on its network value through its impact on expectations, coordination and perceived compatibility.

First, internationalization can be understood as a signal that influences users' expectations about the future dominance of the firm network. There is an advantage for a firm entering a new local market when it is also operating in other countries. The international firm will have a larger perceived installed base compared to new domestic firms. Even, the literature has highlighted the existence of *international* network effects when "the utility of each consumer rises with the increase in the number of consumers who use the same brand regardless of whether they live in their own country or abroad" (Shy, 2001: 92). Thus, an international firm will reinforce the positive expectations of users about its survival in the future on the basis of being present in other countries and the familiarity of domestic users with its brand through the leverage of *international* network effects.

Consequently, we also expect that internationalization will facilitate coordination by international bandwagon effects. If users know that a firm has been chosen by users in other countries, inertia could lead them to make the same choice in their national market. Users will have more incentives to choose the international firm, replicating the choices of foreign users, since they want to imitate global trends (Grant, 2005). In this sense, the firms with international presence try to create interdependences among different countries, which results in the relatedness between the competitive position in one national market with the competitive position in others national markets (Ghoshal, 1987: 425).

Finally, it is also important to note that compatibility among inter-country networks is necessary to influence user's decisions. The firms that offer comparable, seamless and compatible services across international markets will obtain the commitment of users that realize international information exchanges (Sarkar, Cavusgil and Aulakh, 1999). For example, in the case of roaming in mobile telephony, a user will be more willing to choose a firm network if he or she knows that the same company will guarantee the service abroad in similar economic terms with the same handset. In this sense, Gruber and Verboven (2001) suggest that with GSM wide-ranging international roaming, users have more incentives to adopt mobile communications since they benefit from *international* network effects.

As a consequence, we expect that the presence of the firm in several countries will create a larger network value through its influence on expectations and coordination since firms try to compete globally in order to attract users across countries. Compatibility will reinforce the influence of internationalization on network value by allowing *international* network effects.

H2. *The international presence of the firm has a positive effect on its network value*

Switching costs. Switching costs are present in all information markets and its management has a strategic dimension (Shapiro and Varian, 1998; Gomez and Maicas, 2008). Consumer switching costs appear when "consumers who have previously purchased from one firm have (or perceive) cost of switching to a competitor's product, even when the two firms' products are functionally identical" (Klemperer, 1995: 515). The literature has highlighted how switching costs can increase the market power of a firm, allowing it to create entry barriers (Karakaya and Stahl, 1989; Kerin, Varadarajan and Peterson, 1992) and obtain abnormal returns that derive in the achievement of sustainable competitive advantages (Amit and Zott, 2001; Klemperer, 1987; Lieberman and Montgomery, 1988; Schamalensee, 1982). However, the effectiveness of this mechanism as the base for sustainable competitive advantages in information markets has been questioned (Mata, Fuerst and Barney, 1995). The effect of high switching costs may derive in the loss of network value through their impact on expectations and coordination, as we argue below.

As we have explained on Section 2, network value depends on the installed base and users' utility in the presence of network effects. While switching costs has been used as an instrument to maintain installed base by reducing customers desire to leave their current provider (Burnham, Frels and Mahajan, 2003), there is a reduction on users' utility due to the increase of switching costs (Maicas, Polo and Sese, 2009) since switching from one provider to another is costly and users perceive the threat of an opportunistic firm behavior that could derive in a future increase of prices in a bargain-then-rip-off pricing strategy (Farrell and Klemperer, 2007). It is not surprising that current users create a firm image based on untrustworthy derived from its future opportunism (Mata et al., 1995). Since potential users tend to form expectations about the future survival of firm with not only quantitative signals such as installed base, but also qualitative signals as brand image or reputation (Katz and Shapiro, 1994), they will be reluctant to choose a firm with higher switching costs. In this sense, Frels, Shervani and Srivastava (2003) comments that a network of previous adopters is believed to influence adoption among non-adopters by providing opinions by word of mouth and observation. The negative experience of current installed base will derive in the formation of negative expectations about a firm network with higher switching costs that prevent users' coordination to this network, with a negative impact on network value. In this sense, Mata et al. (1995: 490) explain that "the value of opportunities lost because of a reputation for exploiting captured customers can be much larger than the value extracted from those captured customers".

Finally, switching costs are especially high when networks are incompatible. Technological incompatibility is one of the main drivers of consumer switching costs (Garcia-Mariñoso, 2001) since it is costly to abandon a network because of learning costs or loss of communication possibilities with current users. Economic or artificial incompatibility also arise when the costs of communication among users is cheaper if they belong to the same network (Grajek, 2009). In this case, economic incompatibility increases pecuniary switching costs derived from losing saves in the costs of communicating with users of the previous network. Thus, incompatibility will reinforce the negative effect of switching costs on utility and, consequently, on network value.

H3. *Switching costs have a negative effect on firm network value*

Network value and performance

In information markets, current performance is strongly dependent on past events (Farrell and Klemperer, 2007; McIntyre and Subramaniam, 2009). Users prefer to belong to networks which have been previously chosen by other users. This is the positive feedback that "reinforces that which gains success or aggravates that which suffers loss" (Arthur, 1996: 100).

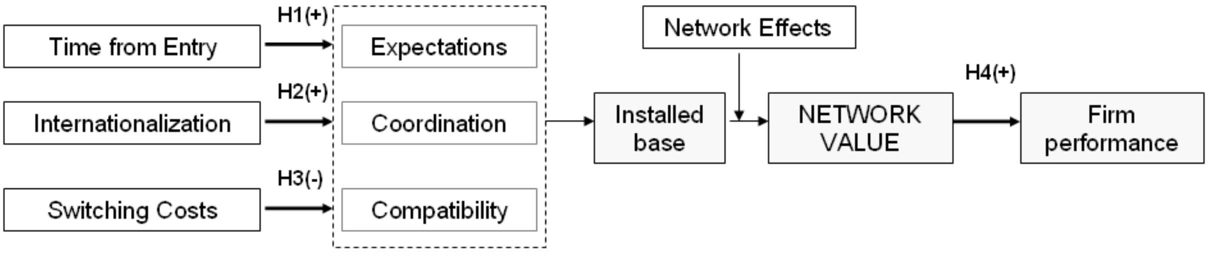
The literature has suggested that a continuous increase in network value is followed by an increase in the willingness to pay to have access to that network (Doganoglu and Grzybowski, 2007) and the subsequent decrease of the marginal costs of each information interchange (Arthur, 1990). This is because the value does not lie in the product itself, but in the size of the network (De Palma and Leruth, 1996; Grajek, 2009). The product is more valuable as more people use it (Doganoglu and Gryzbowski, 2007). While a greater network value permits a higher price, marginal costs decrease as more and more information ties are taking place. In spite of a large initial investment in research and development, the marginal costs of producing an additional exchange are relatively cheap (Shapiro and Varian, 1998) since information markets are knowledge-based (Arthur, 1990).

We expect that a firm with a larger network value will also obtain a higher marginal net income from each information exchange derived from a higher price and lower marginal costs. Thus, performance will be positively related to network value.

H4. *Network value has a positive effect on firm performance*

Figure 2 summarizes our four hypotheses.

FIGURE 2. DETERMINANTS OF NETWORK VALUE AND FIRM PERFORMANCE



4. METHODS

In this section, we develop two econometric models that help to describe and empirically examine the determinants of network value and the impact of the latter on firm profitability. First, we present separately the model components – determinants of network value and firm profitability. Then, we discuss the procedure to estimating the system of equations.

