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Title

Innovation Rankings published in business press: An Evaluation

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Abstract

Due to their increasing relevance in academic works, this study reviews the different Innovation Rankings published in business printed and online press, creating a taxonomy and evaluating their methodology and capacity to measure innovativeness by means of tests conducted on a sample of 5,500 quoted US firms for the period 2003-2011 to verify whether most innovative firms identified by these lists are indeed the most innovative and to characterize innovative companies. The results show that firms comprised in the most well-known ranking (published by Business Week) are on average, larger and more successful firms than those considered as less innovative firms. However, this study finds no further evidence on whether the firms included in the rankings are currently innovative, as size, previous innovativeness and financial success seem to explain firms' inclusion on the lists. Consequently, the results presented in this study are of relevance to academics, innovation practitioners, policy makers, investors and job seekers as they question whether innovation rankings produced by business press are a good source of information on companies innovative efforts and results.

Keywords

Innovation Evaluation; Innovativeness; Performance.

1. INTRODUCTION

Innovativeness is desirable attribute in companies, as it is associated with a superior performance (Schentler, Lindner and Gleich 2010) and reputation (Brown and Perry 1994), leading to an increased attractiveness to prospective investors, partners and job seekers (Lievens and Highhouse 2003). Due to its relevance for companies, governments, investors and even job seekers, innovation has become the subject of increasing attention in the business press. Consequently, mass press publications frequently produce articles, not only on innovation as a general topic, but also on specific firm's innovative efforts and subsequent results. Moreover, reflecting a wide interest in the identification of innovative firms, many of these publications periodically produce lists that identify and rank the most innovative firms using different methodologies (Hira 2003; Brody 2005; Jaruzelski, Dehoff and Bordia 2005; McDonald 2005; Business Week 2006; Reiss 2006; Duga and Studt 2007; Borden, Breen, Chu et al. 2008; Business Week 2009; Jaruzelski and Dehoff 2010; Forbes 2011; Thomson Reuters 2012) which are increasingly used to complement the information reported by public institutions such as the EU (EU Commission 2006). Thus, an increasingly wide audience[1] trusts "Most Innovative firms" articles to help them identify innovative enterprises, proven by the fact that analysts, investors and managers have begun to use them to make investment and managerial decisions (Nussbaum 2008) and could become useful tools as additional indicators to evaluate policies, as it has been shown that evaluation of policies are very diverse among countries and continually evolving (Kuhlmann 2003; Ruegg and Jordan 2007; INNO-Appraisal 2010).

Additionally, these lists are also becoming relevant in the academia, as most of the rankings to be examined in this paper have been used as a source of information on

[1] See table 1

firms innovativeness in the academic literature. Specifically, over 200 academic works[2] (from books to working papers, conference presentations, doctoral thesis and articles in journals) produced during the last 7 years cite any of the innovation rankings and even use them as key data source for their works or to identify innovative companies, as done by (Cho and Pucik 2005; Berg and Einspruch 2008; Berg and Einspruch 2009; Zamboni 2011) which have used different rankings ("World's Most Innovative Companies" from Business Week, "The World's Most Innovative Companies" from Fast Company or "America's Most Admired Companies" from Fortune). Therefore, it would appear that academics have begun to accept innovation rakings as a valid measure of companies' innovativeness. However, there is no prior evidence on whether these rankings are capable of identifying innovative firms or any analysis of the validity of their methodologies.

Therefore, this paper seeks a twofold objective, firstly contributing to expand the methodological literature (Martin 2012) by introducing a classification of the innovation measurement methodologies used in business press and evaluating their capacity to measure innovativeness. Secondly, contributing to fill in a relevant gap in the literature (Martin 2012) by validating whether these rankings provide academics, policy makers, practitioners and the general public reading business publications with a trustworthy and useful list of innovative companies which are capable of over-perform the market or can be used as benchmark and case studies for innovation policies evaluation methodologies (INNO-Appraisal 2010). By looking at the most innovative companies and the policies which have affected them, policy makers could evaluate the impact of policies at firm level across different regions (Herrera and Nieto 2008), complementing other methodologies used, for example, to evaluate the impact of subsidies (Clausen 2009)

[2] Source: Own elaboration using Google Scholar

and using them as case studies to improve the performance of their innovation systems (Georghiou 1997).

This work examines the usefulness of the different innovation rankings by testing a sample of 5,500 quoted US firms to verify (1) whether the most innovative companies identified in these lists are indeed the most innovative firms and (2) whether innovation rankings simply reflect the results of past innovation efforts instead of foreseeing future successes. Additionally, this work looks closely at firms financial results to shed additional light on the relationship between financial results and innovative efforts in these rankings, aiming to verify if those firms identified as innovative obtain a superior financial performance or if it is the other way around, i.e., firms with better financial performance are considered more innovative.

The results obtained in this study are of relevance to academics, policy makers and innovation practitioners as they question whether innovation rankings produced by business press are a good source of information on companies' innovative efforts and future performance: Results show that firms comprised in the Business Week list are on average, larger and more successful firms than less innovative firms, evidence that is consistent with (Schumpeter 1950), (Brown and Perry 1994), (Hult, Hurley and Knight 2004). However, this study finds no further evidence on whether the firms included in the rankings were innovative when they were included in the rankings

The rest of this paper is structured as follows. The second section introduces the main objectives of this study, the research questions and working hypothesis. In the following section, the literature related to innovation determinants relevant for this study is reviewed to provide the theoretical base for an innovativeness model. The fourth section presents the classification of the Innovation lists published in business press and a brief discussion of their methodologies. The fifth section introduces the

model and presents the data and sample used to test the hypothesis. The sixth section consists of a discussion of the empirical results obtained with the model regarding the working hypotheses. Finally, the last chapter of this paper presents some conclusions and future lines of work in this area of research.

2. MAIN RESEARCH QUESTIONS

The main research question of this paper is to whether "most innovative firms" rankings published in business press are a reliable source of information on companies innovativeness, i.e., if they could be used to identify innovative companies overcoming the difficulties encountered when measuring innovation (OECD, 2005), specially in the services sector (Camacho and Rodriguez 2008); and complementing or even becoming widely accessible substitutes[3] of already established information sources, including innovation measurements, surveys and reports, such as (Hernández Guevara, Hervás and Tübke 2011; INE 2011; UNU-MERIT 2012), many of which follow OECD manuals (OECD 2002; OECD 2005) for surveys. This way, innovation rankings could become sources of information, as similar lists in other fields: "America's Most Admired Corporations" list reported by Fortune has become a source for academic studies dealing with firm reputation (Szwajkowski and Figlewicz 1999; Roberts and Dowling 2002; Zyglidopoulos 2005) and "Best Global Brand" lists published by Business Week have been used for brand value studies (Chu and Keh 2006).

