COMMUNICATING EXCELLENCE IN INNOVATION

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ABSTRACT

The innovation-performance relationship is well studied in the literature, but the effect of innovation-based public recognitions is under-researched. This article finds a positive effect, whose magnitude is contingent upon the firm's growth, experience and its service-manufacturer character.

Keywords: innovation; awards; communication; signaling; firm value.

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1. INTRODUCTION

Innovation is a basic pillar of today's firm development and competitiveness, and much research has been devoted to multiple facets of it, especially, to the relationship between innovation and performance (Damijan et al., 2012). However, to the best of the authors' knowledge, no attempt has been made to analyze the effect of innovation awards on performance. This is not by any means a minor issue, as it is a direct way for the firm to communicate the message that it has set and reached a high standard of excellence in a particular area (see examples in Katzy and Crowston, 2008). For decision-makers and managers, the award of a prize entails reaffirmation before shareholders that the decisions made have been appropriate (*agency conflicts avoidance* (Vetschera, 2000)); and for the firm itself, it is a way to convey differentiation to the market (*information asymmetries reduction* (Akerlof, 1970)).

Based on the evidence that the market can assess firm-level innovative activity appropriately (Chan et al. 2001), the aim of this study is to evaluate the effect of communicating innovation awards on firm value.

The effect of innovation awards on firm value. The recipient firm of any award receives public recognition for outperforming in a specific field. When it comes to innovation awards, this recognition has extra relevance as it implies dealing with a main cornerstone of firm development. It is widely observed that firms have a strong need to innovate, not only to survive but also to advance over their rivals and gain competitive edges (Cho and Pucik, 2005). A few decades ago, being innovative could be perceived as a differentiated trait, since it helped position a firm in people's minds; today, however, this has become a common characteristic for many companies. In this context, being given an award for innovation activities can help distinguish one innovative company, among a plethora of other innovative firms, as *the best*. This distinction should lead, on the one hand, to an enhancement of the firm brand, and on the other hand, to a reduction in information asymmetries. Consequently, we hypothesize that:

H.1. *Innovation awards exert a positive effect on firm value*

Growth, innovation awards and firm value. The relationship between innovation and growth is a two-way street: innovation is essential for growth (Bishop et al., 2009), and growth is critical for innovation (Mason et al., 2009). In this context, we argue that the higher the firm's growth, the greater the impact of an innovation award on firm

value, as stakeholders will ultimately have more trust in awards that are backed up by good real figures of growth. Hence, we state hypothesis 2 as follows:

H.2. *Innovation awards have a higher effect on the firm value of companies with higher growth*

Experience, innovation awards and firm value. The effect of firm experience, i.e. firm age, on innovation has only been approached recently. Sorensen and Stuart (2000) and Huergo and Jaumandreu (2004) conclude, in general terms, that as firms accumulate experience, their innovation quality shifts as time goes by. It has only been as recently as 2008 that Balasubramanian and Lee (2008) confronted the two mainstream opposing theories posited to explain the age-innovation relationship. On the one hand, learning-by-doing can be applied to innovation, so that the firm's innovative abilities might be enhanced as it increasingly acquires more experience; and on the other hand, organizational inertia can take over: the organizational capabilities learned over the years certainly bring about positive returns, but they are not easy to create and, more importantly, they might imply high costs. Therefore, if the firm has incurred such costly investment, it will have quite a low willingness to get involved in major adjustments to its already-created-and-costly-adjusted capabilities. In their study, Balasubramanian and Lee (2008) find that "each additional year reduces the impact of a 10% increase in R&D intensity on the firm's market value by over 3%": as the firms accumulate experience, their net adjustment costs rise. In the face of this evidence, the signal created by an innovation award should be more positively impacting on younger firms, as riskier and more daring -and consequently, more profitable- innovative actions that could imply further re-adjustments to the firm's capabilities are more likely to occur among younger firms. Thus, the following hypothesis is proposed:

H.3. *Innovation awards have a higher effect on the firm value of younger companies*