Network value model

We model network value of company i (competing into market k) in period t ($NETWORK\ VALUE_{ikt}$) as a function of the time in the market that the firm i is competing in the market ($TIME_{ikt}$), the international presence of the company i ($INTERNATIONALIZATION_{ikt}$), and the switching costs of the firm i ($SWITCHING\ COSTS_{ikt}$). To control for additional sources of variation in network value, we introduce a set of control variables that include the population in the market k ($POPULATION_{kt}$), the number of firms competing in the market k ($FIRMS_{kt}$) and year effects (*YEAR*). We represent the network value model in Equation (1) as follows:

$$NETWORK\ VALUE_{ikt} = \beta_0 + \beta_1\ TIME_{ikt} + \beta_2\ INTERNATIONALIZATION_{ikt} + \beta_3\ SWITCHING\ COSTS_{ikt} + \beta_4\ POPULATION_{kt} + \beta_5\ FIRMS_{kt} + \beta_6\ YEAR + \varepsilon_{ikt} \quad (4.1)$$

Profitability model

Consistent with the proposed conceptual framework, we relate the network value of the firm to performance outcomes. We model performance of firm i in period t ($PERFORMANCE_{ikt}$) as a function of network value. As common practice in profitability models suggests, especially in industries with increasing returns where is a path dependency from performance on previous periods, we also control for past realizations of the dependent variable ($PERFORMANCE_{ikt-1}$). We control for additional factors that potentially affect profitability, including the population in the market ($POPULATION_{kt}$), the number of firms in the market ($FIRMS_{kt}$) and time controls ($YEAR$). In Equation (2), we represent the profitability model as follows:

$$PERFORMANCE_{ikt} = \lambda_0 + \lambda_1 PERFORMANCE_{ikt-1} + \lambda_2\ NETWORK\ VALUE_{ikt} + \lambda_3\ POPULATION_{kt} + \lambda_4 FIRMS_{kt} + \lambda_5\ YEAR + \varphi_{ikt} \quad (4.2)$$

Estimation procedure

We estimate equations (4.1) and (4.2) as follows. We propose static panel estimators to explore the determinants of network value (Hypotheses 1 to 3). To explore the determinants of network value, we estimate a fixed effect model where network value is the dependent variable. The fixed effects estimation method is used in longitudinal panel analyses and allows the unobserved individual effects to be correlated with the included variables (Greene, 2003). The existence of these individual effects has been tested by the Lagrange multiplier of Breusch and Pagan (1980) and the preference for fixed effects estimation over random effects derives from the test of Hausman (1978). However, dynamic panel estimators are considered for the profitability model (Hypothesis 4) since the lagged performance is introduced as explanatory variable on the performance equation (4.2).

We test Hypothesis 4 by estimating a System Generalized Method of Moments model (System GMM), proposed by Arellano and Bover (1995) and fully developed by Blundell and Bond (1998). System GMM is frequently used in profitability models in which current performance is highly conditioned by firm performance in the previous period. Jointly with the lagged performance, we also include network value as a regressor to test the impact of our key element on the competitive performance of firms.

5. DATA

Research Setting: the European mobile communications industry

Telecommunications in general and mobile communications in particular are paradigmatic examples of direct network effects (Doganoglu and Grzybowski, 2007; Maicas, Polo and Sese, 2009). Srinivasan et al. (2004) suggest that mobile communications present a high degree of network effects. In fact, they rate among the highest in a list of 45 goods and services that are believed to be intensive in network effects. Consequently, this industry constitutes an ideal context for testing and analyzing network value.

Several reasons can be provided for considering the mobile communications industry to be an attractive laboratory for our research purposes. First, the European mobile communications industry represents a large, fruitful and growing portion of Europe's economy. This industry has become an important source of wealth in Europe, since the telecommunications industry made up 2.83% of the GDP at the end of 2007, whereas, for example, agriculture constitutes 1.82% (World Bank Group, 2010). It has grown impressively in recent years: its average penetration rate increases from around 30% at the end of 1998 to slightly over 120% in the middle of 2008 (Merrill Lynch, 2010).

Second, as we have already said, the mobile telecommunications industry is a paradigmatic case of information markets in which information ties are essential to generate direct or pure network effects (Birke and Swann, 2006). The product does not have value in itself, but in the size of its installed base (De Palma and Leruth, 1996; Shankar and Bayus, 2003).

Finally, in the European mobile telecommunications industry, expectations, coordination and compatibility, the three elements that guide the relationship among installed base, network effects and network value, are clearly present. Katz and Shapiro (1994) have highlighted the importance of expectations and coordination in the choice of a mobile communications provider. Compatibility has been especially significant in the European context and has been previously discussed in the literature (Gandal, 2002; Fuentelsaz, Maicas and Polo, 2008). The European Union first established a technological compatibility for the EU members through the GSM standard in the early 90's. As a consequence, a user can employ his handset to make calls to the telephones of any firm in the country without technological compatibility restrictions and can use the same handset in any European country thanks to the roaming service. Nevertheless, in spite of this technological compatibility imposed by institutions, an *economic incompatibility* appeared since there are important price differences between on-net and off-net calls (Grajek, 2009).

Sample

Our database includes the whole population of mobile communications providers that operated in twenty European markets between the last quarter of 1998 and the second quarter of 2008.[2] The availability of this large time period is important because our sample does not suffer from survival bias for the period under analysis. Our data comes from multiple sources, but the main one is the Merrill Lynch Global Wireless Matrix. This publication provides quarterly information on several of the variables of interest such as the name of the firms, the number of subscribers, the number of firms per market and their performance. We have also collected information about the date of entry of the firms and their shareholder structure, mainly from industry reports and the corporate information of the firms.

Measurement of Variables

Network value. The literature offers different approaches to the measurement of the network value of a firm. Swann (2002) describes the traditional ways to determine it. One option, called *Sarnoff's Law,* measures network value through the size of the installed base, n (Reed, 1999).

Nevertheless, our interest in this research is in information markets. The possibilities of communication increase as the number of users consuming the good and, thus, their perceived utility grow. According to Church and Gandal (2004:3), a user's link to the network has no value except to facilitate the transmission of information to, and from, other users. Farrell and Klemperer (2007) suggest that the users of a communication network gain directly when other users adopt it because they have more opportunities for interaction with peers. Thus, a second option for measuring network value is to proxy it by the number of possible communication ties that exist among the users of the same network. This is known as Metcalfe's Law and is measured as $n*(n-1)$. With this measure, we focus on the possibilities of connectivity between users (Ross, 2003).

However, Metcalfe's Law has been criticized for giving the same importance to all users (Grajek, 2009; Briscoe, Odlyzko and Tilly, 2006). Farrell and Klemperer (2007:1975) suggest that early adopters' preferences are more important than later adopters', first adopters having an "excess early power" to determine the dominant network in the future. Early adopters generate more network value to the firm than later ones because of the inertia operating in these markets. For this reason, the literature has suggested a third approach that considers a decreasing marginal network value as $n*log(n)$, namely *Zipf's Law* (Briscoe et al., 2006). The expression $n*log(n)$ recognizes the user connectivity that we have referred to as well as the differences between early and late adopters. As a consequence, we will use this measure of network value (*NETWORK VALUE*).

However, the previous measure of network value confers to all firms the same capability of reinforcing their own network value through positive feedback, without consideration of networks effects that are capable to leverage in function of the rivalry in each market. For example, suppose the existence of two markets A and B with two firms operating in each one, firm 1 and 2, and that the market share are the following:

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

	Market A	Market B
Firm 1	60% (1,200 subscribers)	80% (1,200 subscribers)
Firm 2	40% (800 subscribers)	20% (300 subscribers)

In the two markets, firm 1 has the same network value (1,200*log(1,200)) and offers more communication possibilities than firm 2. However, users of firm 1 in market A have twice the probability of making off-net calls (40%) than users of firm 1 in market B (20%). Accordingly to the literature and anecdotal evidence, in telecommunications markets there is a tendency to penalize off-net calls through a higher price than on-net calls (Birke and Swann, 2006; Grajek, 2009). Thus, users of firm 1 in market B receive a higher utility to have selected firm 1 over firm 2 than in network A. In other words, the network of firm 1 in market B is more attractive than in market A and can leverage stronger network effects, given price differences between on-net and off-net calls.[3]

In this study, we advance in the measure of network value through the use of a corrected measure of *Zipf's Law,* with the aim of considering the competitive advantage of each firm in its market as a function of the differences among rivals' network sizes. Thus, the measure we propose takes into account the probability to make on-net calls to off-net calls for each firm in each market. With this ratio, we reward those firms that have achieved a larger installed base in comparison with its direct rivals in their specific market and penalize those ones that create more disutility to their users in the way of superior costs derived from economic incompatibility.