Many of the most innovation lists published in business press are produced with methodologies (survey to industry experts – including senior managers and innovation

[3] *"Innovation researchers often have problems accessing the data, because the micro innovation data administrated by the state is often considered to be highly confidential […]it is often the case that only a small number of people are able to fully access the data. At best, national statistical agencies report only summary statistics on their national surveys"* (Hong et al., 2012)

directors- and analysts)[4] similar to those of the previously mentioned Fortune list. Consequently, the next research question addressed in this study is whether there is a "financial halo" that affects the rankings under study (i.e., a strong influence of each firm previous financial results in their measure of innovativeness), analogous to that identified in Fortune publication (Brown and Perry, 1994). As it is possible that the most innovative companies lists do not reflect innovativeness but just past superior financial results, and thus the outcome of this study could be similar to the views expressed in Wood (1995): "*The Fortune data cannot and should not be used as a true measure of CSP*", due to the hypothesized heavy correlation of these lists with firms financial performance, which may well be the result of prior innovative efforts.

Combining both research questions, a third one arises, namely whether innovation rankings simply identify firms whose previous innovative efforts have succeeded but fail to provide potentially more relevant insights into which companies will succeed in the future, or to identify companies whose innovative activities have not yet been fully exploited.

2.1. Main predictions

This section develops the three main working hypothesis of this study, introducing the related literature and presenting some hypotheses that advance the expected results of the empirical analysis that is developed in the following sections.

2.1.1. On the effect of previous financial results

It has been demonstrated that well-known rankings, such as Fortune annual list of the most admired corporations in America, are influenced by previous financial results

[4] The disclosed methodology used to elaborate the rankings studied on this paper are available from the author upon request as an appendix to this paper.

(Brown and Perry 1994) and that innovativeness is one of the attributes of "America's Most Admired Corporations" that can be explained by prior financial performance.

More recent research also shows that a firm good financial performance positively affects its reputation (Cable and Graham 2000; Roberts and Dowling 2002). Therefore, to the extent that popular business press rankings are affected by firm reputation and that prior financial performance drives reputation, it could also be expected for this effect to be present in a firm innovativeness reputation, leading to firms with superior financial results to be considered better innovators than others with weaker financial performance. Thus, it is expected that firms included in the most innovative companies lists would present, in the years prior to their inclusion in the list, financial results superior to those of their peers, regardless of their level of innovativeness. Consequently, the following hypothesis is tested (expressed in the alternative form):

H1. Previous financial results have an effect on a company innovativeness as measured by innovation rankings

2.1.2. On the usefulness of innovation rankings

To evaluate the usefulness of this rankings, it is necessary to assess whether the most innovative firms included in these rankings are indeed innovative, testing their innovativeness by identifying widely accepted determinants of innovation in the academic literature (see section 3 below), and building a model with the identified variables to measure how well most innovative firms rankings measure them. Thus, the following hypothesis is tested:

H2. Innovation rankings can be used to identify innovative firms

As a consequence of the expected influence of previous financial results in firms' perceived innovativeness (H1), it is possible that innovation rankings only identify already successful innovators and are unable to provide information on the future performance of current innovation activities. Therefore, these lists could suffer from selection bias, failing to identify future successful innovators, due to their current poor financial performance or, perhaps due to their current size that makes it difficult for these firms to have sufficient visibility and be well known. This way, successful R&D intensive companies could be left out of the lists in the years prior to their success as their high returns are usually preceded by poor returns (Chan *et al.*, 2001). In addition, Lev *et al.* (2003) show that analysts make larger errors when forecasting market values and future earnings (larger forecast errors) of R&D intensive firms. As analysts participate in the elaboration of innovation rankings, it could be possible to observe similar errors when identifying most innovative companies.

Past innovation successes do not guarantee future ones and currently successful innovators can lose their competitive advantage in the future and fail to compete with newcomers or disruptors (Christensen, 1997) or they could be trapped on an inertia that could lead to failure in the future (Woodside 2005). Thus, it would be necessary to look at the firms' financial performance in the years after their inclusion in these lists, as there is a lag between innovation efforts and its results (Sougiannis 1994), to confirm or reject the following hypothesis:

H3. Innovation rankings provide information on already successful innovators but not on future ones.

If this hypothesis is accepted, it would mean that it is inadequate to use these rankings as investment tools: Innovative companies that are yet to succeed would not be

considered innovative and those that are considered innovative could be living out of past successes without a guarantee of future returns.

3. DETERMINANTS OF INNOVATION: A REVIEW OF THE LITERATURE

This section reviews the literature related to the determinants of innovation to identify the key variables to build the empirical model to be used to verify whether most innovative firms lists measure firm innovativeness.

3.1. Firm size and Innovation

Firm size has long been considered one of the main determinants of innovation: Beginning with the seminal work of Schumpeter (1950) through more recent works in different geographies, such as the studies by Kannebley, Porto and Pazello (2005) and Rogers (2004), most academic literature has considered innovation to be positively related with firm size, as larger firms are more likely to innovate (Kannebley, Porto and Pazello 2005) and that size is an advantage for both R&D (Cohen and Kleppler 1996; Crepon, Duguet and Mairesse 1998; Bhattacharya and Bloch 2004) and other innovative activities (Bhattacharya and Bloch, 2004). Despite these results, the relationship between R&D and firm size remains an open issue in academic literature (Bhattacharya and Bloch 2004; Tsai 2005), as it has been shown that highly innovative small firms ("serial innovators") can innovate more efficiently (measuring its output by patent quality, value and number of patents by R&D Euro spent) than larger firms (Hicks and Hegde 2005).

Additionally, it has to be noticed that the rankings under study in this work could be biased towards larger firms firstly, because larger firms have a greater visibility

(Orlitzky 2001) and are more likely to be known outside their sector and country of origin; and secondly, because firm size has been demonstrated to have a significant positive effect on firm reputation (Lichtenthaler and Ernst 2007), so it is also expected to impact in its innovativeness reputation.

