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Licensing Out as a Real Activity to engage in Myopic Management

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Abstract

This paper argues and empirically tests that managers, under the pressure to attain analysts' forecast, license out their intellectual property as a mean to increase short term earnings. Over the last years markets for technology have experienced an amazing development. Recent surveys show that companies use strategically their intellectual property to generate firm value and, thus, the number of licensing contracts has dramatically increased (1). On the other hand, it has been shown that the pressures that managers support to achieve analysts' forecast give them incentives to manipulate earnings (2). In order to do it, they prefer to use real activities rather than accruals (3). Motivated by these two apparently unrelated trends, I propose that managers can license out their intellectual property to increase short term earnings and thus meet analysts' expectations. However, licensing contracts always imply a trade-off. Hence, I expect that these companies will increase their benefits in the short term (Revenue Effect) but they will also harm their market share in the long run (Dissipation Effect) (4). This paper contributes to innovation literature that examines the strategic drivers of technology licensing. Prior research has identified diverse motivations for licensing (5). I extend this research showing that the pressure to achieve analysts' forecasts is also a potential determinant to license out technology. I also contribute to the Myopic Management Theory. Prior research has identified several activities that managers use to engage in myopic management (6). I extent this literature showing that licensing out technology can be used as a real activity that increases current earnings at the expense of reducing market share in the incoming years. My sample selection procedure consists on the following steps. First, I selected the U.S. companies (N=140) with largest number of granted patents during 1990-2009 at the U.S.P.T.O. Second, I collected the universe of licensing agreements for these companies during the period 1998-2009 using Prompt database, Google News, Highbear Database and SDC Platinum. This extensive search has delivered 1,729 licensing agreements of which 840 correspond to "license in", 716 to "license out" and 173 to "cross licensing" for the companies of my sample during the period under study. Finally, I matched this data with the financial data of Compustat and with the analysts' forecast data of DataStream. These matches reduced the sample to 106 companies during the period 1998-2009 (1,269 observations). To test my main hypothesis I followed the same procedure as Bushee (1991). I estimated a logit model explaining the probability of increasing licensing out from period t-1 to period t using as main independent variable a dummy that captures whether

the company has or has not achieved analysts' forecasts in period t-1. In addition, I also controlled for other variables that typically are considered as main drivers of myopic management: a company's growth opportunities and the existence of current liabilities. Results confirm that 1) companies are more likely to license out their intellectual property when they are not able to achieve analysts' forecasts and 2) companies that license out their technology under this pressure situation show a shrinking market share in the next two years compared to companies that do not engage in such behavior.

References:

(1) Kamiyama, Sheehan & Martinez (2006), Arora (2010).
(2) Degeorge et al. (1999).
(3) Graham et al. (2005).
(4) Arora & Fosfuri (2003), Fosfuri, (2006).
(5) Shepard (1987), Katz & Shapiro (1985), Gallini (1984), Rockett (1990), Lichtenthaler (2007).
(6) Aaker (1991), Roychowdhury (2006), Moorman & Spencer (2008), Chapman & Steenburgh (2009).

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This paper argues and empirically tests that managers, under the pressure to attain analysts' forecast, license out their intellectual property as a mean to increase short-term earnings. Over the last years markets for technology have experienced an amazing development Recent surveys show that companies use strategically their intellectual property to generate firm value and that the number of licensing contracts has dramatically increased. On the other hand, financial analysts are increasingly influencing companies' strategies. The severe consequences of missing their forecast give managers incentives to manipulate earnings. Graham et al. (2005) have demonstrated that managers prefer to inflate current earnings through real activities manipulation. Motivated by these two apparently unrelated trends, I propose that managers can license out their intellectual property to increase short-term earnings and thus meet analysts' expectations. However, as licensing contracts always imply a trade-off, I expect that these companies will increase their benefits in the short term (*Revenue Effect*) but they will also harm their market share in the long run (*Dissipation Effect*). The sample to test the latter arguments contains the 106 U.S. companies with more granted patents by U.S.P.T.O. during 1998-2009 (1,269 observations). Results confirm that 1) companies are more likely to license out their intellectual property when they are not able to achieve analysts' forecasts and 2) companies that license out their technology under this pressure situation show a shrinking market share in the next two years compared to companies that do not engage in such behavior.

INTRODUCTION

Over the last two decades licensing agreements have experienced an unprecedented growth and its management had become a core competence of high-tech companies (Kamiyama et al. 2006). In fact, nowadays is getting common that companies establish their own licensing department and/or publish in the web their patents available to license (PAL)[1]. Companies are increasingly licensing-out their technology because of the revenue it generates. In a survey conducted by Zuniga & Guellec (2009) 51% of the European companies and 53.6% of Japanese companies recognized that their main motivation to license-out their technology in the previous three years was the earnings revenue. However, licensing also has a negative counterpart. That is, even though companies increase their benefits by the licensing revenues (net of transaction costs), they also could reduce their market share or their price-cost margin because the additional competition in the product market (Arora & Fosfuri, 2003; Fosfuri, 2006). Therefore, licensing decision has to be taken with caution: balancing the short-term earnings against the possible negative long-term consequences. Nevertheless, evidence shows that companies sometimes put at stake their competitive position underestimating this long-term effect. For instance, Hitachi before 2003 was one of the companies that license-out more technology. In fact, in 2002 the company presented licensing revenues of JPY43 billion. However, as a result of its aggressive licensing strategy, licensees in China and Korea rapidly improved their technology and threatened its competitive advantage. In 2003 Hitachi had to restrict its licensing policy if it did not want to be overcome by licensees (Kamiyama et al. 2006).