In order to calculate an expected probability to make on-net calls to off-net calls, we borrow the example provided by Birke and Swann (2006) who develops a likelihood matrix that offers the pattern of calls between rival networks in a given market. Let's suppose that there are four operators (i = 1,…, 4) competing in a market and that the market share of each one is given by m_i. Assuming that there is not price differences between on-net and off-net calls and accepting that the calls from one network to other network are proportional to the sizes of the installed bases, the expected call probability among

[3] The literature has referred to this phenomenon as tariff or price-mediated network effects (Laffont, Rey and Tirole, 1998; Birke and Swann, 2006), which leads to artificial or economic incompatibility among networks.

users of different networks is given by the product of their respective market shares as it is given by the following matrix:

TABLA 1. LIKEHOOD MATRIX OF CALLS ACROSS NETWORKS

		To Network			
		1	**2**	**3**	**4**
Calls from Network	**1**	$m_1 m_1$	$m_1 m_2$	$m_1 m_3$	$m_1 m_4$
	2	$m_2 m_1$	$m_2 m_2$	$m_2 m_3$	$m_2 m_4$
	3	$m_3 m_1$	$m_3 m_2$	$m_3 m_3$	$m_3 m_4$
	4	$m_4 m_1$	$m_4 m_2$	$m_4 m_3$	$m_4 m_4$

Source: Birke and Swann (2006)

The probability of making on-net calls is given by the elements of the matrix diagonal (m_i m_i), whereas the off-diagonal elements refers to off-net calls among networks (m_i m_j) for each firm. Thus, the probability to make on-net calls to off-net calls for each firm is given by the following ratio:

$$m_i \, m_i \, / \sum m_i \, m_j =\cdot \, m_i \, / \sum m_j \qquad [i \neq j] \qquad (5.1)$$

By modifying the previous measure of network value with this ratio, the corrected network value (*NETWORK VALUE'*) is expressed as:

$$n_i * log \, (n_i) * m_i \, / \sum m_j \qquad [i \neq j] \qquad (5.2)$$

Thus, the corrected network value will be higher when: a) There is a higher installed base that allows higher communications possibilities among its current users; b) There is a larger difference among network sizes of the reference firm and its rivals than confers it a competitive advantage to leverage stronger network effects and make its network more attractive to potential users. This measure not only includes the size component, but also the rivalry dimension in order to detect the network that results more attractive to users in a given market. This corrected network value becomes a strategic measure very useful for weighting up the market position of each firm in its specific competitive environment.

Performance **(**_PERFORMANCE_**)**. Firm profitability is measured through EBITDA (Earnings Before Interests, Taxes, Depreciation and Amortization) divided by the total revenues of the firm.

Time in the market **(**_TIME_**)**. Different concepts of pioneering have been used when modelling first mover advantages. Srinivasan et al. (2004) consider the pioneer to be the first firm to commercialize a new product. Lieberman and Montgomery (1988) suggests some alternative measures such as the numerical order of entry, rates of company survival, advantages duration or time from pioneer entry. Brown and Lattin (1994) suggest time in the market as an adequate measure of FMA. Accordingly, our variable counts the number of months that a firm has been operating in the market.

International presence **(**_INTERNATIONALIZATION_**).** International diversification has been measured with variables such as international sales over total sales (Strike, Gao and Bansal, 2006), number of workers abroad (Brock, Yaffe and Dembovsky, 2006), sales in a country weighted by the importance of this market (Hitt et al., 1997), number of international subsidiaries (Barkema and Drogendijk, 2007; Strike et al., 2006) and number of countries in which firm operates (Brock et al., 2006). In this study, we have identified the number of countries in which the firm is present around the world with an ownership of above 50%.

Switching **costs (**_SWITCHING COSTS_**)**. According to the existing literature, there is an important gap between the theoretical and the empirical research on switching costs (Stango, 2002; Grzybowski, 2007; Chen and Hitt, 2007; Viard, 2007). Only a few articles have tried to properly measure their magnitude. To advance in this direction and given the available information, we use a model proposed by Shy (2002). This author develops a method for estimating switching costs among firms in a context where we only need to have information about prices and market shares. It is important to note that Shy's method has been used previously in the literature with very similar purposes to ours (Carlsson and Löfgren, 2006; Krafft and Salies, 2008).

Shy (2002) considers a market with two firms (A and B). Consumers are assumed to be distributed between the firms so that, initially, N_A consumers have already purchased brand *A* (type *a* consumers) and N_B consumers have already purchased brand *B* (type *b* consumers). p_A and p_B represent firm *A* and *B* prices, respectively, and *s* is the cost of switching brands. The utility U_A (U_B) for a user who is now buying from *A* (*B*), can be written as:

$$U_A \stackrel{def}{=} \begin{cases} -p_A & \text{staying with brand A} \\ -p_B - s & \text{switching to brand B} \end{cases}$$

The number of subscribers for A (B), n_A (n_B) in the following period is given by,

$$n_A = \begin{cases} 0 & \text{if } p_A > p_B + s \\ N_A & \text{if } p_B - s \leq p_A \leq p_B + s \\ N_A + N_B & \text{if } p_A < p_B - s \end{cases}$$

If we assume that the firm's production costs are zero, the profit, π_A (π_B), of each firm is:

$$\pi_A\left(p_A, p_B\right) = p_A n_A$$

Shy (2002) postulates that the pair of prices that solve the problem for firms *A* and *B* and constitute a Nash-Bertrand equilibrium are:

$$p_A = \frac{\left(N_A + N_B\right)\left(N_A + 2N_B\right)s}{\left(N_A\right)^2 + N_A N_B + \left(N_B\right)^2} \quad \text{and} \quad p_B = \frac{\left(N_A + N_B\right)\left(2N_A + N_B\right)s}{\left(N_A\right)^2 + N_A N_B + \left(N_B\right)^2}$$

Shy (2002) extends the model to a multi-firm industry. He considers the possibility of more than two firms, each indexed by *i, i* = 1,…, *I*. The expressions for switching costs in a multi-firm industry are:

$$s_i = p_i - \frac{N_I p_I}{N_i + N_I}, \text{ if i} \in \ \{1, \ldots, \text{I-1}\} \text{ and } s_I = p_I - \frac{N_1 p_1}{N_1 + N_I}$$

In this model, it is important to have a precise measure of the sizes and prices. Sizes are incorporated into the switching costs function through the market shares of the firms. A more controversial issue is to define prices in mobile communications. Prices usually vary depending on the characteristics of the user, the receiver of the phone call (on-net *vs*. off-net calls) or the time of the day. To solve this problem, Shy (2002) derives prices from the Average Revenue per User (ARpU) in his calculation of switching costs in mobile communications in Israel. Furthermore, the use of ARpU is also motivated by "its widespread use in industry and regulatory circles" (McCloughan and Lyons, 2006:523). An additional advantage of ARpU is that it makes comparisons among countries possible.

Control variables. Besides the variables described to test the proposed hypotheses, our model also controls for additional covariates. First, we control for the population in each national market (*POPULATION*), which we expect to have a positive relationship with network value and performance, since the communication possibilities in each national market will be higher. We also control for country-specific rivalry by taking into account the number of firms operating in each market (*FIRMS*). This variable is expected to negatively affect firm performance. However, the relationship between the number of firms and network value is not so clear. A higher number of firms would probably derive in smaller networks, decreasing network value. But also the increase in the number of firms could constitute an improvement in the competitiveness of the market that derives in price reductions. It might enhance users' utility and technology adoption, with a subsequent increase of network value. Finally, the model also includes year dummies in order to control for time-specific influences (*YEAR*).

Descriptive Statistics

Descriptive statistics are shown in Tables 2 and 3. The first includes the determinants of the network value model and the second those of the profitability model. The existence of missing values in our dependent variables means that we are left with 2,032 observations for the network value model and 1,991 for the profitability model.

As can be seen in Table 3, the average European firm has been operating in the market for nine years (107.5 months), it has presence in 8 countries around the world and presents positive switching costs of around 17 euros per user. The average number of firms per market is 3. When we analyze the correlation matrix, we can observe that both network value and corrected network value are especially correlated with population and also with time in the market. Nevertheless, the correlation among the independent variables is moderate. Table 4 shows that the average performance is larger than the performance in the previous period, with a positive relationship with network value but negative with population and number of firms.

It is important to note that our first measure of network value (*NETWORK VALUE*) is larger (15.28) than the average corrected network value (*NETWORK VALUE'*) (9.25). The inclusion of the specific rivalry in the market where the firm is operating assumes the consideration of a disutility caused by the additional costs derived from existing off-net calls. Additionally, we can observe in Table 2 that the correlation of independent variables changes according to the measure of network value. When we take into account the competitive position of the firm in the measure of network value, the correlation with time in the market and the internationalization decreases while the correlation with switching costs increases. In Table 3, we can also observe that the correlation with performance and lagged performance it is higher to the corrected network value than to traditional network value. Thus, taking into account the competitive advantage that a firm could have as a result of higher differences in network sizes increases the explanation of performance behaviour.