3.2. Innovativeness and firm performance

Innovativeness has been found in previous literature not only to be a key determinant of firm success and business performance (Hult, Hurley et al. 2004), but also to play a critical role in its short and long term survival (Wan, Ong and Lee 2005; Cotec 2006). Additionally, it has been established a positive relationship between firm innovation and both its financial performance (including growth) (see, e.g., (Cefis and Ciccarelli 2005; Weerawardena, O'Cass and Julian 2006; Departamento de Estudios CDTI 2009) and firm productivity, measured as value added (Crepon, Duguet et al. 1998; Lööf and Heshmati 2006). Thus it is expected for most innovative firms to (financially) outperform their peers as an effect of their superior innovation efforts. Regarding the firm innovation activities, it has also been proved that current R&D expenditure will produce positive returns in the future over a given number of years (Sougiannis, 1994; Lev et al., 2006), meaning that current innovative efforts of firms should make them outperform their peers in the years to come, or the other way around, that current positive returns could be linked to previous innovative activities. By empirically looking at when do these firms obtain better results, in the past or in the future, it would be possible to test Hypothesis 3.

3.3. Firm Sector and company innovativeness

Whenever a firm innovative activities are analysed, it is necessary to take into account the industry it belongs to, since it is a well-known fact (Pavitt 1984) that companies in different sectors behave differently when it comes to innovation. Indeed, several studies have produced results showing that the sector a firm belongs is a key determinant of its innovative efforts (see Malerba, 2002; Hipp and Grupp, 2005; Kannebley *et al.*, 2005; OECD, 2005; Wan *et al.*, 2005; Weerawardena *et al.*, 2006; Molero and Garcia, 2008) and that the determinants of innovation can vary from one industry to another (Bhattacharya and Bloch, 2004; Molero and Álvarez, 2005). Additionally, there are empirical studies that point out that sectors may be more innovative than others (Kannebley *et al.*, 2005), which reinforces the works showing that innovations tend to cluster in certain industries and sectors (Fagerberg 2005), tendency early observed by Schumpeter (1939).

Therefore, it will be necessary to account for the sector the company belongs to when modelling the determinants of innovation and when comparing a given company innovativeness with others.

3.4. Innovation and R&D expenditure

Research and Development (R&D) expenditure is a well known input measurement of innovation (OECD 2002; OECD 2005). Indeed, the positive returns of R&D expenditure have been proven during the last three decades in different geographies by numerous publications (Hall 1993; Sougiannis 1994; Al-Horani, Pope and Stark 2003).

A positive relationship between R&D intensity (measured as the ratio between R&D expenditure and the company sales) and both firm innovation and its financial

performance has been also shown in several studies (Adams, Bessant and Phelps 2006; Lev, Radhakrishnan and Ciftci 2006; Hernández Guevara, Hervás et al. 2011).

Furthermore, it has been shown that firms in R&D intensive sectors obtain positive returns from R&D and that the returns of the most intensive R&D spenders (leaders) in each industry are higher than those of their competitors (followers) (EU Commission 2006; Lev, Radhakrishnan et al. 2006) (it has to be noticed that due to the different average R&D intensity of the sector, a leader in one sector could be classified as a follower in another industry).

However, there is some controversy on the use of total R&D expenditure and R&D intensity to measure innovation because R&D generally plays a small role in the innovation activity of both Small and Medium sized Enterprises (SMEs) (Adams *et al.*, 2006), and firms belonging to service sector (Hipp and Grupp, 2005), as these firms usually present low R&D intensity, if any R&D expenditure at all (e.g. firms in trade sector have normally no R&D expenditure, while firms in telecommunication services industry usually show a low R&D intensity).

In summary, it is necessary to take into account the company size and the sector it belongs to, when using R&D expenditure and R&D intensity to measure firm innovativeness. Thus, in the empirical analysis that will be carried on in the following section, R&D intensity will be used in the model and an intra-sector analysis will be carried on to measure the impact of R&D on those sectors where it is most relevant.

3.5. Market to Book ratio and Innovation

R&D expenditure is just one of the many innovation activities a company can carry on (OECD, 2005), which extend from the investment in intangible assets, the acquisition of knowledge (e.g., patents and consulting services) (Adams, Bessant and Phelps, 2006) or

capital goods (e.g. equipment and software) to support activities such as training, learning (Weerawardena, O'Cass and Julian, 2006), development activities and others, like developing new marketing or organisational methods and the absorptive capacity (Cohen and Levinthal 1989). However, for most of these activities (excluding marketing expenditure) there is not publicly accessible information in the available databases and Market-to-Book (MTB) ratio (calculated as market value divided by book value of total shareholder's equity) has been used in previous literature as proxy to measure these factors that play a key role in a firm innovation.

Additionally, a high Market-to-Book (MTB) ratio signals that the market expects future returns of a firm to be higher than those of companies with smaller MTB ratios, as market value incorporates future expectations (Roberts and Dowling, 2002), which could be linked to the fact that innovative firms obtain and sustain better financial results than their less innovative peers, as it has been explained in a previous section.

Thus, it is expected that the larger the MTB ratio is, the greater the value of the intangible assets of the firm would be and the most innovative the firm should be considered.

3.6. Market concentration and innovation

Industry structure has been pointed out by several studies as one of the determinants of innovation. In this line, Weerawardena *et al*. (2006) shows that more dynamic markets lead to greater learning and higher innovation. However, other empirical studies show that market concentration has a significant positive influence on firms innovation, specially for high-tech firms (Bhattacharya and Bloch, 2004).

Therefore, the relationship between market structure and innovation remains an open issue in literature as it can be seen in the study by (Rogers 2004) that points out

that UK manufacturing firms with high market share have higher rates of innovation, which is aligned with the study by Crepon *et al*. (1998), showing that the probability of carrying on R&D activities increases with the firm market share. Nevertheless, Rogers (2004) fails to find a significant association between market share and industry concentration with innovation, when analysing Australian companies, which can be explained by the inverted inverted-U shape relationship between market competition and innovation identified by (Aghion, Bloom, Blundell et al. 2005).

3.7. Prior level of firm innovativeness

Companies innovate to improve their performance and to obtain competitive advantage. Consequently, it is expected that most innovative companies will show a persistent innovative behaviour, as proven by (Cotec 2006) for Spanish innovative companies. Although it could be argued that disruptors can surpass previous innovators (Christensen, 1997), it is unlikely (if correctly identified) for current most innovative companies to loose their innovative advantage in the short term. However, if lists are identifying past innovators, it could be possible that identified companies could be bound to fail due to inertia.

Additionally, and to the extent that popular business press rankings are affected by firm reputation, it is expected for innovativeness, as measured by innovation rankings, to show a high persistence over time, similar to that observed in prior studies related to reputation rankings published in business press (Roberts and Dowling 2002).