An important nuance, however, should be considered in the latter hypothesis. The aforementioned high adjustment costs should be regarded differently contingent upon the "manufacturer" or "service" character of the firm. Most of the literature on innovation has focused on manufacturing, but there are differential characteristics on the part of services that are necessary to be considered in innovation research (Criscuolo et al., 2012; Zach, 2012). In fact, Tether (2005) empirically finds, in his analysis of 3,014 European firms found in the Innobarometer Dataset, that service companies have a different innovation orientation from manufacturers. In particular, while manufacturers carry out innovation changes in a more occasional discrete step-wise way, service

companies are more used to undertaking continuous changes, which are mainly oriented to improving "soft" capabilities (e.g. skills of their workforce or co-operation practices with suppliers and customers) (Tether, 2005). Consequently, on the one hand, "changing continuously" leads service companies to consider adaptation and adjustment as the norm, regardless of their experience; and on the other hand, as they are more inclined to organizational innovations (more than to the development of new products and new production processes) (Tether, 2005), the concomitant changes derived from these innovations should be less costly, both in monetary terms and in re-adjustments efforts.

Therefore, the reluctance of older firms, outlined in the previous hypothesis and justified by the adjustment outlays they would have to incur, is reduced for the service companies on account of their being more prone to and more used to changes, and their lower expected costs. Accordingly, in hypothesis 4 we propose a moderating effect of service character on the previously hypothesized negative impact of experience:

H.4. *The service character of a firm moderates (diminishes) the (negative) effect of experience on firm value*

3. METHOD

The method followed to test the hypotheses is as follows: to test the effect of innovation awards on the market value (hypothesis H.1), we rely on the event study methodology; and for hypotheses H.2 (growth), H.3 (experience) and H.4 (service character), we employ regression analysis.

Event study. The use of the event-study method allows us to measure the potential existence of abnormal returns derived from the stock market reaction to the innovation award announcement. In line with McWilliams and Siegel (1997), we first detect all the innovation awards given to any company ever trading in the Spanish market between 1994 and 2008 (the Factiva database is used for this purpose). The event day is defined as the first day in which the news is released. The search detects 49 innovation awards. Next, we look for possible confounding news published close to the announcement day, such as takeover bids, profit announcements, dividend declarations, split announcements, complaints, claims, government contracts, court cases, or labor disputes, etc. Accordingly, 19 announcements appear to have confounding effects, so we are left with 30 news items. Finally, we collect data on market measures of performance: daily returns on the shares of the firms which won the 30 innovation awards during the period January 3, 1994 to 31 December 30, 2008, a temporal period defined by the availability of daily stock market information. These daily returns are

adjusted with dividends, subscription rights and splits. The returns on the share price of a company i on day t (R_{it}) are expressed as:

$$R_{it}=\alpha_i+\beta_i R_{mt}+\varepsilon_{it} \qquad (1)$$

where R_{mt}=returns on the market portfolio on day t (this study uses the IBEX-35, a representative index of the Spanish Stock Market; the information is obtained from the Stock Exchange Society); α_i=returns on the shares of company i independent of those of the market; β_i= sensitivity of returns on the share i to variations in market returns; and ε_{it}= error term. The estimation of equation (1) allows us to calculate daily abnormal returns (AR) for a company i announcement:

$$AR_{it}=R_{it}-(a_i+b_i R_{mt}) \qquad (2)$$

where a_i and b_i are the estimations of the regressions (1) for a period T before the event. It is important to note that the characteristic kurtosis and heteroskedasticity in the error term of equation (1), which have been detected in various empirical applications, would lead to defective estimates. For this reason, this study estimates an autoregressive conditional heteroskedasticity model, GARCH(1,1), whose main purpose is to model the conditional variance of the returns. Such models distinguish between unconditional variance, which is constant and stationary, and conditional variance, which is modified by the available information. Thus, the returns defined by means of this specification are obtained by assuming that

$$\varepsilon_{it}= h_{it}^{1/2}\eta_{it} \text{ and } \varepsilon_{it}/\varepsilon_{it-1},\varepsilon_{it-2},... \sim N(0, h_{it})$$

where η_{it} i.i.d. with $E(\eta_{it})=0$ and $E(\eta^2_{it})=1$.

In this context, h_{it} is the conditional variance and is represented as

$$h_{it}=c_i+\lambda_i\varepsilon^2_{it-1}+\gamma_i h_{it-1} \qquad (3)$$

where c_i, λ_i and γ_i are parameters to be estimated.