TABLE 2. DESCRIPTIVE STATISTICS MODEL 1 (N= 2,032)

Variable	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7
1. NETWORK VALUE	15.28	24.09	-0.37	140.08	1						
2. NETWORK VALUE'	9.25	17.14	-0.13	105.38	0.92	1					
3. TIME	107.48	44.36	3.00	258.00	0.36	0.34	1				
4. INTERNATIONALIZATION	7.95	7.04	1.00	28.00	0.25	0.20	0.27	1			
5. SWITCHING COSTS	17.22	11.19	-18.28	56.51	0.07	0.15	0.25	0.14	1		
6. FIRMS	3.27	0.65	2.00	5.00	0.16	0.04	-0.12	0.11	0.02	1	
7. POPULATION	27.12	25.64	3.87	82.541	0.72	0.55	0.03	0.08	-0.02	0.34	1

TABLE 3. DESCRIPTIVE STATISTICS MODEL 2 (N=1,991)

Variable	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6
1. PERFORMANCE $_t$	0.29	0.24	-3.57	.58	1					
2. PERFORMANCE $_{t-1}$	0.28	0.38	-9.17	0.58	0.90	1				
3. NETWORK VALUE	15.59	24.29	-0.37	140.08	0.23	0.17	1			
4. NETWORK VALUE'	9.54	17.49	-0.07	105.38	0.26	0.18	0.91	1		
5. FIRMS	3.28	0.66	2.00	5.00	-0.23	-0.14	0.14	-0.02	1	
6. POPULATION	26.48	25.57	3.87	82.54	-0.01	0.01	0.74	0.57	0.32	1

6. RESULTS

Determinants of Network Value

Table 4 reports the parameter estimated for the fixed effects models. All the equations present heteroskedasticity and autocorrelation consistent (HAC) estimates. To test our hypotheses, eight regressions with two dependent variables are run: network value (*NETWORK VALUE*) from equation A.1 to A.4 and corrected network value (*NETWORK VALUE'*) from B.1 to B.4. Equations A.1 and B.1 only include the control variables, while the remaining explanatory variables are added consecutively in a nested way, so that Models A.4 and B.4 present the estimation that includes all the explanatory variables. The hypothesis that the independent variables are jointly equal to zero is rejected for the two models ($\rho < 0.01$), as can be inferred from F-test (not shown). Thus, compared with equations with no explanatory variables, the full models (A.4 and B.4) show a significant better fit.

Model A.2 shows that the variable *time in the market* presents a positive and highly significant sign, which supports Hypothesis 1: network value increases with the time that the firm has been operating in the market. Model A.3 adds the variable *internationalization* whose value is also positive but not significant, thus Hypothesis 2 cannot be accepted. Finally, model A.4 also includes the variable *switching costs*, with a negative and significant coefficient: the presence of switching costs decreases the network value, as proposed in Hypothesis 3. The F-test, which compares different nested models is also shown at the end of Table 5 and confirms that the estimation presented in column A.4 is the one that best fits our data. In this model, the global fit is quite satisfactory, with an R-squared around 0.6. In any case, it is also important to note that the value of the coefficients of the main explanatory variables of the model remains highly stable in all the estimations. With respect to control variables, *population* in each national market and *number of firms* have a positive and significant influence in network value, jointly with time dummies which are globally significant.

If we consider the set of models that use the corrected network value as dependent variable, the sign and significance of the main coefficients does not change. As can be seen in Table 4, *time in the market* increases corrected network value and *switching costs* decrease it, supporting respectively Hypotheses 1 and 3. *Internationalization* has not a significant effect on network value, which leads us not to accept Hypothesis 2. These coefficients remain highly stable in all the estimations. As for control variables, *time dummies* are globally significant and *population* preserves its positive and significant influence on network value. However, *number of firms* loses its positive significance. The F-test confirms that B.4 is the estimation that best fits our data when network value is measured through this corrected way. In this model, R-squared presents here a value of 0.46. Note that the measure of network value that takes into account the disutility perceived by the existence of rivals networks in the presence of economic incompatibility reduces the coefficients of the main explanatory variables although the sign of the relationship with network value does not change.

TABLE 4. DETERMINANTS OF NETWORK VALUE. FIXED EFFECTS ESTIMATES

	NETWORK VALUE				NETWORK VALUE’			
	(A.1)	**(A.2)**	**(A.3)**	**(A.4)**	**(B.1)**	**(B.2)**	**(B.3)**	**(B.4)**
TIME		0.242***	0.229***	0.224***		0.117***	0.113***	0.110***
		(5.70)	(5.46)	(6.06)		(4.81)	(4.74)	(5.31)
INTERNATIONALIZATION			0.230	0.168			0.0746	0.0350
			(1.02)	(0.79)			(0.59)	(0.30)
SWITCHING COSTS				-0.539**				-0.348***
				(-2.60)				(-2.90)
FIRMS	1.899	1.971	1.781	4.636**	0.00628	0.0415	-0.0204	1.823
	(1.12)	(1.17)	(1.09)	(2.37)	(0.01)	(0.04)	(-0.02)	(1.44)
POPULATION	6.225***	6.210***	5.991***	6.434***	2.855**	2.847**	2.776**	3.062***
	(3.48)	(3.47)	(3.16)	(4.06)	(2.50)	(2.49)	(2.35)	(3.07)
YEAR Dummies	YES***	YES***	YES***	YES***	YES*	YES**	YES**	YES**
Constant	-176.4***	-186.8***	-180.3***	-187.1***	-75.69**	-80.71**	-78.60**	-82.99***
	(-3.74)	(-4.01)	(-3.61)	(-4.39)	(-2.47)	(-2.63)	(-2.48)	(-3.05)
Number of observations	2,032	2,032	2,032	2,032	2,032	2,032	2,032	2,032
R2	0.524	0.530	0.534	0.600	0.370	0.373	0.375	0.463
F-Test vs. 1		32.55***	16.70***	15.37***		23.14***	11.80***	11.51***
F-Test vs. 2			1.03	3.68**			0.34	4.21**
F-Test vs. 3				6.74**				8.41***

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Performance and Network Value

The results of the estimations of the performance model are shown in Table 5. Model C.1 introduces the control variables and the lagged performance, whereas Models C.2 and C.3 add network value and corrected network value, respectively. Our specification choice is based on a System GMM with first differences, one-step estimation and robust to heterokedasticity. To assess the validity of the System GMM estimators, we run the Arellano-Bond test for first-order and second-order serial correlation. Table 5 reports the significant m1 and insignificant m2 serial correlation statistics. This indicates that there is not second-order correlation on the level of residuals. The Hansen test is also reported and its not significance validates the robustness of our estimations.

Lagged performance has a positive and significant influence on performance with a coefficient that remains highly stable in the three estimations. This means that performance in the previous period positively influences the current performance. This result justifies the use of GMM estimator in this part of our analysis. Firm *network value* has, as expected, a positive and significant impact on performance (Models C.2 and C.3), which supports Hypothesis 4. The *number of firms* has negative and significant influence on firm performance as a result of increasing rivalry and *year dummies* are also statistically significant. However, *population* does not seem to influence on performance in any of the three models. In this case, the influence of corrected network value on firm performance is slightly higher than the traditional network value.

TABLE 5. PERFORMANCE AND NETWORK VALUE

	PERFORM $_t$		
	(C.1)	**(C.2)**	**(C.3)**
PERFORMANCE $_{t-1}$	0.711^{***}	0.675^{***}	0.674^{***}
	(18.14)	(29.22)	(29.13)
NETWORK VALUE		0.000972^{***}	
		(4.10)	
NETWORK VALUE'			0.00104^{***}
			(4.17)
FIRMS	-0.0241^{***}	-0.0243^{***}	-0.0229^{***}
	(-2.90)	(-3.08)	(-2.86)
POPULATION	0.000195	-0.000491	-0.000212
	(0.95)	(-1.58)	(-0.85)
YEAR Dummies	YES^{*}	YES^{**}	YES^{**}
Constant	0.184^{***}	0.190^{***}	0.187^{***}
	(5.83)	(7.61)	(7.41)
Number of observations	1,991	1,991	1,991
m1	-2.08^{**}	-2.29^{**}	-2.28^{**}
m2	0.44	0.33	0.33
Hansen Test	37.66	33.80	33.44
F-Test vs. 1		16.79^{***}	17.38^{***}

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7. DISCUSSION AND CONCLUSIONS

This paper has advanced in the study of markets with network effects from a strategic perspective. With this aim we propose a theoretical model in which firm's strategy may condition network effects and firm profitability through the three main elements that the literature has remarked in information markets, i.e.: expectations, coordination and compatibility.