4. A CLASSIFICATION OF INNOVATION RANKINGS

Innovation rakings published in business press use different methodologies to identify the most innovative companies, which could be classified into four broad categories:

- Based on R&D expenditure
- Based on experts' insights, which might be the editors of the publications or practitioners which are surveyed.
- Based on Patents
- Based on proprietary methodologies (e.g. innovation premium)

4.1. Discussion

R&D expenditure has been proven to be a key factor for innovation (OECD, 2002; 2005), but it has also been shown that companies without R&D expenditure could be highly innovative. Consequently, using R&D expenditure (Brody, 2005; Jaruzelski *et al.*, 2006; Duga and Studt, 2007; Hira and Ross, 2008) as the single innovation measurement could lead to mistakenly consider SMEs and companies belonging to sectors with no R&D expenditure, to be non-innovative or less innovative than those with R&D expenditure (Bhattacharya and Bloch, 2004), which is not necessarily true as service firms do innovate (Hipp and Grupp, 2005), and may do it continuously to stay ahead of their competitors (Agarwal, Erramilli and Dev 2003), despite their innovations being frequently non-technical (Droege, Hildebrand and Heras Forcada 2009). Another limitation of these rankings is that they seem to fail into a common misunderstanding that tends to identify higher R&D Expenditure with more innovativeness (e.g. Jaruzelski *et al.*, 2005), without regard of the company sector, size or country of origin.

Patents are a well accepted measurement of innovation output (OECD 2005) as proven by studies that provide empirical evidence on the capacity of patents to measure the innovative activities of firms (see (Acs, Anselin and Varga 2002)). Consequently, it is expected that companies with successful patents, as those identified by "Top innovators" list by Reuters to be innovative companies. However, they present limitations as shown by (Adams, Bessant et al. 2006; Martin 2012) which point out that not all industries use patents, that their value is variable and they only reflect a small portion of the 'knowledge industry'. Thus, the main drawbacks of rankings based on this methodology are their inability to identify innovative companies which do not patent their innovations and the fact that they seem to be biased towards companies belonging to sectors, such as pharmaceutical, where patents have a higher economic impact (Mansfield 1984).

At this point, it can be accepted that companies identified by Patent and R&D based rankings are innovative, but that not all innovative companies are included in those lists, as that they fail to identify innovative companies that do not patent their innovations or do not invest on R&D. Consequently, this bias should be acknowledged whenever using these kind of rankings to identify innovative firms and it is suggested, in order to overcome its limitations, to complement them with direct measurements of innovation, either objective (e.g. number of innovations) or subjective (collecting innovation-related data by means of firm-based surveys) as increasingly done in other academic studies (Hong, Oxley and McCann 2012) and by policy makers by using microdata.

Forbes methodology (Gregersen and Dyer 2011) is based on the "Innovation Premium" of each firm, which is calculated as the difference between current market capitalization and the Net Present Value (NPV) of the projection of each company cash

flows from existing businesses (taking into account its anticipated growth). Therefore, it seems that this ranking is measuring intangibles, which are well-known innovation determinant. However, before accepting this list as a source of information, it would be necessary to test it in a similar fashion as it is going to be done with Survey based rankings and to acknowledge that this ranking can only identify publicly traded innovative companies.

Survey based rankings are both those with a wider audience and higher usage among the academics, as they allow the identification of innovative companies no matter if they are private, they invest on R&D or own patents. Consequently, the following sections of this paper will concentrate on evaluating the Survey based rankings, as no prior evidence on its capacity to measure innovation has been provided in the literature (Martin 2012).

Among survey based rankings, this study focuses on the "World's Most Innovative Companies" list, elaborated by the Boston Consulting Group (BCG) and published by Business Week magazine (Business Week 2005; Business Week 2006; Business Week 2007; Business Week 2008; Business Week 2009; Business Week 2010) as it uses a rigorous and well documented methodology similar to that used in (Adams, Bessant et al. 2006); it has provided the foundation for two investment vehicles: the "Innovation Index Found" (Innovation Index Group, 2006) and the "S&P/BusinessWeek Global Innovation Index"[5] (Standard & Poor's, 2007a); it has been widely cited by academic papers (over 100 times) and used to characterize the similarities and differences between the innovation in goods and service sectors (Berg and Einspruch 2008) or to identify innovative entrepreneurs (Dyer, Gregersen and Christensen 2008).

[5] It was discontinued in 2012 (Standard & Poor's 2012) (2 years after the last BusinessWeek innovation ranking was published)

Although there are other innovation lists that also use surveys[6] to identify innovative firms (se table 1), these lists are less relevant and the methodologies followed to elaborate them are not specified.

[6] Fortune list focuses on "Most Admired Companies", with innovativeness being just one of the factors considered to be included in the list.

Table 1 Most innovative lists classification

Name	Years Active	Methodology	Media	Citations	Citations since 2010	Audience
"Most Innovative Companies"	2003-2010	Survey among top executives in charge of innovation	Businessweek printed and online (free access)	>100	10-20	Printed paid & verified circulation: 993,267 (Source: "eCirc for Consumer Magazines". Alliance for Audited Media. June 30, 2012.) Online unique Worldwide Visitors: 13.3 MM+ (Source: comScore (October 2011))
"The Wired 40"	1998-2007	Survey among Wired magazine editors and readers (only in 2007 edition)	Wired magazine printed and online (free access on wired.com)	10-20	1	Printed paid & verified circulation: 837,966 (Source: "eCirc for Consumer Magazines". Alliance for Audited Media. June 30, 2012.) Online unique Worldwide Visitors: 11.6 MM unique users/month (Source: Omniture 2010 Average (Jan-Dec), @Plan Rel 4 2010)
"The 50 Most Innovative Companies (TR50)"	2010-2012	Survey among Technology Review magazine editors	Technology Review	1	1	Printed edition: 1.2MM estimated audience Online unique Worldwide Visitors: 2MM+ (Sources: U.S. Online, Omniture; U.S. Print, ABC Statement, Ad Q Study; International, China, Germany, Spain, and Italy, Print Circulation and Web Logs; Newsletters, Exact Target; Events, EmTech Registration)
"The World's Most Innovative Companies" (The Fast Company 50 in 2009)	2009-2012	Not disclosed, editorial staff of the magazine collectively chooses the top 50 every year	Fast Company magazine printed edition and free online access	7	4	Printed paid & verified circulation: 759,898 (Source: "eCirc for Consumer Magazines". Alliance for Audited Media. June 30, 2012.) Online unique World Wide Visitors: 6,9MM Source: Omniture, 3 month rolling average (May '12– July '12)
Fortune "America's Most Admired Companies"	1983-act	Survey among CEOs, top executives, and fin. analysts in more than 40 industries of the Fortune 1000 companies	Fortune Magazine printed Edition and free online access	>150	>5	Printed paid & verified circulation: 846,965 (Source: "eCirc for Consumer Magazines". Alliance for Audited Media. June 30, 2012.)