To analyze the effect of a company's innovation announcements on its share price, this article tests the significance of the average abnormal returns for innovation awards in the event window (-5,+5) using Boehmer et al.'s (1991) test, which accounts for the event-induced increase in return volatility. This test is specified as

$$t_1 = \frac{\frac{1}{N}\sum_{i=1}^{N} SAR_{i0}}{\sqrt{\frac{1}{N(N-1)}\sum_{i=1}^{N}\left[SAR_{i0} - \sum_{i=1}^{N}\frac{SAR_{i0}}{N}\right]^2}}$$

where N is the number of news items issued and SAR_{i0} is the standardized abnormal return on day 0 or the event day, which is defined by dividing AR_{i0} by the standard deviation of the asset i obtained from the estimation period.

To confirm the results, we also apply the *complete nonparametric event study approach* (Dombrow et al., 2000), which is distribution free in both stages: estimation and testing. For the estimation of parameters the Theil nonparametric regression technique is used, which follows the following process: i) sort the T pairs of (R_t, R_{mt}) in the estimation period in ascending order of the R_{mt}; ii) separate the data pairs into two groups based on the median, excluding the median pair if T is odd; iii) calculate a slope parameter β for each of the $T/2$ data pairs in each group by computing the expression

$$\beta_{t,t+\frac{T}{2}} = \frac{R_{t+\frac{T}{2}} - R_t}{R_{m,t+\frac{T}{2}} - R_{mt}}$$

iv) Sort the calculated slope parameters in ascending order; v) estimate β with the median slope and compute the values of $\hat{\alpha}_t$ for all data pairs; and vi) estimate α with the median value of the $\hat{\alpha}_t$.

As for the nonparametric test employed, in line with McWilliams and Siegel's (1997) suggestions, we use Corrado's (1989) test, which is defined as:

$$t_2 = \frac{\frac{1}{N}\sum_{i=1}^{N}\left[K_{io} - \frac{1}{2}(T+1)\right]}{\sqrt{\frac{1}{T}\sum_{t=1}^{T}\left[\frac{1}{N}\sum_{i=1}^{N}\left[K_{it} - \frac{1}{2}(T+1)\right]\right]^2}}$$

where K_{it} is the rank of the abnormal returns in the time series estimated for security i, and T is the total number of days observed.

Regression analysis. To test hypotheses H2, H3 and H4 we rely on regression analysis, so that the impact of growth (Gr_i), experience (Exp_i) and the moderator effect of service character ($Serv_i$) are included as explanatory variables of the excess returns (AR_i). Subscript i refers to the information of the company at the time of the innovation award i. The resulting regression is as follows

$$AR_i = \delta_1 + \delta_2 Gr_i + \delta_3 Exp_i + \delta_4 Exp_i Serv_i + \delta_5 Serv_i + \mu_i \quad (4)$$

where μ_i is the error term. Note that to test the hypothesized moderating effect of service, the variable $Serv_i$ must also be included alone, together with the interaction term (Baron and Kenny, 1986).

As for the measurement of the three explanatory variables in the regression analysis: Growth was calculated through the average annualized growth in turnover over the last three years prior to the award, defined as Growth=1/3·[ln(turnover$_{t-1}$/ turnover$_{t-3}$)]. Firm experience is measured by age. According to Balasubramanian and Lee (2008), firm age captures overall firm experience, as it can incorporate all the effects of learning processes and accumulated knowledge that can have an impact on innovation. For "service", a categorical variable is used, which takes value 1 if the firm is a service company and 0 if it is a manufacturer.

4. RESULTS

Table 1 shows the results of the event study technique applied to test the first hypothesis. We find that innovation awards have a positive effect on day +5, with significant results through both parametric and nonparametric approaches[2]. Thus, we cannot reject hypothesis H.1 that innovation awards exert a positive effect on firm value. It seems that these awards help companies signal the market about their competitive capability and reduce information asymmetries for consumers, patrons and investors. All in all, these firms seem to gain some brand enhancement from innovation awards.

Table 1 about here

Table 2 presents the outcome of the regression analyses: Equation 1 shows the results for the excess returns estimated from the parametric Garch approach and Equation 2 from the nonparametric Theil technique. Both of them depict robust results in terms of significant variables and their signs, with R^2 and adjusted R^2 equal to 35.5%-36% and 22.6%-23.2%, respectively.

Table 2 about here

As for the individual parameters, a positive and significant parameter is found for growth, indicating that the higher the firm's growth, the greater the impact of an innovation award on firm value, in line with hypothesis H.2. This relationship supports the idea that stakeholders have more trust in awards that are endorsed by good business performance in terms of growth.