Probably the main contribution of the paper is that the observation of network effects through network value, together with the development of the subsequent theoretical model, has allowed us to endogenize network effects. The underlying idea for the endogenous character of network effects is that firm strategy can lead them to company's own interest.

Our results reveal the importance of entry timing strategy in markets with network effects. This result is highly consistent with previous findings in the literature (Gomez and Maicas, 2008; Usero and Fernández, 2009). Switching costs has also appeared as a key strategy weapon that influences network value. In this case, high switching costs has been probed to dissuade the firm network selection by potential users with the subsequent negative effect on network value. Users distrust firms with high switching costs since they anticipate an opportunistic behaviour of firms (Mata et al., 1995), decreasing the effectiveness of network effects. Consequently, firms have to find a trade-off between create high switching costs in their customers to retain them and being not so aggressive to be perceived by potential customers as an appealing and trustworthy alternative. Contrary to our *ex ante* expectations, operating in several international markets has not been found a remarkable strategy that influences users' expectations and, thus, its effect on network effect is not significant. The explanation we can provide to this unexpected finding is twofold. First, while it is true that several mobile service providers are competing globally, users are restricted in their choices to companies operating in their local markets. In mobile telecommunications, users take into account only the network of the country where they live, whereas in other kind of information industries such as software, hardware, or online auctions, users do not perceive national boundaries in their decisions. Second, the internationalization of mobile operators could have become a strategic necessity. This seems to be clear from the analysis of the industry evolution in the last years in which international diversification followed by the main operators has been quite similar. Thus, the non significance of international presence on network value could respond to these particularities in the mobile communications industry.

Our study does not dwell on the role that strategy plays on network value. It also confirms how network value constitutes an element that is positively related to firm performance. Our main premise at this point is that users are willing to pay more for being part of a network firm with a larger installed base since the product does not have any value in itself. The value resides in the communication ties that the firm network offers to users and this allows firms to increase the price of their product or service.

In analyzing the previous relationships, this research has tried to respond to a more accurate meaning of network value. Traditionally, network value has been considered to be proportional to network size, since the installed base has been found the main driver of network effects. Although this is reasonable, in this paper we have added a strategic dimension to the traditional approach. We corrected previous measures by considering not only the own network of the firm, but also rivals' network, that is, market competition is introduced in assessing network value. Although the main findings do not substantially change, the corrected measure we use shows a lower network value, which is perfectly understandable as we consider market competition.

Our research has several managerial implications. It recommends paying special attention to entry timing strategies in information markets. Firms should try to attract users to their network as soon as possible to gain competitive advantage. Because of this, it is not surprising to observe that *bargain-then-rip-off* strategies are very common in the first stages of market evolution as an adequate mechanism to attract users that will be locked-in at a later stage. According to the previous reasoning, entry timing and price strategy have to be considered simultaneously when network effects are important. However, firms in these markets should be aware of not overexploiting their customers when lock-in is a likely market outcome. As being observed, the perception of high switching costs by users may anticipate a later opportunistic firm behaviour that could derive in the reduction of incentives to enter into the relationship with the firm. This study also shows managerial insights on the international diversification for mobile operators. Apparently, international presence has no significance over network value, which, in our view, does not mean that firms must not pay attention to their international strategy, but rather it could has become a strategic necessity to survive in the industry.

We should not forget that our research setting is referred to an industry in which the regulator plays a key role. For this reason, several policy implications can also be derived. Importantly, the effectiveness of FMA in the mobile communications industry depends on the winning of a licence that is granted by national institutions and that is compulsory to compete. Governments should be aware of the direct impact that their decisions have on competition in each local market. A reduced number of licenses or restrictive criteria to start an activity could reduce the number of competitors. This initial restriction could constitute an entry barrier in the future because a firm that cannot obtain a licence at the first stage of competition will lose time in the market, which has been revealed as a valuable resource. Additionally, our results show the important effect of switching cost to reduce the network value and consumers' welfare in information markets. Thus, the regulator has to take decisions being conscious of that switching costs are a constant in the industry that can be harmful for customers' interests. Indeed, in the context of mobile communications, the regulator has already recognized the importance of this dimension, reducing switching barriers and developing several measures lead to make switching easier and less costly. Mobile number portability is, perhaps, the most remarkable effort in this direction and it has had, according to the literature, the desired effects (Lee, Kim, Lee and Park, 2006).

To our knowledge, our paper is one of the first attempts to empirically integrate network effects into firm strategy. However, several issues deserve further attention. First, we use a corrected measure of network value which does not confer the same importance to all users and it also takes into account market position of each firm. However, while it is true we make an effort to incorporate several dimensions in our network value approach, this measure has several limitations. First, it does not consider the existence of industry network effects derived from the existence of technological compatibility among networks as a result of European regulation. Second, the tendency to make on-net communications only includes markets shares and not price differences that leverage the firm's network effects in a context of economic incompatibility. Precisely, a firm that offers a price for on-net calls under the average price will attract more users, increasing the value of the network. Due to these limitations, future research should try to find a measure of network value that includes the existence of industry network effects and the price dimension. Another possible extension would be to incorporate the existence of social network effects that reinforce network value. Users do not only select a firm because they believe it will be bigger than the others. Consumers' behaviour is also influenced by the previous decisions of the people who are socially related to them.

International presence has been showed not to have any significant impact on network value. However, internationalization is expected to confer brand familiarity that may shape expectations and coordinate users to the same network. Although some explanations have been developed, a better understanding about how the internationalization process have influenced firm performance in these markets until becoming an strategic necessity is needed.

REFERENCES

Arellano, M. and Bover, O. (1995). "Another look at the instrumental variables estimation of error-components models". *Journal of Econometrics,* 68(1), pp. 29-51.

Arthur, W.B. (1989). "Competing Technologies, Increasing Returns, and Lock-In by Historical Events". *The Economic Journal,* 99(394), pp. 116-131.

Arthur, W.B. (1990). "Positive Feedback in the Economy". *Scientific American*, 262(2), pp. 92-99.

Arthur, W.B. (1996). "Increasing Returns and the New World of Business". *Harvard Business Review,* 74(4), pp. 100-108.

Barkema, H.G. and Drogendijk, R. (2007). "Internationalising in Small, Incremental or Larger Steps?" *Journal of International Business Studies,* 38(7), pp. 1132-1148.

Beggs, A. and Klemperer, P. (1992). "Multi-Period Competition with Switching Costs". *Econometrica,* 60(3), pp. 651-666.

Birke, D. and Swann, P. (2006). "Network Effects and the Choice of Mobile Operator", *Journal of Evolutionary Economics,* 16(1/2), pp. 65-84.

Blundell, R. and Bond, S. (1998). "Initial conditions and moment restrictions in dynamic panel data models". *Journal of Econometrics,* 87(1), pp. 115-143.

Breusch, T. S. and Pagan, A. (1980). "The lagrange multiplier test and its applications to model specification in econometrics". *The Review of Economic Studies,* 47(1), pp. 239-253.

Briscoe, B., Odlyzko, A. and Tilly, B. (2006). "Metcalfe's Law is wrong". *IEEE Spectrum,* 43(7), pp. 34-39.

Brock, D.M., Yaffe, T. and Dembovsky, M. (2006). "International Diversification and Performance: A Study of Global Law Firms". *Journal of International Management,* 12(4), pp. 473-489.

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.

Brynjolfsson, E. and Kemerer, C. (1996). "Network Externalities in Microcomputer Software: An econometric analysis of the spreadsheet market". *Management Science,* 42(12), pp. 1627-2647.

Burnham, T. A., Frels, J.K. and Mahajan, V. (2003). "Consumer Switching Costs: A Typology, Antecedents, and Consequences". *Journal of the Academy of Marketing Science,* 31(2), pp. 109-126.

Carlsson, F. and Löfgren, Å. (2006). "Airline Choice, Switching Costs and Frequent Flyer Programs". *Applied Economics*, 38(13), pp. 1469-1475.

Carpenter, G.S. and Nakamoto, K. (1986). "Consumer Preference Formation and Pioneering Advantage". *Journal of Marketing Research,* 26(8), pp. 285-298.