The Global Innovation 1000	2005-act	Top 1000 Companies by R&D expenditure	strategy+business printed edition and free online access to registered users	>150	>30	Printed paid & verified circulation: 90,959 (Source: ABC Statement - December 2011) Online unique World Wide Visitors: 324,081 (Source: s+b June 2012)
The 10 Most Innovative Companies	2010-act	Survey among innovation leaders/senior executives in more than 400 companies	Stategy+business	None	None	Published within "The Global Innovation 1000" in 2010 and 2011
R&D 100 (R&D Goes Global in 2008)	2002-2008	Top 100 Companies by R&D Expenditure	IEEE Spectrum magazine printed edition and free online access	>20	3	IEEE Spectrum printed edition reaches 385.000 IEEE members Free online access to magazine
The 20xx EU Industrial R&D Investment Scoreboard[7]	2004-act	Top 1000 EU companies and 1000 non-EU companies investing in R&D	Free online Access	>100	39	n.a.
Global R&D Report	2005-act	Top Companies by R&D Expenditure	R&D Magazine printed edition and free online access	20	9	Printed audience: 72.000 readers
Top innovators Reuters	2012-act	Based on Patent count	Free online access	None	None	n.a.
The World's Most Innovative (Growth)Companies	2011 - 2012	Innovation Premium	Forbes magazine printed edition and Free online access	1	1	Printed paid & verified circulation: 923,848 (Source: "eCirc for Consumer Magazines". Alliance for Audited Media. June 30, 2012.) Online unique World Wide Visitors: 50M (Source: Print: MRI Spring 2009 – 2 Issue Reach; Omniture, March 2009; Adify, March 2009; TV: Nielsen January 2009)

[7] This list is not published on business press but by the European Union, but has been included to provide a wider picture of most innovative companies lists.

5. METHOD AND MODEL

5.1 Description of the proposed model to identify most innovative firms

Based on the reviewed literature, an analytical model has been developed to validate whether firms included in most innovative lists are indeed the most innovative companies accordingly with widely accepted determinants of innovation:

$$INNOVATIVENESS_{i,t} = \alpha_0 + \alpha\ SIZE_{i,t} + \beta\ R\&DExpen_{i,t} + \gamma\ PERF_{i,t} + \delta\ MTB_{i,t}$$

$$+ \varepsilon\ INNOVATIVENESS_{i,t-1} + \zeta\ CONC_{i,t} + \eta\ PATENT_{i} \qquad (1)$$

where *i* is the firm-specific indicator, *t* is a time series indicator.

INNOVATIVENESS is measured using a dummy variable, which takes the value of 1 if the firm is included in the list and a value of 0 otherwise. Although the rankings provide a discrete value (position in the list) for each company, it is considered that inclusion in the list is more relevant than the position obtained itself. This is coherent with the current usage of these lists, which also take into account whether firms are or not included in the lists, disregarding their positions**.**

SIZE: Size of the company, as measured by the book value of end-of-year Total Assets.

R&DExpen: A proxy of R&D intensity (R&D Expenditure divided by Total Sales).

PERF: Financial performance measured by ROA (Net Income divided by Total Assets).

MTB: Market-to-Book ratio (market value divided by book value of Total Shareholder's Equity).

INNOVATIVENESS$_{t-1}$: Dummy variable that indicates whether the company was innovative in prior years (which in this study is interpreted as whether it was included in prior years' rankings).

CONC: Sector concentration measured by the Herfindahl-Hirschman index (HH index).

PATENT: Number of patents owned by the company in 2012. Due to stickiness of patents (Griliches 1994), the available data has been used for all studied years.

5.2. Sample and Data Description

To build the most innovative companies data set for the empirical work of this paper, all non-public and non-US based firms included in the "World's Most Innovative Companies" lists were removed: Non public companies because their information is not available in public databases[8] and non-US[9] as it was considered more adequate to select companies based on a single country due to the significant regulatory and structural differences between the different National Systems of Innovation (Freeman 1995; Furman, Porter and Stern 2002; Mairesse and Mohnen 2002).

Additionally, another data set was built with all the publicly traded companies in US between 2003 and 2011 for empirical verification of the proposed hypothesis and sector analysis, using NACE rev 2[10].

It should be noted that the data (surveys) used to build each of these lists had been collected the year previous to its publication. For this reason, in this study the lists

[8] An analysis using INE or CIS microdata would overcome this drawback.
[9] Most participants in the survey are in the USA, possibly explaining part of the bias.
[10] NACE (rev 2) classification is also used in CIS data

have been lagged one year, i.e., data from the list published in a given year (e.g. 2008) is assigned to the previous year (e.g. 2007).

Table 2. World's Most Innovative Companies by year

	2003	2004	2005	2006	2007	2008	2009
Firms included in list	10	22	100	50	50	50	50
Publicily traded (%)	100%	90%	89%	92%	98%	94%	94%
Of which are US firms (%)	70%	70%	54%	70%	60 %	51%	45%
Innovative data set size	7	14	48	32	30	24	21
Total number of firms	-	-	2428	2430	2758	3922	4465

Notes:
Lists have been lagged one year, i.e., for each year the data included this table is obtained from the list published in the following year and clear outliers have been eliminated
Source of data included in the table: World's Most Innovative Companies list and self-elaboration

6. EMPIRICAL RESULTS

Using the data set described in section 5, several empirical analyses have been carried on to test the three presented hypothesis, with the main variables used in the empirical analysis being summarized in the following table.