Similarly, over the last decades financial analysts are increasingly influencing companies' strategies. The consequences of missing their forecast, even by a small quantity, have been disproportionate. For instance, Oracle on December 1997 had seen how its stock price declined by 29% as a consequence of not achieving the analysts' forecast by 0.04$ (even this result was 4% above EPS for the same quarter in last year). (Skiner & Sloan, 2002). Also Procter & Gamble has seen how its stock price was reduced by 30% when they warned that the company would not beat the analysts' forecast in the first quarter of 2000. The same warning before the second quarter of that

1. See, for example:
    a. Dow Chemical: http://www.dow.com/licensing/
    b. Kimberly Clark: http://www.merck.com/licensing/home.html
    c. Merck & Co's webpage: http://www.merck.com/licensing/home.html

year generated an additional reduction on the stock price of 10% and the CFO's dismissal (Duncan, 2001). The severe consequences of not attaining the analysts' thresholds put extra pressure on managers and create incentives to manipulate current earnings. In a survey conducted by Graham et al. (2005) CFOs admit that they put much attention on meeting the earnings thresholds. In fact, they recognized that they are willing to inflate current earnings in order to get them and that they prefer to manipulate earnings using real activities rather than using accruals.

Motivated by these two apparently unrelated trends this paper wants to shed light on the relationship between the company's financial situation and its licensing strategy. In particular, my objective is to examine 1) whether managers license-out their technology to inflate current earnings and 2) what are the long-term consequences for the companies that took the licensing decision under pressure to inflate current earnings. I argue that managers that feel the pressure to attain the analysts' forecast will have incentives to inflate current earnings and, thus, engage in myopic management. Since myopic managers put more emphasis on the short term than in the long run, I expect that, at the time to make the licensing decision, managers will overestimate the revenue effect (short-term effect) while underestimate the dissipation effect (long-term effect). This distortion will generate that managers license-out more technology than the optimal and/or license it under not appropriate situations and companies, in turn, will face negative long term consequences.

I test my hypotheses using a panel of 106 U.S. high-tech companies during 1998-2009 (1,281 observations). Licensing data is one of the strength points of this paper. It has been collected from four different sources: Prompt Database, Google News, Highbeam Research and SDC Platinum. This extensive search has delivered 1,729 licensing agreements[2] of which 840 correspond to "*license in*", 716 to "*license out*" and 173 to "*cross licensing*".

To test the first hypothesis I followed the same procedure as Bushee (1998). I estimated a logit model explaining the probability of increasing the number of licensing-out contracts from period t-1 to period t using as main independent variable a dummy that captures whether the company has or has not achieved analysts' forecasts in period t-1. Results confirm that companies are more likely to license out their intellectual property when they are not able to achieve analysts' forecasts.

[2] Only 153 licensing agreements were collected from SDC Platinum during the period of study for this sample.

To test the second hypothesis I divided the data in two subsamples: *Suspect* and *Not-Suspect* companies. Then, I controlled for the factors that can influence the market share's decrease and I calculated the probability of decreasing market share for each subsample. Results show that companies that license out their technology under this pressure situation (*Suspect companies*) show a shrinking market share in the next two years compared to companies that do not engage in such behavior (*Not-Suspect companies).*

This paper contributes to innovation literature in two ways. The first contribution is to the literature that examines the strategic drivers of technology licensing. Prior research has identified economic as well strategic motivations for licensing (Shepard, 1987; Katz & Shapiro,1985; Gallini, 1984; Rockett,1990; Lichtenthaler, 2007). I extend this research showing that the pressure to achieve analysts' forecasts is also a potential determinant to license out technology. The second contribution is empirical. As the best of my knowledge, it is the first time that someone empirically tests the Dissipation Effect. Prior research has defined theoretically the effect (Arora & Fosfuri, 2003; Fosfuri, 2006) and proposed strategies to limit its extent (Patel and Pavitt, 1997; Granstrand et al. 1997; Bresnahan and Gambardella, 1998; Cohen et al., 2000; Arora and Ceccagnoli, 2006). However, the negative long-term consequences of licensing has never been tested empirically.

I also contribute to the Myopic Management Theory. I proposed a new real activity to inflate current earnings. Prior research had identified several activities that managers use to engage in myopic management (Aaker ,1991; Roychowdhury, 2006; Moorman & Spencer, 2008; Chapman & Steenburgh, 2009). I extent this literature showing that licensing out technology can be used as a real activity that increases current earnings at the expense of reducing market share in the incoming years.

The remainder of this paper is organized as follows. Section 2 presents the theoretical background regarding Myopic Management and Licensing. Section 3 develops the hypotheses to be tested. Section 4 describes the sample and the data. Section 5 reports and discusses the results. Section 6 concludes.

THEORY BACKGROUND

Myopic Management

Effective management requires to be focused on the long-term and to take projects that generate the highest expected net present value (Mizik, 2009). However, the importance that the market gives to current earnings forces managers to put more emphasis on strategies that result in immediate pay-offs (Dechow, 1994; Degeorge et al. 1999). Usually managers' compensation as well their evaluation are based on the company's stock price (Mizik, 2009) and this, in turn, depends on the achievement of three earnings benchmarks: zero earnings, the prior comparable period's earnings and the analysts' forecasts (Degeorge et al. 1999).

As a consequence, managers are very keen on meeting these thresholds to maintain their job, obtain rewards and enhance their external reputation. The pressure to do so gives managers incentives to manipulate results and, thus, inflate current earnings. In fact, evidence has shown that this pressure has already changed the distribution of earnings reported: only few firms report losses while so many report small profits (Dechow, Richardson & Tuna, 2003). In a survey conducted by Graham et al. (2005) financial executives declared that in order to avoid negative surprises they are willing to inflate current earnings and that they prefer to do so by using real activities manipulation rather than using accruals. Even though the objective of both strategies is to inflate current earnings their implications and costs differ greatly. Namely, manipulating discretionary accruals supposes to change the time at which earnings are recognized, not to modify neither the quantity nor the temporal flow of economic profits. However, real activities manipulation always implies engaging in Myopic Management. Basically, it consists on using some activities to inflate current earnings at the expense of sacrificing the long-term firm value. Then, for attaining the same objective, managers prefer to use the strategy that implies worse consequences.