Chen, P.Y. and Hitt, L.M. (2002). "Measuring Switching Costs and Their Determinants in Internet Enabled Businesses: A Study of the Online Brokerage Industry". *Information Systems Research*, 13(3), pp. 255-274.

Chen, P-Y and Hitt, L.M. (2007). "Information Technology and Switching Costs". In T. Hendershott, ed., Handbook of Information Systems Economics.

Chou, C. and Shy, O. (1996). "Do consumers gain or lose when more people buy the same brand?". *European Journal of Political Economy,* 12(2), pp. 309-330.

Church, and Gandal, (2004). Platform Competition in Telecommunications. Prepared for The HandBook of Telecommunications Vol 2 edited by M.Cave, S. Majumdar and I. Vogelsang available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.99.5070&rep=rep1&type=pdf

Cowan, R. (1990). "Nuclear Power Reactors: a Study in Technological Lock-in". *The Journal of Economic History,* 50(3), pp. 541-567.

David, P. A. (1985). "Clio and the Economics of QWERTY". *The American Economic Review*, 75(2), pp. 332-337.

De Palma, A. and Leruth, L. (1996). "Variable willingness to pay for network externalities with strategic standarization decisions". *European Journal of Political Economy*, 12(2), pp. 235-251.

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

Dranove, D. and Gandal, N. (2003). "The DVD-vs.-DIVX Standard War: Empirical evidence of network effects and preannouncement effects". *Journal of Economics and Management Strategy,* 12(3), pp. 363-386.

Eisenmann, T. R. (2006). "Internet Companies' Growth Strategies: Determinants of Investment Intensity and Long-Term Performance". *Strategic Management Journal,* 27(12), pp. 1183-1204.

Farrell, J. and Saloner, G. (1986). "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation". *American Economic Review,* 76(5), pp. 940-955.

Farrell, J. and Klemperer, P. (2007). Coordination and Lock-in: Competition with switching costs and network effects, in M.Amstrong and R. Porter (eds.) *Handbook of Industrial Organization,* Vol.3, Elveiser

Frels, J.K., Shervani, T. and Srivastava, R. (2003). "The Integrated Networks Model: Explaining Resource Allocations in Network Markets". *Journal of Marketing,* 67(1), pp. 29-45.

Fuentelsaz, L., Maicas, J.P. and Polo, Y. (2008). "The evolution of mobile communications in Europe: the transition from the second to the third generation". *Telecommunications Policy,* 32(6), pp. 436-449.

Fuentelsaz, L., Maicas, J.P. and Polo, Y. (2010). "Switching cost, network effects and competition in the European mobile communications industry". *Information Systems Research*, forthcoming.

Gandal, N. (2002). "Compatibility, Standardization, and Network Effects : Some Policy Implications". *Oxford Review of Economic Policy,* 18(1), pp. 80-91.

García-Mariñoso, B. (2001). "Technological Incompatibility, Endogenous Switching Costs and Lock-In". *The Journal of Industrial Economics,* 49(3), pp. 281-298.

Garud, R. & Kumaraswamy, A. (1993). "Changing competitive dynamics in network industries: An exploration of Sun Microsystems' open systems strategy". *Strategic Management Journal*, 14(5), pp. 351-369.

Ghoshal, S. (1987). "Global Strategy: An Organizing Framework". *Strategic Management Journal*, 8(5), pp. 425-440.

Gomez, J., Lanzolla, G. and Maicas, J.P. (2009). "Order of Market Entry, Maket and Technological Evolution and Firm Competitive Performance". Fundación de las Cajas de Ahorros. Documento de Trabajo Nº 473/2009.

Gomez, J. and Maicas, J.P. (2008). "An Empirical Assessment of the Impact of Switching Costs and First Mover Advantages on Firm Performance". Fundación de las Cajas de Ahorros. Documento de Trabajo Nº 389/2008.

Grajek, M. (2010). "Estimating Network Effects and Compatibility: Evidence from the Polish mobile market". *Information Economics and Policy,* 22(2), pp. 130-143.

Grant, R.M. (2005). Contemporary strategy analysis. 5th Edition. *Blackwell Publishing*.

Greene, W.H. (1993). Econometric Analysis, 2nd Edition. *MacMillan*, New York.

Gruber, H. and Verboven, F. (2001). "The Diffusion of Mobile Telecommunications Services in the European Union". *European Economic Review,* 45(3), 577-588.

Gryzbowski, L. (2007). "Estimating Switching Costs in Mobile Telephony in the UK". *Journal of Industry, Competition and Trade*, 8(2), pp. 113-132.

Hausman (1978). "Specification Test in Econometrics". *Econometrica*, 46(6), pp. 1251-1272.

Hill, C.W.L. (1992). "Establishing a Standard: Competitive Strategy and Technological Standards in Winner-Take-All Industries". *Academy of Management Executive,* 11(2), pp. 7-25.

Hitt, M.A., Hoskisson, R.E. and Kim, H. (1997). "International Diversification: Effects on Innovation and Firm Performance in Product-Diversified Firms". *Academy of Management Journal*, 40(4), pp. 767-798.

Jang, S-L., Dai, S-C. and Sung, S. (2005). "The Pattern and Externality Effect of Diffusion of Mobile Telecommunications: the Case of the OECD and Taiwan". *Information Economics and Policy*, 17(2), pp. 133-148.

Kalyanaram, G. and Urban, G.L. (1992). "Dynamic Effects of the Order of Entry on Market Share, Trial Penetration, and Repeat Purchases of Frequently Purchased Consumer Goods". *Marketing Science*, 11(3), pp. 235-250.

Karakaya, F. and Stahl, M.J. (1989). "Barriers to Entry and Market Decisions in Consumer and Industrial Goods Markets". *Journal of Marketing*, 53(2), pp. 80-91.

Katz, M. and Shapiro, C. (1985). "Network Externalities, Competition, and Compatibility". *The American Economic Review*, 75(3), pp. 424-440.

Katz, M. and Shapiro, C. (1994). "Systems Competition and Network Effects". *Journal of Economic Perspectives*, 8(2), pp. 93-115.

Kerin, R., Varadarajan,P.R. and Peterson, R.A. (1992). "First-Mover Advantage: A Synthesis, Conceptual Framework, and Research Propositions". *Journal of Marketing*, 56(4), pp. 33-52.

Kim, H. and Kwon, N. (2003). "The Advantage of Network Size in Acquiring New Subscribers: A conditional logit analysis of the Korean telephony market". *Information Economics and Policy*, 15(1), pp. 17–33.

Klemperer, P. (1995). "Competition When Consumers Have Switching Costs: An Overview With Applications to Industrial Organization, Macroeconomics and International Trade". *Review of Economic Studies*, 62(213), pp. 515-539.

Koski, H. and Kretschmer, T. (2005). "Entry, Standards and Competition: Firm Strategies and the Diffusion of Mobile Telephony". *Review of Industrial Organization*, 26(1), pp. 89-113.

Krafft, J., Salies, E. (2008). "The diffusion of ADSL and costs of switching Internet providers in the broadband industry: Evidence from the French case". *Research Policy*, 37(4), pp. 706-719.

Laffont, J.J., Rey. P. and Tirole, J. (1998). "Network Competition: II. Price Discrimination". *Rand Journal of Economics*, 29(1), pp. 38-56.

Lambkin, M. (1988). "Order of Entry and Performance in New Markets". *Strategic Management Journal*, 9(5), pp. 127-140.

Lane, V. and Jacobson, R. (1995). "Stock Market Reactions to Brand Extension Announcement: The Effects of Brand Attitude and Familiarity". *Journal of Marketing*, 59(1), pp. 63-77.

Lee, D. and Mendelson, H. (2007). "Adoption of Information Technology Under Network Effects". *Information Systems Research*, 18(4), pp. 395-413.

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*, 24(1), pp. 107-124.

Lieberman, M.B. and Montgomery, D.B. (1988). "First-mover Advantages". *Strategic Management Journal*, 9(S1), pp. 41-58.

Liebenstein, H. (1950). "Bandwagon, Snob and Veblen Effects in the Theory of Consumers' Demand". *The Quarterly Journal of Economics*, 64(2), pp. 183-207.

Liebowitz, S.J. and Margolis, S.E. (1994). "Network Externality: An Uncommon Tragedy". *The Journal of Economic Perspectives*, 8 (2), pp. 133-150.

Maicas, J.P., Polo, Y. and Sese, J. (2009). "The role of (personal) network effects and switching costs in determining mobile users' choice". *Journal of Information Technology*, 24(2), pp. 160-171.