Table 3a. Descriptive of main variables (I)

Variable	2006 Full sample Mean (Std. Dev)	2006 Most innovative Mean (Std. Dev)	2006 All other Mean (Std. Dev)	2007 Full sample Mean (Std. Dev)	2007 Most innovative Mean (Std. Dev)	2007 All other Mean (Std. Dev)
Number of firms	2758	32	2726	3892	30	3922
SIZE (Total Assets)	5302527 ($5.20E^7$)	$1.43E^8$ ($3.43E^8$)	4349875 ($4.24E^7$)	5390670 ($5.64E^7$)	$1.86E^8$ ($3.75E^8$)	4322205 ($4.69E^7$)
R&DExpen	3.07 (81.72)	0.06 (0. 07)	3.09 (81.96)	6.24 (344.76)	0.04 (0.06)	3.27 (345.69)
MTB	6.94 (176.3)	5.77 (6.47)	6.95 (177.33)	5.98 (293.79)	-7.45 (70.56)	6.08 (294.85)
ROA	-2.77 (80.09)	0. 1 (0. 05)	-2.79 (80.36)	-28.80 (1823.56)	-8.55 (47.28)	-28.91 (1828.94)
HH Index	0.14 (0.11)	0. 15 (0.11)	0.14 (0.1)	0.13 (0.1)	0.15 (0.11)	0.13 (0.1)
PATENT	253.99 (2750.9)	13189.5 (29155.6)	179.44 (1376.1)	253.99 (2750.88)	10607.33 (28903.89)	198.07 (1631.88)

Notes:
SIZE is calculated as the book value of total assets; R&DExpen is R&D Intensity as calculated by the ratio of Total R&D Expenditure to total sales; MTB is the market-to-book ratio calculated as market value divided by total shareholders' equity; ROA is net income divided by total assets. HH Index is the Herfindahl-Hirschman index of the sector; PATENT is the number of Patents as Dec'12.
Most innovative firms are those identified in "World's Most Innovative Companies" in 2009 and 2010

Table 3b. Descriptive of main variables (II)

Variable	2008 Full sample Mean (Std. Dev)	2008 Most innovative Mean (Std. Dev)	2008 All other Mean (Std. Dev)	2009 Full sample Mean (Std. Dev)	2009 Most innovative Mean (Std. Dev)	2009 All other Mean (Std. Dev)
Number of firms	4465	24	4441	4803	21	4782
SIZE (Total Assets)	5356323 (5.79 E^7)	2.08E^8 (4.49E^8)	4431299 (4.79E^7)	5464942 (5.81E^7)	2.45E^8 (4.68E^8)	4541396 (4.86E^7)
R&DExpen	4.14 (171.28)	0.04 (0. 05)	4.16 (171.64)	1.53 (40.2)	0.04 (0.06)	1.53 (40.28)
MTB	33.44 (1780.82)	3.36 (2.21)	33.60 (1785.63)	9.06 (679.07)	3.42 (2.92)	9.09 (680.56)
ROA	-0.99 (315.70)	0. 92 (0. 75)	-1 (316.42)	-3.98 (54.64)	0.09 (0.06)	-4 (54.75)
HH Index	0.13 (0.1)	0.17 (0.12)	0.13 (0.1)	0.13 (0.1)	0.15 (0.13)	0.13 (0.1)
PATENT	253.99 (2750.88)	12911.25 (32009.32)	199.36 (1632.85)	253.99 (2750.88)	14787.38 (33893.24)	199.13 (1632.4)

Notes:
Variables are the same as in table 3a, but for most innovative firms which are those identified in "World's Most Innovative Companies" in 2007 and 2008

6.1. Prior financial results and innovativeness (H1)

As previously described, to verify whether previous financial results introduce a bias in innovation rankings, H1 (***Previous financial results have an effect on a company innovativeness measured by innovation rankings***) is tested as alternative hypothesis by regressing previous firm performance, measured using ROA, with the firm innovativeness as measured by the innovation rakings.

Firstly, the descriptive statistics of the previous variables for most innovative and non-"most innovative" firms were tested to verify whether they are significantly different by using a t test[11]. The results of these tests demonstrate that for all considered variables, most innovative companies values were significantly larger than the ones of the other companies; showing that on average most innovative firms present better prior financial results than those of less innovative companies. Next, a Logit model was used to test H1 on a (simplified) modified version of the proposed model (1):

[11] All untabulated results are available from the author upon request.

$$INNOVATIVENESS_t = \alpha_0 + \gamma\ PERF_{t-1} \quad (2)$$

Due to the low Pseudo R sq. obtained (very low fit), which can be observed in the following tables, further testing of H1 hypothesis using Total Net Income to measure the financial results (PERF) was carried on. The results of running model (2) using these alternative definitions of PERF are presented on Table 4.

Table 4. Probability of being included in the most innovative list

Panel A: Performance ($PERF_{t-1}$) measured as ROA_{t-1}	**2006 Intercept**	**2006 $PERF_{t-1}$**	**2007 Intercept**	**2007 $PERF_{t-1}$**	**2008 Intercept**	**2008 $PERF_{t-1}$**	**2009 Intercept**	**2009 $PERF_{t-1}$**
Coefficient	-4.901	0.001	-5.012	0. 068	-5.352	0.0006	-5.522	0
Standard error	0.177	0.005	0.439	0.0439	0.204	0.002	0.219	0.0025
Z-value	*-27.62*	0.28	*-27.34*	1.55	*-26.16*	0.24	*-25.26*	0.02
(p-value)	(<0.01)	(0.777)	(<0.01)	(0.122)	(<0.01)	(0.807)	(<0.01)	(0.987)
Pseudo R-sq		0.0002		0.0051		0.02		0.0000
Panel B: Performance ($PERF_{t-1}$) measured as Net $Income_{t-1}$	**2006 Intercept**	**2006 $PERF_{t-1}$**	**2007 Intercept**	**2007 $PERF_{t-1}$**	**2008 Intercept**	**2008 $PERF_{t-1}$**	**2009 Intercept**	**2009 $PERF_{t-1}$**
Coefficient	-5.63	$6.5E^{-7}$	-5.542	$3.76E^{-7}$	-6.252	$6E^{-7}$	-5.873	$4.12e^{-7}$
Standard error	0.244	$-7E^{-8}$	0.226	$4.46E^{-8}$	0.306	$6.2\ E^{-8}$	0.256	$6.22E^{-8}$
Z-value	*-23.09*	9.39	*-24.56*	*8.45*	*-20.46*	9.74	*-22.93*	6.2
(p-value)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Pseudo R-sq		0.3393		0.2366		0.4179		0.1893

Notes:

Model being run is as follows: $INNOVATIVENESS_t = \alpha_0 + \gamma^* PERF_{t-1}$, where INNOVATIVENESS is a dummy variable that takes the value of 1 if the firm appears in the most innovative list; 0 otherwise. PERF is a measure of prior financial performance: in Panel A, PERF is measured as prior period ROA; in Panel B, it is measured as prior period Net Income.

The previous results point towards the acceptance of H1, i.e., they show that prior financial results have an effect on the innovativeness measured by innovation rankings also pointing towards the existence of the hypothesized "financial halo". Nevertheless, and as robustness test, all the previously identified means to measure financial performance were tested using the same regression model (2), obtaining similar results, but observing that the two variables that produce a better fit and are statistically significant are Total Net Income and Operating Revenues.