Prior research on Myopic Management has mainly concentrated on the reduction of R&D investment as well on the factors that influences this practice. In particular, evidence has shown that managers reduce R&D expenditures when they cannot ensure positive earnings for the next year (Baber et al.,1991), when the time of retirement is close (Dechow and Sloan, 1991), when the presence of institutional ownership is not

high (Bushee, 1998) and when managers have to repurchase stock to avoid EPS dilution.

However, managers are also using other activities to inflate current earnings. In particular, Aaker (1991) found that companies reduce marketing's expenditures used to enhance brand value while increasing the ones oriented to inflate temporarily the results. Bartov (1993) and Herrmann et al. (2003) show that managers increase the sell of fixed assets; Roychowdhury (2006) demostrate that managers use price discounts and zero financing strategies, overproduce and reduce discretionary expenses and Moorman and Spencer (2008) show that managers delay the introduction of innovations in order to not reduce earnings.

Although the evidence of myopic management is more established, only few studies have quantified the financial future impact of engaging in this practice. Pauwels et al. (2004) demonstrated that sales promotions imply negative long-term effects on firm value. Gunny (2005) found that myopic practices are associated with lower ROA in the subsequent year. Mizik and Jacobson (2007) found that two years after reducing the marketing expenditure the company began to have negative earnings and that in the fifth year the market value of the company was reduced by 25%. In the same vein, Mizik (2009) found that companies that have reduced the marketing expenditure present greater negative abnormal returns in the future than companies that did not. Chapman & Steenburgh (2009) show that companies can use marketing to increase quarterly net income by up to 5% but that this strategy will be reflected in a 7,5% reduction of the next period quarterly net income.

Therefore, external observers cannot know if the reported earnings are a valid proxy of the firm future performance or if they are coming at the expense of future profits. This inability to immediately identify those firms provides managers with the opportunity to inflate current earnings and to benefit from this for some time. Hence, more effort is required to identify a priori the real activities that managers could use to inflate current earnings. If not, the market will be conscious of that observing their long term negative consequences.

Licensing Theory

Over the last decades companies have moved from protecting aggressively their knowledge to license it (Vishwasrao, 2004). Nowadays, licensing is the most important way of technology transfer and its management has become a core competence of high-tech companies (Kamiyana et al. 2006)

In general, the most important motivation for licensing out technology is the revenue it generates. That is, the present value of the fixed fee and/or the royalties that the licensee has to pay to the licensor. Surveys conducted by Gambardella (2005) and by Pluvia Zuniga & Guellec (2009) corroborate that earnings revenue is, by far, the main motivation for companies to license-out technology.

However, in order to really generate profits from licensing, three important points should be considered before taking the decision. First, companies should know what are the downstream assets needed to exploit by itself the innovation. For companies that do not own the marketing and distribution's capabilities would be more difficult to benefit from their innovations. Hence, license out their technology would be a good idea (Teece, 1986). Second, companies should be conscious of what are the transaction costs related with the licensing contract. If the transaction costs generated with the buying of downstream assets are greater than the transaction costs related with the licensing of technology the best strategy would be to license out technology (Arora & Fosfuri, 2003).[3] Finally, companies should pay attention to the extent of the profit-dissipation effect. This effect refers to the reduction in the licensor's profit as a consequence of the additional competition in the product market or of an existing firm becomes more aggressive. Therefore, a company should license its technology only if the revenue effect (net of transaction costs) is greater than the profit-dissipation effect.

In order to limit the extent of the latter effect researchers found that it is better to license out technology when the strength of the patent protection is high (Cohen et al., 2000; Arora and Ceccagnoli, 2006), when the patent refers to general technologies (Bresnahan and Gambardella, 1998), when intellectual knowledge are based on scientific knowledge (Arora & Gambardella, 1994), when the market share of the company is

[3] In general, these contracts are distinguish by: 1) higher search costs resulting from looking for suitable licensees and/or licensors, 2) the existence of information asymmetries between the parties and the consequent incomplete contracts, 3) the bargaining difficulties due to the risk of giving information before signing the contract and 4) the lack of an established mechanism for pricing technologies.

small (Fosfuri, 2006), when intellectual property are related to non-core technologies and to geographically separated markets (Patel and Pavitt, 1997; Granstrand et al. 1997) and when the competition in the product market is high (Arora & Fosfuri, 2003).
Moreover, prior research has also shown that in some situations strategic incentives are more important than the mere licensing revenues. First, Gallini (1984) demonstrates that licensing could be used to guarantee technology leadership. If the established company license out its technology to potential entrants, it will reduce their incentives to develop its own, maybe better technology. Second, Katz & Shapiro (1985) show that licensing could be used to achieve a collusive agreement. If the licensor choose an appropriate royalty rate for the licensee, it will increase price and stimulate the formation of a cartel (Shapiro, 2001). Third, Farrel & Gallini (1988) demonstrated that licensing could be used to create a second source mechanism and, thus, to encourage purchase. That is, if the new technology is complex and is only produced by one company, potential buyers will be reluctant to buy it for fear that this company cannot meet the demand for several circumstances. Fourth, Rockett (1990) found that through licensing a company could choose its competitors. If the established firm licenses its technology to a weak rival, it will crowd the market and block the entry by a stronger competitor. Fifth, Lichtenthaler (2007) shows that if a established company license out its technology to the most of the competitors could create market standards. Finally, Lichtenthaler (2007) demonstrated that through licensing and cross licensing agreements companies have more freedom to operate: they do not block each other and avoid going to court or ceasing production.