Maicas, J.P. and Sese, J. (2008). Análisis de la intensidad de los costes de cambio en la industria de la telefonía móvil. *Cuadernos de Economía y Dirección de Empresa*, 35(abril), pp. 27-56.

Mata, F., Fuerst, W. and Barney, J.B. (1995). "Information Technology and Sustained Firm-Level Value: a Resource-Based Analysis". *MIS Quarterly*, 19(4), pp. 487-505.

McCloughan, P. and Lyons, S. (2006) "Accounting for ARPU: New evidence from international panel data". *Telecommunications Policy*, 30(10-11), pp. 521-532.

McIntyre, D.P. and Subramaniam, M. (2009). "Strategy in Network Industries: A Review and Research Agenda". *Journal of Management*, 35(6), pp. 1494-1517.

Merrill Lynch (2010). Global Wireless Matrix 2009.

Park, S. (1997). "VHS/Beta and Network Externalities". mimeo, Department of Economics, State University of New York, Stony-brook, 1997.

Reed, D.P. (1999) "That sneaky exponential: Beyond Metcalfe's Law to the Power of Community Building". *Context*, Spring Issue available at: http://www.contextmag.com/archives/199903/digitalstrategyreedslaw.asp

Reichheld, F.F. (1996). The Loyalty Effect: The Hidden Force Behind Growth, Profits, and Lasting Value. *Harvard Business School Press*. Boston.

Rohlfs, J.H. (2001). Bandwagon Effects in High Technology Industries. *MIT Publishing*.

Roodman (2006). "How to Do xtabond2: An introduction to "Difference" and "System" GMM in Stata". Working Paper 103, Center for Global Development, Washington.

Ross, P.E. (2003). "5 Commandments: Technology Laws and Rules of Thumb". *IEEE Spectrum*, 40(12), pp. 30-35.

Sarkar, M.B., Cabusgil, S.T. and Aulakh, P.S. (1999). "International Expansion of Telecommunications Carriers: The Influence of Market Structure, Network Characteristics, and Entry Imperfections". *Journal of International Business Studies*, 30(2), pp. 361-382.

Schilling, M.A. (2002). "Technology Success and Failure in Winner-Take-All Markets: the Impact of Learning Orientation, Timing, and Network Externalities". *Academy of Management Journal*, 45(2), pp. 387-398.

Shankar, V. and Bayus, B.L. (2003). “Network Effects and Competition: an Empirical Analysis of the Home Video Game Industry”. *Strategic Management Journal*, 24(4), pp. 375-384.

Schmalensee, R. (1982). “Product Differentiation Advantages of Pioneering Brands”. *The American Economic Review*, 72(3), pp. 349-365.

Shapiro, C. and Varian, H.R. (1998).Information Rules: a Strategic Guide to the Network Economy. *Harvard Business School*, Boston.

Shy, O. (2002). “A Quick-and-Easy Method for Estimating Switching Cost”. *International Journal of Industrial Organization*, 20(1), pp. 71-81.

Shy, O. (2001). The Economics of Networks Industries. *Cambridge University Press*, Cambridge.

Srinivasan, R., Lilien, G.L. and Rangaswamy, A. (2004). “First in, First out? The Effects of Network Externalities on Pioneer Survival”. *Journal of Marketing*, 68(1), pp. 41-58.

Stango, V. (2002). “Pricing with Consumer Switching Costs: Evidence from the Credit Card Market”. *Journal of Industrial Economics*, 50(4), pp. 475-492.

Strike, V., Gao, J. and Bansal, P. (2006). “Being Good while Being Bad: Social Responsibility and the International Diversification of US Firms”. *Journal of International Business Studies*, 37(6), pp. 850-862.

Suarez, F. (2005). “Network Effects Revisited: The role of ties in technology selection”. *Academy of Management Journal*, 48(4), pp. 710-720.

Swann, P. (2002). “The Functional Form of Network Effects”. *Information Economics and Policy*, 14(3), pp. 417-429.

Tanriverdi, H. and Lee, C.H. (2008). “Within-industry Diversification and Firm Performance in the Presence of Network Externalities: Evidence from the Software Industry”. *Academy of Management Journal*, 51(2), pp. 381-397.

Usero, B. and Fernández, Z. (2009). “First come, first served: How market and non-market actions influence pioneer market share”. *Journal of Business Research*, 62(11), pp. 1139-1145.

Viard, B. (2007). “Do Switching Costs Make Markets More or Less Competitive? The Case of 800-Number Portability”. *Rand Journal of Economics*, 38(1), pp. 146-164.

World Bank Group (2010). World Development Indicators Online.

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 Tram-ways, 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

474/2009 La Unión Económica y Monetaria Europea en el proceso exportador de Castilla y León (1993-2007): un análisis de datos de panel
Almudena Martínez Campillo y Mª del Pilar Sierra Fernández

475/2009 Do process innovations boost SMEs productivity growth?
Juan A. Mañez, María E. Rochina Barrachina, Amparo Sanchis Llopis & Juan A. Sanchis Llopis

476/2009 Incertidumbre externa y elección del modo de entrada en el marco de la inversión directa en el exterior
Cristina López Duarte y Marta Mª Vidal Suárez

477/2009 Testing for structural breaks in factor loadings: an application to international business cycle
José Luis Cendejas Bueno, Sonia de Lucas Santos, Inmaculada Álvarez Ayuso & Mª Jesús Delgado Rodríguez

478/2009 ¿Esconde la rigidez de precios la existencia de colusión? El caso del mercado de carburantes en las Islas Canarias
Juan Luis Jiménez y Jordi Perdiguero

479/2009 The poni test with structural breaks
Antonio Aznar & María-Isabel Ayuda

480/2009 Accuracy and reliability of Spanish regional accounts (CRE-95)
Verónica Cañal Fernández

481/2009 Estimating regional variations of R&D effects on productivity growth by entropy econometrics
Esteban Fernández-Vázquez y Fernando Rubiera-Morollón

482/2009 Why do local governments privatize the provision of water services? Empirical evidence from Spain
Francisco González-Gómez, Andrés J. Picazo-Tadeo & Jorge Guardiola

483/2009 Assessing the regional digital divide across the European Union-27
María Rosalía Vicente & Ana Jesús López

484/2009 Measuring educational efficiency and its determinants in Spain with parametric distance functions
José Manuel Cordero Ferrera, Eva Crespo Cebada & Daniel Santín González

485/2009 Spatial analysis of public employment services in the Spanish provinces
Patricia Suárez Cano & Matías Mayor Fernández

486/2009 Trade effects of continental and intercontinental preferential trade agreements
Salvador Gil-Pareja, Rafael Llorca-Vivero & José Antonio Martínez-Serrano

487/2009 Testing the accuracy of DEA for measuring efficiency in education under endogeneity
Salvador Gil-Pareja, Rafael Llorca-Vivero & José Antonio Martínez-Serrano

488/2009 Measuring efficiency in primary health care: the effect of exogenous variables on results
José Manuel Cordero Ferrera, Eva Crespo Cebada & Luis R. Murillo Zamorano

489/2009 Capital structure determinants in growth firms accessing venture funding
Marina Balboa, José Martí & Álvaro Tresierra

490/2009 Determinants of debt maturity structure across firm size
Víctor M. González

491/2009 Análisis del efecto de la aplicación de las NIIF en la valoración de las salidas a bolsa
Susana Álvarez Otero y Eduardo Rodríguez Enríquez

492/2009 An analysis of urban size and territorial location effects on employment probabilities: the spanish case
Ana Viñuela-Jiménez, Fernando Rubiera-Morollón & Begoña Cueto

493/2010 Determinantes de la estructura de los consejos de administración en España
Isabel Acero Fraile y Nuria Alcalde Fradejas

494/2010 Performance and completeness in repeated inter-firm relationships: the case of franchising
Vanesa Solis-Rodriguez & Manuel Gonzalez-Diaz

495/2010 A Revenue-Based Frontier Measure of Banking Competition
Santiago Carbó, David Humphrey & Francisco Rodríguez

496/2010 Categorical segregation in social networks
Antoni Rubí-Barceló

497/2010 Beneficios ambientales no comerciales de la directiva marco del agua en condiciones de escasez: análisis económico para el Guadalquivir
Julia Martin-Ortega, Giacomo Giannoccaro y Julio Berbel Vecino

498/2010 Monetary integration and risk diversification in eu-15 sovereign debt markets
Juncal Cuñado & Marta Gómez-Puig