However, Total Net Income and Operating Revenues variables are correlated with firm size, so it is possible that the hypothesis we are accepting is related to firm size instead of financial results.

6.2. Usefulness of innovative rankings

To evaluate H2 ***(Innovation rankings can be used to identify innovative firms)*** the model proposed to measure innovativeness (1) has been tested using a Logit model with the data set and the variables previously described, obtaining the following results:

Table 5. Probability of being included in the most innovative list

	2006	**2007**	**2008**	**2009**
	Coefficient *Z-value* (p-value)	Coefficient *Z-value* (p-value)	Coefficient *Z-value* (p-value)	Coefficient *Z-value* (p-value)
Intercept	-7.05 *-11.05* (<0.001)	-6.68 *-10.23* (<0.001)	-7.76 *-11.24* (<0.001)	-7.44 *-9.90* (<0.001)
$SIZE_t$	$3.81E^{-9}$ *4.62* (<0.001)	$3.25E^{-9}$ *3.16* (0.002)	$2.29E^{-9}$ *1.98* (0.048)	$2.87E^{-9}$ *3.13* (0.002)
$R\&DExp_t$	-0.08 *-0.12* (0.906)	-11.09 *-1.75* (0.080)	-0.028 *-0.27* (0.791)	-0.037 *-0.19* (0.846)
$PERF_t$	0.32 *0.71* (0.478)	$3.17E^{-6}$ *0.02* (0.986)	$7.76E^{-4}$ *0.10* (0.919)	0.012 *0.27* (0.786)
MTB_t	$-9.89E^{-5}$ *-0.05* (0.958)	$-3.12E^{-4}$ *-0.59* (0.557)	$4.8E^{-5}$ *-0.03* (0.976)	$1.8E^{-5}$ *-0.01* (0.989)
$CONC_t$	3.73 *1.73* (0.084)	0.87 *0.27* (0.784)	4.06 *1.95* (0.051)	1.21 *-0.36* (0.718)
PATENT	$1.26E^{-4}$ *3.25* (0.001)	$3.79E^{-6}$ *0.21* (0.836)	$8.6E^{-5}$ *1.67* (0.095)	$9.19E^{-5}$ *1.86* (0.063)
INN_{t-1}	5.97 *10.64* (<0.001)	8.29 *10.15* (<0.001)	7.31 *10.71* (<0.001)	8.00 *9.74* (<0.001)
PseudoR-sq.	0.6416	0.7166	0.6944	0.7464

Notes:
See variable definitions in section 5 above.

These results and that obtained by testing the model on the innovative sectors[12] show that the proposed model does not provide a very good fit for the data sample, not only because the Pseudo-R^2 is relatively low but principally because many of the coefficients of the model are not statistically significant. Therefore, a more detailed analysis was carried on to identify whether this results were a consequence of a poorly defined model, due to an incorrect choice of variables (whenever two or more measures were available); or a proof to reject H2, meaning that most innovative rankings do not measure companies' innovativeness.

The analysis of SIZE variable showed that confirmed that, on average, most innovative firms are larger than their less innovative peers by all identified measures of size (Market Capitalization, Total Employees, Sales, Operating Revenues and Net Income for simplicity), meaning that small-sized highly innovative firms could have been left out of the rankings due to the lack of visibility produced by their small size. Additionally, it was shown that using Market Share to measure firm size would increase the model fit significantly if they were to replace Total Assets. It could be argued that the reason why Market Capitalization produces a better fit might be found on that innovative companies have fewer assets than less innovative firms due to their activity or, in line with the previous arguments, that participants in the surveys, mostly industry experts, measure publicly traded companies' sizes using their Market Capitalization and not their Assets.

Although the Market-to-Book ratio was predicted to be an explanatory variable in the model, both the regression results and the information on tables 3 indicate that the calculated coefficient is not statistically significant and that MTB is on average higher

[12] Sectors that comprise two or more "Most Innovative Companies"

for non-most innovative companies. Consequently, MTB will not be included in the modified model.

As previously shown in table 6, firm performance, measured as ROA, had not a significant coefficient and thus it did not contribute to explaining the inclusion of a firm in the most innovative firms ranking. Replacing it, ceteris paribus, in the model (1) by the other identified variables to measure financial performance and testing a modified version of the model (2), seems to confirm that the rankings measure financial performance in absolute terms, i.e., the bigger the Operating Revenues or Net Income are, the most innovative the company is considered, no matter whether these companies grow slower or have worse margins than those of their peers. Therefore, financial performance will be not included in the modified model.

Regression results have shown that the coefficient of R&DExpen is not statistically significant when it is measured by R&D intensity. However, R&D Expenditure could replace, ceteris paribus, R&D intensity in the model, becoming statistically significant in all years and leading to a better but on 2009. These results seem to suggest that those firms that have higher R&D Expenditure are most likely to be considered most innovative by the innovation rankings. Consequently, R&D Expenditure, instead of R&D Intensity will be included in the modified model.

Market Concentration nor Market Share tests showed no significant association between these variables and innovativeness as measured by innovation rankings, therefore this variable will not be included in the revised model.

Previous innovativeness has been shown to be key when explaining a company innovativeness as measured by innovation rankings, probably due to the previously described persistent innovative behaviour. Nevertheless, it must be noticed that another

possible explanation is that "World's Most Innovative Companies" list has become well-known and it is easily accessible, thus it is possible that respondents take into account previous years results when answering the questionnaires used to produce this ranking or that those companies that have strong brands would be considered more innovative as they are better well-know. To control this effect, a test was done by correlating the "World's Most Innovative Companies" list and the annual ranking "BrandZ Top 100 Most Valuable Global Brands" (Millward Brown Optimor 2006; Millward Brown Optimor 2007; Millward Brown Optimor 2008; Millward Brown Optimor 2009; Millward Brown Optimor 2010), which demonstrated that both lists are heavily correlated.

With the exception of 2008, patents are a significant variable and are positively correlated with innovativeness as measured by innovation rankings, which is in line with previous literature showing the capacity of patents to measure innovativeness (Acs, Anselin et al. 2002). However, Patents will not be included in the modified model due to their low explanatory capacity, and the observed multicollinearity due to total patent by company being correlated with firm size.