HYPOTHESIS DEVELOPMENT.

Financial analysts are increasingly influencing companies' strategies. The severe consequences of missing their forecast, even by a small quantity, have caused that managers modify the normal business of their companies (Skinner & Sloan, 2002). In order to avoid stock prices reduction, to maintain their job and to enhance their reputation they are even willing to engage in not efficient projects that put at stake the long-term firm performance (Degeorge et al., 1999)
Licensing always implies a trade-off. Although the main motivation to license is the revenue effect, managers only will take benefits from it if the profit-dissipation effect is lower than the former. However, if managers are facing pressure to beat analyst's forecast they will have incentives to inflate current earnings and, as consequence, to

engage in myopic management. Since myopic managers by definition put more emphasis in the short term than in the long run, I expect that companies that are under pressure to beat the analysts' forecast, don't take the efficient decision and overestimate the revenue effect while underestimate the dissipation effect. This distortion will lead to license out more technology than the optimal and/or to license-out inappropriate technology (i.e. core technologies) and/or to license out technology under not recommended situations (i.e. same geographical market). Accordingly, I suggest that, in an attempt to increase short -term earnings, managers could license out their technology without any control and without taking into account the negative long-term consequences.

H1. Companies are more likely to license out their intellectual property when they were not able to achieve analyst' forecasts in previous year.

While many researchers have studied the motivations to license-out technology, few of them have focused on its consequences. Theoretically, researchers agree upon the existence of a negative long-term effect: Dissipation Effect (Arora & Fosfuri, 2003; Gambardella et al. 2006; Zuniga & Guellec, 2009). However, as best of my knowledge, it was never shown empirically.

In general, when companies license-out their technology they are increasing their own competition and putting at stake their reputation. No doubt, it can significantly erode their market share and their price cost margin (Arora & Fosfuri, 2003; Fosfuri, 2006). Even though prior research had proposed some strategies to limit the extent of this profit-dissipation effect (Granstrand et al., 1997; Patel & Pavitt, 1997; Arora & Fosfuri, 2003), additional competition always can be a threat for the company.

Accordingly, I hypothesize that managers that took the decision to license out its technology under the pressure to inflate current earnings will face the consequences of underestimating the dissipation effect in the next years. In particular, we expect that companies that have engaged in myopic management will present a reduction in their market share in comparison with the companies that do not.

H2. Companies that license out technology under a pressure situation show a shrinking market share in the next years compared to companies that do not engage in such behavior.

METHODOLODY

SAMPLE & DATA

The empirical analysis is based on a sample of innovative U.S. companies. The operative criterion to select the sample was the following. First, I focused on the companies (140) with the longer number of granted patents at the U.S.P.T.O. during the period 1990-2009.[4] Licensing is not yet a common established practice in many companies and sectors. As the main objective of this paper is to analyze if companies license-out their technology to inflate current earnings I focus on companies that own the raw material to do it: companies with technological assets. Second, because of their rich information environment, I narrowed the initial sample to U.S. companies. Licensing data is per se difficult to find, however, this search process would be even worse in countries where the information about companies is less accessible. Third, I decided to use annual data. Since a number of companies present quarterly losses because the intrinsic seasonality related with their business, I prefer to focus on yearly analysts' forecast. From my point of view, it imposes more pressure on managers and, thus, more incentives to manage earnings.

DATA

Licensing data were obtained from four sources: Prompt database, HighBeam Research, Google News and SDC Platinum. The first three sources are based on press news while the last one is an established licensing database. In Prompt, Google News and HighBeam Research I looked for licensing agreements using key words. In particular, I have always introduced the term "licensing agreement" plus the company name. For Prompt and HighBeam Research, I read all the resulting news, in Google I checked them until the 20th page. After reading the news, I codified these agreements as "licensing out", "licensing in" or "cross licensing". Afterwards, I matched these licensing agreements with the ones from SCD Platinum. The final licensing output was 1,729 licensing agreements of which 840 correspond to "*license in*", 716 to "*license out*" and 173 to "*cross licensing*".

[4] I choose a period of almost 20 years because of the normal length of a granted patent. Therefore, if U.S.P.T.O. granted patents to a company in 1990, these patents can still be valid at the end the period of study.

Afterwards, I have matched the licensing data above with the Compustat financial data and with the analysts forecast data offered by DataStream. These matches reduce the sample to 106 companies during the period 1998-2009. (1,269 observations)

METHODOLOGY

To test the first hypothesis, I follow the same procedure as Bushee (1998). First, in order to create a model for observing the change in the number of licensing agreements I took differences for all variables with respect to the previous year. Second, I use a logit[5] model to predict the probability of observing an increase in the number of licensing agreements.

To check the second hypothesis I divided the total sample between: *"Suspect Companies"* and "*Not Suspect Companies*". *Suspect companies* are the companies that in the last year were not able to attain the analysts' forecast (or equal them) and that have increased the number of licensing contracts with respect to prior year. *Not-Suspect Companies* refer to the rest of the companies. Once I have the sample divided, I calculated the probability of each subsample to decrease the market share in the following years.

VARIABLES DESCRIPTION

Dependent variable:

The dependent variable that I use (***Increaselicensingout***) is a dummy variable that equals one if the firm increases the number of licensing contracts relative to the prior year, and zero if the firm maintains or decreases them.

[5] I decided to use a logit instead a probit because two main reasons: 1) The pseudo R2 is higher under the logit model and 2) The kurtosis after the estimation is higher than 3.