499/2010 The Marshall Plan and the Spanish autarky: A welfare loss analysis
José Antonio Carrasco Gallego

500/2010 The role of learning in firm R&D persistence
Juan A. Mañez, María E. Rochina-Barrachina, Amparo Sanchis-Llopis & Juan A. Sanchis-Llopis

501/2010 Is venture capital more than just money?
Marina Balboa, José Martí & Nina Zieling

502/2010 On the effects of supply strategy on business performance: do the relationships among generic competitive objectives matter?
Javier González-Benito

503/2010 Corporate cash holding and firm value
Cristina Martínez-Sola, Pedro J. García-Teruel & Pedro Martínez-Solano

504/2010 El impuesto de flujos de caja de sociedades: una propuesta de base imponible y su aproximación contable en España
Lourdes Jerez Barroso y Joaquín Texeira Quirós

505/2010 The effect of technological, commercial and human resources on the use of new technology
Jaime Gómez & Pilar Vargas

506/2010 ¿Cómo ha afectado la fiscalidad a la rentabilidad de la inversión en vivienda en España? Un análisis para el periodo 1996 y 2007
Jorge Onrubia Fernández y María del Carmen Rodado Ruiz

507/2010 Modelización de flujos en el análisis input-output a partir de la teoría de redes
Ana Salomé García Muñiz

508/2010 Export-led-growth hypothesis revisited. a balance of payments approach for Argentina, Brazil, Chile and Mexico
David Matesanz Gómez & Guadalupe Fugarolas Álvarez-Ude

509/2010 Realised hedge ratio properties, performance and implications for risk management: evidence from the spanish ibex 35 spot and futures markets
David G McMillan & Raquel Quiroga García

510/2010 Do we sack the manager... or is it better not to? Evidence from Spanish professional football
Francisco González-Gómez, Andrés J. Picazo-Tadeo & Miguel Á. García-Rubio

511/2010 Have Spanish port sector reforms during the last two decades been successful? A cost frontier approach
Ana Rodríguez-Álvarez & Beatriz Tovar

512/2010 Size & Regional Distribution of Financial Behavior Patterns in Spain
Juan Antonio Maroto Acín, Pablo García Estévez & Salvador Roji Ferrari

513/2010 The impact of public reforms on the productivity of the Spanish ports: a parametric distance function approach
Ramón Núñez-Sánchez & Pablo Coto-Millán

514/2010 Trade policy versus institutional trade barriers: an application using "good old" ols
Laura Márquez-Ramos, Inmaculada Martínez-Zarzoso & Celestino Suárez-Burguet

515/2010 The "Double Market" approach in venture capital and private equity activity: the case of Europe
Marina Balboa & José Martí

516/2010 International accounting differences and earnings smoothing in the banking industry
Marina Balboa, Germán López-Espinosa & Antonio Rubia

517/2010 Convergence in car prices among European countries
Simón Sosvilla-Rivero & Salvador Gil-Pareja

518/2010 Effects of process and product-oriented innovations on employee downsizing
José David Vicente-Lorente & José Ángel Zúñiga-Vicente

519/2010 Inequality, the politics of redistribution and the tax-mix
Jenny De Freitas

520/2010 Efectos del desajuste educativo sobre el rendimiento privado de la educación: un análisis para el caso español (1995-2006)
Inés P. Murillo, Marta Rahona y Mª del Mar Salinas

521/2010 Sructural breaks and real convergence in opec countries
Juncal Cuñado

522/2010 Human Capital, Geographical location and Policy Implications: The case of Romania
Jesús López-Rodríguez, Andres Faiña y Bolea Cosmin-Gabriel

523/2010 Organizational unlearning context fostering learning for customer capital through time: lessons from SMEs in the telecommunications industry
Anthony K. P. Wensley, Antonio Leal-Millán, Gabriel Cepeda-Carrión & Juan Gabriel Cegarra-Navarro

524/2010 The governance threshold in international trade flows
Marta Felis-Rota

525/2010 The intensive and extensive margins of trade decomposing exports growth differences across Spanish regions
Asier Minondo Uribe-Etxeberria & Francisco Requena Silvente

526/2010 Why do firms locate r&d outsourcing agreements offshore? the role of ownership, location, and externalization advantages
Andrea Martínez-Noya, Esteban Gárcía-Canal & Mauro f. Guillén

527/2010 Corporate Taxation and the Productivity and Investment Performance of Heterogeneous Firms: Evidence from OECD Firm-Level Data
Norman Gemmell, Richard Kneller, Ismael Sanz & José Félix Sanz-Sanz

528/2010 Modelling Personal Income Taxation in Spain: Revenue Elasticities and Regional Comparisons
John Creedy & José Félix Sanz-Sanz

529/2010 Mind the Remoteness!. Income disparities across Japanese Prefectures
Jesús López-Rodríguez, Daisuke Nakamura

530/2010 El nuevo sistema de financiación autonómica: descripción, estimación empírica y evaluación
Antoni Zabalza y Julio López Laborda

531/2010 Markups, bargaining power and offshoring: an empirical assessment
Lourdes Moreno & Diego Rodríguez

532/2010 The snp-dcc model: a new methodology for risk management and forecasting
Esther B. Del Brio, Trino-Manuel Ñíguez & Javier Perote

533/2010 El uso del cuadro de mando integral y del presupuesto en la gestión estratégica de los hospitales públicos
David Naranjo Gil

534/2010 Análisis de la efectividad de las prácticas de trabajo de alta implicación en las fábricas españolas
Daniel Vázquez-Bustelo y Lucía Avella Camarero

535/2010 Energía, innovación y transporte: la electrificación de los tranvías en España, 1896-1935
Alberte Martínez López

536/2010 La ciudad como negocio: gas y empresa en una región española, Galicia 1850-1936
Alberte Martínez López y Jesús Mirás Araujo

537/2010 To anticipate or not to anticipate? A comparative analysis of opportunistic early elections and incumbents' economic performance
Pedro Riera Sagrera

538/2010 The impact of oil shocks on the Spanish economy
Ana Gómez-Loscos, Antonio Montañés & María Dolores Gadea

539/2010 The efficiency of public and publicly-subsidiz ed high schools in Spain. evidence from pisa-2006
María Jesús Mancebón, Jorge Calero, Álvaro Choi & Domingo P. Ximénez-de-Embún

540/2010 Regulation as a way to force innovation: the biodiesel case
Jordi Perdiguero & Juan Luis Jiménez

541/2010 Pricing strategies of Spanish network carrier
Xavier Fageda, Juan Luis Jiménez & Jordi Perdiguero

542/2010 Papel del posicionamiento del distribuidor en la relación entre la marca de distribuidor y lealtad al establecimiento comercial
Oscar González-Benito y Mercedes Martos-Partal

543/2010 How Bank Market Concentration, Regulation, and Institutions Shape the Real Effects of Banking Crises
Ana I. Fernández, Francisco González & Nuria Suárez

544/2010 Una estimación del comercio interregional trimestral de bienes en España mediante técnicas de interpolación temporal
Nuria Gallego López, Carlos Llano Verduras y Julián Pérez García

545/2010 Puerto, empresas y ciudad: una aproximación histórica al caso de Las Palmas de Gran Canaria
Miguel Suárez, Juan Luis Jiménez y Daniel Castillo

546/2010 Multinationals in the motor vehicles industry: a general equilibrium analysis for a transition economy
Concepción Latorre & Antonio G. Gómez-Plana

547/2010 Core/periphery scientific collaboration networks among very similar researchers
Antoni Rubí-Barceló

548/2010 Basic R&D in vertical markets
Miguel González-Maestre & Luis M. Granero

549/2010 Factores condicionantes de la presión fiscal de las entidades de crédito españolas, ¿existen diferencias entre bancos y cajas de ahorros?
Ana Rosa Fonseca Díaz, Elena Fernández Rodríguez y Antonio Martínez Arias

550/2010 Analyzing an absorptive capacity: Unlearning context and Information System Capabilities as catalysts for innovativeness
Gabriel Cepeda-Carrión, Juan Gabriel Cegarra-Navarro & Daniel Jimenez-Jimenez

551/2010 The resolution of banking crises and market discipline: international evidence
Elena Cubillas, Ana Rosa Fonseca & Francisco González

552/2010 A strategic approach to network value in information markets
Lucio Fuentelsaz, Elisabet Garrido & Juan Pablo Maicas