Regarding the experience parameter, it is significantly negative, supporting hypothesis H.3 in that innovation awards have a higher effect on the firm value of

[2] The sample has also been controlled for outliers in abnormal returns, which were detected through a box-plot analysis, leaving us with 28 announcements. Nevertheless, the significance of day +5 is always present with and without outliers.

younger companies. This result is in line with the evidence found by Balasubramanian and Lee (2008), on account of the riskier but more profitable innovative actions of younger firms.

As for the service variables, we find that the interaction term "experience 3 service" is significant and positive, and the "service" parameter is not significant. In line with Baron and Kenny's (1986) indications as to moderator detection, the significance of the interaction and the non-significance of "service alone" confirm that the service character of the firm is a moderator for the relationship between "experience" and "excess returns". Specifically, this moderator implies that the service character of a firm diminishes the negative effect of experience on firm value, in line with hypothesis H.4, confirming that service companies have a different innovation orientation from manufacturers.

5. CONCLUSIONS

Innovation prizes are awarded to companies that have reached a high level of excellence in their innovative activities. This article looks into whether the market regards this information as relevant. The empirical application shows that the market reacts positively to innovation awards, which adds to the extant literature in that a positive relationship between innovation and performance exists not only for innovation investments themselves (i.e. R&D, patents or new products/services), but also for public recognitions of innovation (i.e. awards). Also, the results show that growth positively affects firm value while experience has a negative effect, which is moderated by the "service" character of the firm.

Several managerial implications can be drawn from these results: i) Getting an innovation award is a way of demonstrating that the decisions made on innovative issues have been correct. This can reduce agency conflicts and reinforce the trust shareholders have in the management team. In a time when uncertainty is the norm, showing that one's decisions have been appropriate is not trivial. Obviously, this recognition has to be accompanied by real growth; in fact, the higher the growth, the more recognition the award gives (measured by the superior increment in firm value). ii) Innovation awards can help the firm position itself in people's minds. Being awarded an innovation prize is a signal to the market that suggests that, among the innovative companies, the awarded firm is the best. It gives the firm extra credit when aiming at consumers (to get them to trust the firm's products and services more) and potential

patrons (in the event of raising funds for future innovations). iii) Firm value reflects higher increases in younger firms than older, and this fact is especially evident for older manufacturers. Mistakenly or not, the market seems to have the perception that old manufacturers are less adventurous and more reluctant to change. Accordingly, such firms should pay special attention to this fact and provide the market with extra information as to the scope and reach of their innovations.

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Table 1. Estimates and test of excess returns from innovation awards

Event day	Parametric approach to estimation and testing		Non parametric approach to estimation and testing	
	Excess returns (Garch estimates)	Boehmer et al. test	Excess returns (Theil estimates)	Corrado test
-5	-0.0006%	0.203	0.0309%	0.155
-4	-0.1150%	-0.432	-0.0622%	0.018
-3	0.0346%	-0.008	0.0942%	0.550
-2	-0.4104%	-1.297	-0.4697%	-1.175
-1	-0.0337%	-0.171	-0.0554%	-0.967
0	0.1134%	-0.091	0.2065%	0.683
+1	-0.1587%	-0.838	-0.2586%	-1.188
+2	-0.0115%	0.158	0.0041%	0.248
+3	-0.2455%	-1.421	-0.1853%	-1.108
+4	0.3208%	1.179	0.2312%	0.452
+5	0.4167%	1.709	0.2815%	1.765

Table 2. Explanatory variables for excess returns

	Equation 1		**Equation 2**	
	Garch Excess returns		**Theil Excess returns**	
	Parameter	***t*-statistic**	**Parameter**	***t*-statistic**
C	0.0215 (0.0103)	2.0847	0.0210 (0.0104)	2.0153
Growth	0.0334 (0.0140)	2.3751	0.0328 (0.0142)	2.3071
Experience	-0.0003 (0.0001)	-2.4018	-0.0003 (0.0001)	-2.3927
Experience*Service	0.0003 (0.0001)	2.1002	0.0003 (0.0001)	1.7816
Service	-0.0180 (0.0117)	-1.5277	-0.0158 (0.0119)	-1.3327
R^2	0.360		0.355	
Adjusted R^2	0.232		0.226	
F statistic	2.819		2.759	