Independent variable

With this variable I try to capture the presence of earnings pressure (***Priornegativesurprise***). It is an indicator variable equal to one if the company has not beat the analysts' forecast in the previous year (or if it presents exactly the same results as the analysts) and equal to zero if the company has surpassed the analysts' forecast in the previous year.

This variable was developed in the following way. First I calculated the difference between the actual earnings per share and the mean of the consensus of analysts' forecast during the fiscal year before the results presentation. I considered that if this difference is equal to zero or negative, managers will suffer more pressure to attain the analysts' forecast next year. Second, I create a dummy variable that reflect the latter argument. This variable is equal to one if the difference between the actual earnings per share and the mean of the consensus of analysts' forecast is zero or negative, and zero otherwise.

Third, I measure earnings pressure in previous year because writing and executing a reliable licensing contract requires time. Companies need to search partners, legal assistance, draft the contract, negotiate,… in a context characterized by asymmetric information and the lack of experience. Prior literature have demonstrated that managers use real activities when they realize that company will be not able to achieve the objectives in order to inflate current earnings and to avoid negative surprises (Aaker, 1991; Roychowdhury, 2006; Moorman & Spencer, 2008; Chapman & Steenburgh, 2009). However, licensing contracts are not so immediate. Therefore, I considered that although managers will begin with the licensing's negotiations when they realize that they will not be able to attain the analysts' forecast, the licensing contract will be finally established in the next year.

Control variables

Lincreaselicenisngout: Is defined as the prior year's change in the number of licensing agreements. The objective of this variable is to control for the company trend to license. If the number of licensing agreements have increased in the last year, would be more likely to increase them also this year.

LogMv: Following Bushee (1998) I use the logarithm of the market value to control for company's size. In general, size proxies for the amount of information available about the firm and for the likelihood the firm faces cash constraints. I expect that larger companies will face fewer opportunities to successfully manage earnings because of the richer information environment and less cash flow shortages that force the company to engage in myopic management.

IncreaseGDPUSA: It is a dummy variable that reflects the change in the U.S. Gross Domestic Product with respect to the previous year. This variable is equal to one if the U.S. GDP has increased from previous year and zero otherwise. Following Bushee (1998) changes in Gross Domestic Product measure growth in the overall economy and proxy for increases in the level of technological progress in the economy. Therefore, it is expected that if the GDP is increasing (decreasing) firms will have more (fewer) opportunities to license out their technology.

Increasecurrentliabilities: It is a dummy variable that reflects the change in the current liabilities with respect to the prior year. This variable is equal to one if the current liabilities[6] increase with respect to the previous year, or zero otherwise. It is supposed that when the ability to pay credits and other short-term liabilities is at stake, managers will be more worry about the negative reaction of suppliers. Therefore, following Roychowdhury (2006) I would expect that companies that increase (decrease) the liabilities with short-term suppliers will have more (less) incentives to inflate current earnings and, thus, engage in myopic management.

Increasegrowthopportunities: It is a dummy variable that reflect the change in the company's growth opportunities with respect to the previous year. This variable is equal to one if the opportunities to growth for a company has increased from previous year, zero otherwise.Following Skinner & Sloan (2002), Hribar et al. (2004) and Roychowdhury (2006) this variable is defined as the ratio between the market value of equity[7] and the book value of the equity[8]. Since companies with higher opportunities to growth are more punished by financial markets if they fail to meet the expected

[6] Compustat item nº5
[7] Compustat item nº199 * Compustat item nº25
[8] Compustat item nº60 * Compustat item nº25

objectives, I would expect that companies with higher opportunities to growth have more incentives to engage in myopic management.

Decreaserdintensity: It is a dummy variable that reflects the change in the R&D intensity with respect to previous year. RD intensity is defined as the ratio between the R&D expenditure[9] and the sales[10]. This variable is equal to one if the R&D intensity has decreased from previous year and zero otherwise.

Yeart: Year trend.

SIC: I create seven sector dummy variables. Six of them correspond to the more common specific SIC-2 codes in the data and the other one includes the rest of the SIC2 codes. Table 3 provides a detailed description of the more important SIC codes in terms of licensing.

RESULTS

TABLE 1. DESCRIPTIVE STATISTICS & CORRELATIONS

	MEAN	SD	MAX	MIN	1	2	3	4	5	6	7
1.LICENSINGOUT	0.502	1.173	13	0	1.000						
3.DIFFACTUALMEAN	-0.112	0.857	4.820	-13.700	0.005	1					
4.RDINTENSITY	45.691	70.457	659.468	0.004	-0.099	-0.0111	1				
5.CURRENTLIABILITIES	4,516.180	8,721.251	141,579	12.751	0.173	0.0223	-0.232	1			
6.GROWTHOPPORTUNITIES	5.957	45.140	1,575	-118.636	0.148	0.0014	-0.0197	-0.013	1		
7.LOGMVE	9.235	1.641	13.139	1.282	0.148	0.1517	-0.1175	0.5355	0.0142	1	
8.GDPUSA	155.319	5.467	163	145	-0.022	-0.0288	0.0246	-0.0818	0.0051	0.037	1

The final sample includes 1,269 observations representing 106 companies over 12 years from 1998 to 2009. Table 1 shows the main descriptive statistics and correlations of the variables in absolute terms. Companies establish by mean 0.502 licensing-out contracts per year and they are involved, as maximum, in 13 licensing-out's contracts by year.
Table 2 and Table 3 present more detailed information of the *Licensingout* variable. In particular, Table 2 shows that the most of the companies (73.77%) are not involved in

[9] Compustat ítem nº46
[10] Compustat item nº12

any licensing-out contract per year while the 99.53% of the companies are involved in less than six per year. This corroborates previous findings that show that Markets for Technologies are still underdeveloped (Gambardella et al. 2006; Arora et al. 2010). In an OECD survey, patenting companies recognized that they want to license out more but that is much difficult to achieve a successful licensing agreement (Zuniga & Guellec, 2009). Table 3 provides evidence that companies belonging to the "*Electronic & Other Electrical Equipment*", "*Machinery"* and "*Chemical & Allied Products"* SIC codes are the ones that license out more technology. Anand & Khanna (2000) have already shown that these sectors were the three more important in terms of licensing. However, the proportions of licensing contracts in each sector are quite different. In my database Electronic & Other Electrical Equipment is the sector more important in terms of licensing (represents the 22.33% vs 18.15% in Anand & Khanna) followed by Machinery (19.59% vs 24.2%) and by Chemical (14.05% vs 38.5%). These differences could be due to the sample selection method[11] or to a change in the licensing trend over the last 10 years in which the Chemical sector lost importance.