6.2.8. Revised model: Innovativeness as measured by innovation rankings

After the previous analysis, model (1) has been modified to better fit innovativeness as measured by the innovation rankings. The modified (simplified) model is as follows:

$$INNOVATIVENESS_{i,t} = \alpha_0 + \alpha\, SIZE_{i,t} + \beta\, R\&DExpen_{i,t} + \varepsilon\, INNOVATIVENESS_{i,t-1} \quad (3)$$

where, *i* is the firm-specific indicator and *t* is the time-period indicator. All other variables are defined as follows:

- **SIZE**: Size of the company, as measured by its Market Capitalization.

- **R&DExpen**: Measured as total R&D Expenditure.
- **INNOVATIVENESS**: Dummy variable taking the value of 1 if the firm appears in the Most Innovative Companies list, 0 otherwise.

Table 6. Probability of being included in the most innovative list

	2006	**2007**[13]	**2008**	**2009**
	Coefficient *Z-value* (p-value)	Coefficient *Z-value* (p-value)	Coefficient *Z-value* (p-value)	Coefficient *Z-value* (p-value)
Intercept	-13.404 -2.24 (0.025)	1.12 0.76 (0.447)	-11.01 -2.79 (0.005)	-6.76 -9.46 (<0.001)
$SIZE_t$	5.69E-5 1.68 (0.093)	4.42E-5 1.54 (0.124)	5.67E-5 1.76 (0.079)	-1.81E-6 -0.2 (0.839)
$R\&DExp_t$	-1.98 E-6 -0.94 (0.053)	1.6E-6 1.9 (0.058)	-3.14 E-7 -0.61 (0.539)	4.38 E-7 -1.33 (0.183)
INN_{t-1}	9.88 2.18 (0.029)		8.5 2.67 (0.008)	6.52 3.87 (<0.001)
PseudoR-sq.	0.9275	0.3680	0.9193	0.6580

Notes:
See variable definitions in section 5 above.

Although this regression results show that the modified model is a better fit than the initial model, it does not completely capture the factors measured by the studied ranking. Additionally, it has to be noticed that this model does not include many of the widely accepted determinants of innovation. Therefore, these facts seem to indicate that "World's Most Innovative Companies" lists do not measure properly current innovativeness as identified in the literature, but it is not possible to reject the current hypothesis and further tests would be required to verify whether innovation rankings do measure companies' past innovativeness.

[13] Previous year innovativeness has not been reported for 2007 in table 7, as it has a 86% correlation with innovativeness and the statistical program drops it, measuring only the effect of the remaining variables.

6.3. Future financial results and innovativeness (H3)

To test the last hypothesis H3 (***Innovation rankings provide information on current successful innovators but none on future ones),*** a process analogous to the one used to test hypothesis H1 has been followed, by running regressions on the following model:

$$INNOVATIVENESS_{i,t} = \alpha_0 + \gamma\ PERF_{i,t+1} \quad (4)$$

The evidence does not permit rejecting the current hypothesis, but neither does it show a clear association between current innovativeness and future financial result.

Table 7. Future Financial Performance analysis

Variable	2006 P-val.	2006 Adj. R^2	2007 P-val.	2007 Adj. R^2	2008 P-val.	2008 Adj. R^2	2009 P-val.	2009 Adj. R^2
ROA	0.778	0.0002	0.985	0.000	0.329	0.0025	0.32	0.0028
Net Income Growth	(0.128)	0.0031	(0.174)	0.0024	(0.435)	0.01	(<0.001)	0.0977
Net Income Growth (%)	0.989	0.000	0.981	0.000	0.982	0.000	(0.628)	0.0001
Total Net Income	(<0.001)	0.3355	-	-	-	-	(<0.001)	0.4387
Operating Revenues	(<0.001)	0.2811	(<0.001)	0.3078	(<0.001)	0.4295	(<0.001)	0.2775
Value Added	(0.467)	0.0009	0.495	0.008	(0.603)	0.0006	(0.893)	0.0005

Notes:

Model being run is as follows: $INNOVATIVENESS_t = \alpha_0 + \gamma\ *PERF_{t+1}$, where INNOVATIVENESS is a dummy variable that takes the value of 1 if the firm appears in the most innovative list; 0 otherwise. PERF is a measure of prior financial performance (t-1): alternatively, ROA, Net Income Growth, % Net Income Growth, Total Net Income, Operating Revenues and Value Added (measured as total earnings divided by the number of employees) . Only the p-value of the coefficient is reported in the table, and the Pseudo R-sq.

Looking at the results obtained testing hypothesis H1 and H2 (regarding current financial results coefficients not being significant), it seems that prior financial results provide a better fit than current or future financial results, which could be interpreted as meaning that innovation rankings provide more information on past innovators than on current or future ones, pointing towards the acceptance of hypothesis H3. Furthermore, a qualitative analysis of the most innovative lists shows that in some cases the innovative efforts of those companies identified as most innovative began to fail soon

after being identified as most innovative (Woodside 2005), leading them to a decline and even collapse, which could make them case studies (e.g. Motorola) similar to those described in (Christensen 1997).

7. SUMMARY AND CONCLUSIONS

This study has provided a classification of most innovative companies' rankings, showing the limitations of those rankings based on R&D expenditure and Patent counts and that that past financial results seem to influence rankings based on surveys, as companies included in the rankings have usually outperformed their peers in the years previous to their inclusion on the lists. Although this fact alone does not invalidate the usefulness of these rankings, it points out a fact confirmed along the different empirical analysis done, namely, that the "World's Most Innovative Companies" lists are strongly biased towards large and successful firms, with less successful or smaller firms falling out of their radar.

Regarding the usefulness of the rankings, the current study has not found empirical evidence on "World's Most Innovative Companies" measuring current companies' innovativeness as determined by the factors commonly identified as determinants of innovation. Indeed, the current work has identified that the most significant variables to explain the inclusion in the ranking were firm size, previous innovativeness (measured as previous presence in the ranking) and R&D Expenditure, the later being the least significant variable.

In addition to this, the findings regarding the information on future innovators seem to indicate that studied innovation rankings provide more information on past innovators than on current or future ones. Consequently, it could point towards the

veracity of (Gregersen and Dyer 2011) statement: *"Many "Most Innovative" rankings of companies begin by asking executives to vote on which firms they think are most innovative. These end up becoming popularity contests based on past performance."*

Therefore, it might be advisable to exercise great caution when using these rankings for academic studies or for policy making, till more conclusive results are obtained on whether these rankings can be used to identify current innovativeness as well as past one.

Regarding the future work on this area, it is suggested to run the initially proposed model (1) on the original data sample to build a data set of innovative firms and compare it with those identified by the most innovative companies lists. Aiming to produce a set of innovative companies that could be used for academic studies and policy evaluation.

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