TABLE 2. LICENSING AGREEMENTS BY YEAR

Number per year	Freq.	Percent	Cum.
0	945	73.77	73.77
1	194	15.14	88.91
2	68	5.31	94.22
3	35	2.73	96.96
4	21	1.64	98.59
5	8	0.62	99.22
6	4	0.31	99.53
7	1	0.08	99.61
9	2	0.16	99.77
10	1	0.08	99.84
12	1	0.08	99.92
13	1	0.08	100

[11] Anand & Khanna (2000) collected all the licensing contracts from the SDC database in which at least one U.S. participant is involved.

TABLE 3. LICENSING AGREEMENTS BY SIC-2

SIC2	Definition	Freq.	Percent	Cum.
36	Electronic & Other Electrical Equipment	286	22.33	66.28
35	Machinery	251	19.59	43.95
28	Chemical & Allied Products	180	14.05	19.67
37	Transportation Equipment	132	10.3	76.58
38	Instruments & Related Products	132	10.3	86.89
73	Business Services	84	6.56	100
39	Miscelaneous Manufacturing Industries	48	3.75	90.63
25	Furniture & Fixtures	24	1.87	3.75
26	Paper & Allied Products	24	1.87	5.62
30	Rubber & Miscelaneous Plastic Products	24	1.87	22.48
67	Holding & Other Investments Offices	24	1.87	93.44
1	Agriculture	12	0.94	0.94
24	Lumber & Wood Products	12	0.94	1.87
29	Petroleum & Coal Products	12	0.94	20.61
32	Stone, Clay & Glass Products	12	0.94	23.42
33	Primary Metal Industries	12	0.94	24.36
48	Communications	12	0.94	91.57

TABLE 4. DESCRIPTION DIFFACTUALMEAN

	Percentiles	Smallest		
1%	-3.43	-13.7		
5%	-0.97	-11.59		
10%	-0.51	-7.17	Obs	1,281
25%	-0.14	-6.78		
50%	0.01		Mean	-0.1121
		Largest	Std. Dev.	0.86
75%	0.08	3.05		
90%	0.27	3.35	Variance	0.73
95%	0.47	4.15	Skewness	-6.7
99%	1.51	4.82	Kurtosis	89.77

Table 4 presents a more detailed description of the *Diffactualmean* variable. Companies that surpass the analysts' forecast report, as maximum, earnings per share 4.82 higher than the threshold while companies that fail to beat them report, as maximum, earnings per share 13.7 lower than the analysts' forecast. This asymmetry makes that the mean of this variable be negative (-0.1121) while the median is positive (0.01). Its negative skewness (-6.7) shows that the mass of the distribution is concentrated on the right and that there is relatively few low values. This corroborates the finding of Dechow, Richarson & Tuna (2003) that show that so many firms report small profits while only

few present losses. In Table 5 we can see that the 55.89% of the year-firm present positive results while 44.11% report losses.

TABLE 5. DIFFACTUALMEAN DISTRIBUTION

	Freq.	Percent	Cum.
POSITIVE	**716**	**55.89**	**55.89**
NEGATIVE	**565**	**44.11**	**100**
TOTAL	**1,281**	**100**	

To describe better the data I divided the sample in four categories attending to two main variables in the dummy version: *INCREASELICENSINGOUT* and *PRIORNEGATIVESURPRISE*. In this way, I define *NOINCREASENOSURPRISE* as the companies that in last year attained the analysts' forecast and not increased licensing-out, *NOINCREASESURPRISE* as companies that in the last year attained the analysts' thresholds and not increased licensing-out, *INCREASENOSURPRISE* as companies that attained the analysts forecast in the previous year and that increased licensing-out and *INCREASESURPRISE* as companies that did not attain the analysts' previsions and that increased licensing-out from previous year.

TABLE 6 . SAMPLE DIVIDED IN 4 CATEGORIES

	NEGATIVE SURPRISE IN PRIOR YEAR	
	NO	**YES**
LICOUTt+1-LICOUTt<0	***NOINCREASENOSURPRISE*** **449 (76.90%)**	***NOINCREASESURPRISE*** **417 (70.70%)**
LICOUTt+1-LICOUTt>0	***INCREASENOSURPRISE*** **135 (23.10%)**	***INCREASESURPRISE*** **173 (29.30%)**

Table 6 shows that companies that did not attain analysts' forecast in the previous year (right column) are more likely to increase the number of licensing contracts (29.3%) that the ones that have achieved them (23.10%). This intuition is corroborated by the logit regression.

The results for the first hypothesis are presented in Table 7. Model 1 reports the results of the logit regression only with the control variables and Model 2 reports the results of the logit regression with the introduction of the earnings pressure variable (*Priornegativesurprise*). Most of the control variables are significantly associated with the probability of increasing licensing-out. In particular, the coefficient of R&D

intensity is significantly negative. This seems not to have so much sense because, in general, higher R&D intensity would imply higher licensing-out (because of a higher patent portfolio). However, in order to inflate current earnings, increasing licensing-out contracts and reducing R&D intensity can be good complements [12]. Moreover, increasing current liabilities or growth opportunities of a company from previous year are positively associated with the probability of increase the number of licensing-out contracts. Contrary to prior findings, the logarithm of the market value (proxy for size) is positively and significantly associated with the probability of increasing licensing-out contracts[13]. Gross Domestic Product has a positive relation with licensing-out, hence, when GDP is increasing companies will have more probabilities to license out technology. Finally, over the years it is more likely to increase the licensing-out of technology.

Hypothesis 1 proposes that earnings pressure in the previous year makes more likely that companies increase the number of licensing-out contracts during this year. Model 2 support this hypothesis: Companies that fail to meet analysts' forecast in previous year increase the licensing out of technology with respect to the prior year in 0.420. In other words, the probability of increasing licensing-out technology increases from 22.9% (without earnings pressure) to 30.5% (with earnings pressure)[14]. The introduction of this variable also generates an increased in the Pseudo R2 from 0.135 to 0.141.

TABLE 7. LOGIT REGRESSION

	(1)	(2)
INCREASELICENSINGOUT	**MODEL 1**	**MODEL 2**
LINCREASELICENSINGOUT	**-0.355**	**-0.360**
	(0.193)	**(0.194)**
DECREASERDINTENSITY	**-0.564*****	**-0.583*****
	(0.152)	**(0.153)**
INCREASECURRENTLIABILITIES	**0.389***	**0.378***
	(0.162)	**(0.162)**
INCREASEGROWTHOPPORTUNITIES	**0.356***	**0.344***
	(0.154)	**(0.155)**
LOGMVE	**0.142****	**0.165*****

[12] I found that earnings pressure in year t (no in year t-1) influences significatively the probability of decreasing R&D intensity. Logit regressions are attached in Annex: Table 10 and Table 11.

[13] If I use the logarithm of the number of employees as a proxy of size, the association is still positive. The coefficient is 0.127 ** under Model 1 and 0.133** under Model 2.

[14] The marginal effects after logit is 0.2299 and the discrete change of *PRIORNEGATIVESURPRISE* from 0 to 1 is equal to 0.075.

	(0.0474)	**(0.0483)**
YEART	**0.162*****	**0.172*****
	(0.0259)	**(0.0262)**
SIC28	**0.0307**	**0.0658**
	(0.255)	**(0.257)**
SIC35	**-0.0887**	**-0.0736**
	(0.236)	**(0.237)**
SIC36	**-0.416**	**-0.372**
	(0.238)	**(0.240)**
SIC37	**-0.754***	**-0.705***
	(0.310)	**(0.312)**
SIC38	**-0.105**	**-0.0274**
	(0.283)	**(0.284)**
SIC73	**-0.250**	**-0.239**
	(0.329)	**(0.332)**
INCREASEGDPUSA	**0.956*****	**0.881*****
	(0.153)	**(0.155)**
PRIORNEGATIVESURPRISE		**0.420****
		(0.154)
_cons	**-3.720*****	**-4.190*****
	(0.528)	**(0.562)**
N	**1163**	**1163**
pseudo R^2	**0.135**	**0.141**

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To test the second hypothesis I converted the four prior categories to two. As the main objective now is to analyze the long-term consequences of companies that suffered earnings pressure and increased the number of licensing-out contracts I focus on the observations that satisfy these two conditions (*INCREASESURPRISE* group). I refer to this group as SUSPECT (173 observations). The others three groups: *NOINCREASENOSURPRISE, INCREASENOSURPRISE* and *NOINCREASESURPRISE* are classified together under the *NOT-SUSPECT's* name (1,108 observations).

Taking into account this distinction, I compared the evolution of the market shares[15] of these two subsamples in the next 2 years.

[15] Market Share is defined in two ways: taking into account the SIC classification and taking into account the Global Industry Classification Standard, (GICS). In both cases DECREASEMARKETSHARE is defined as a dummy variable equal to one if the market share have decreased from previous year and equal to zero if not.

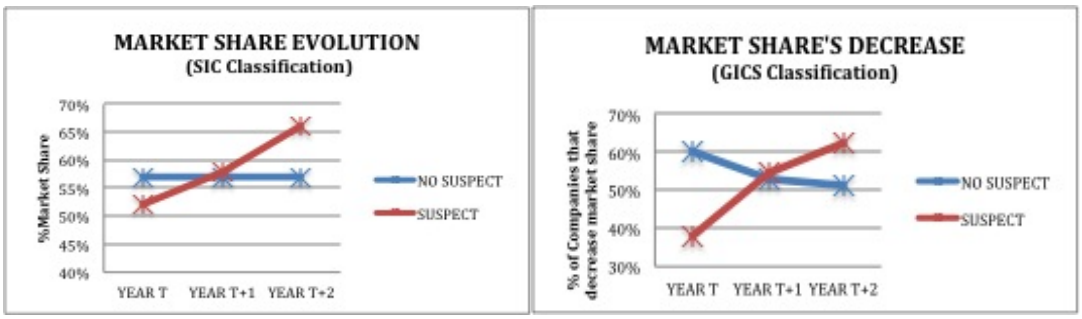
TABLE 8. MARKET SHARE DECREASE

			SUSPECT FIRMS Absolute Terms		SUSPECT FIRMS Percentage	
			NO (=0)	SI (=1)	NO (=0)	SI (=1)
DECREASE MARKET SHARE	SIC	YEAR T	638	90	57%	52%
DECREASE MARKET SHARE	SIC	YEAR T+1	611	61	57%	58%
DECREASE MARKET SHARE	SIC	YEAR T+2	556	60	57%	66%
DECREASE MARKET SHARE	SUBINDUSTRY	YEAR T	610	67	60%	38%
DECREASE MARKET SHARE	SUBINDUSTRY	YEAR T+1	569	57	53%	55%
DECREASE MARKET SHARE	SUBINDUSTRY	YEAR T+2	502	61	51%	62.30%

Table 8 shows that under the SIC market share definition, the percentage of not-suspect companies that decrease their market share is constant over the period (57%) while this percentage is increasing in the group of suspect companies (from 52% to 66%). In period t seems that suspect companies perform even better than the non-suspect ones: only 52% of the suspect companies decrease their market share with respect to previous year while 57% of the non-suspect ones do so. In period t+1 suspect companies began to perform worse than the non-suspect: 58% against 57%. Finally, in period t+2, suspect firms behave much worse than the non-suspect ones: 66% of suspect companies decrease their market share while only 57% of the non-suspect companies do so.

Under the GICS-subindustry market share's definition, the trends followed by suspect and not-suspect companies are completely opposite. While not-suspect companies reduce the percentage of companies that decrease market share in the three year period (from 60% to 51%), suspect companies perform each time worse: from 38% in year t to 62.3% in year t+2. Graph 1 shows the market share's evolution under the two definitions.

GRAPH 1. MARKET SHARE EVOLUTION



Prior table is merely descriptive but not conclusive at all. The differences between subsamples could still be due to the differences in the sample size (173 vs 1,108). In order to analyze deeper these differences, I regress a logit on the factors that could influence the decrease of the market share for each subsample. I control for the SIC sector, the number of employees, year, GDP and the number of granted patents accumulated. With the coefficients resulting from the two regressions, I calculate the probability of decreasing market share conditional on belonging to the suspect group or to the not-suspect one using the following formula:

$$P(y = 1|X) = \frac{\exp(X\beta)}{1 + \exp(X\beta)} = \Lambda(X\beta),$$

The resulting probabilities are reported in Table 9. Results partially supported the intuition from Table 8. The probability of decreasing market share from previous year for suspect companies is strongly increasing from t to t+1 and weakly decreasing from t+1 to t+2 while it is quite constant for the not-suspect ones. The greater difference between the subsample appears in period t+1.

TABLE 9. PROBABILITIES TO DECREASE MARKET SHARE SUSPECT VS NON SUSPECT COMPANIES

	SUSPECT	NO_SUSPECT	DIFF
T	0.5241	0.5812	-0.0571
T+1	0.6274	0.5719	0.0555
T+2	0.6167	0.5755	0.0412

CONCLUSION

The severe consequences of not meeting analysts' forecasts put extra pressure on managers and radically change their way to run the business. Nowadays, managers usually focus on short-term strategies and try to manipulate earnings to avoid negative stock market reactions and to maintain their job and their reputation. The increasing tendency to inflate current earnings is mainly strengthened by the market inability to immediately identify the myopic behavior. Therefore, managers have the opportunity to inflate current earnings and to benefit from this situation during a period.

Prior research has identified several real activities used by managers to inflate current earnings and then, to distort our vision of the company. I wanted to contribute to this literature proposing the licensing-out of technology as a way to inflate current earnings.

From my point of view, licensing can be considered a real activity because the trade-off that it implies. In the short term, companies increase their benefits by the licensing revenues but, in the long term, companies could reduce their market share or their price cost margin due to additional competition. Managers should carefully balance both effects to take the right decision. However, as myopic managers put more emphasis in the short term than in the long term, I expected that, when they are supporting pressure to meet analysts' forecast, they give priority to the short-term effect and take the decision to license without taking into account the long-term negative consequences.

The results of this paper confirm that 1) licensing-out is a potential real activity to inflate current earnings. In particular, I show that companies are more likely to license-out their intellectual property when they are not able to achieve analysts' forecasts in previous year and that 2) companies that took the decision to license under the pressure to inflate current earnings and to meet the analysts forecast will suffer the long-term negative consequences. In particular, I found that those companies will show a shrinking market share in the next two years compared to companies that do not engage in such behavior.

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ANNEX

TABLE 10. R&D INTENSITY DECREASE WITH EARNINGS PRESSURE IN PERIOD T.

	(1)	(2)
	DECREASERDINTENSITY	DECREASERDINTENSITY
DECREASERDINTENSITY		
LDECREASERDINTENSITY	0.260*	0.283*
	(0.121)	(0.122)
INCREASECURRENTLIABILITIES	0.0481	0.0758
	(0.129)	(0.130)
INCREASEGROWTHOPPORTUNITIES	0.00834	-0.00156
	(0.127)	(0.128)
INCREASEACCPATENTSGRANTED	-0.355**	-0.349**
	(0.124)	(0.125)
INCREASEGDPUSA	0.248	0.267*
	(0.131)	(0.131)
YEART	-0.108***	-0.103***
	(0.0197)	(0.0199)
LOGMVE	0.00550	0.0143
	(0.0391)	(0.0395)
SIC28	0.284	0.294
	(0.219)	(0.219)
SIC35	0.0818	0.0920
	(0.203)	(0.203)
SIC36	0.0539	0.0763
	(0.198)	(0.199)
SIC37	0.0613	0.0790
	(0.242)	(0.242)
SIC38	0.349	0.383
	(0.240)	(0.241)
SIC73	0.154	0.158
	(0.278)	(0.279)
NEGATIVESURPRISE		0.233+
		(0.126)
_cons	0.255	-0.0133
	(0.418)	(0.443)
N	1163	1163
pseudo R^2	0.031	0.034

Standard errors in parentheses
+ P< 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

TABLE 11. R&D INTENSITY DECREASE T-1 WITH EARNINGS PRESSURE IN PERIOD T-1

	(1)	(2)
	DECREASERDINTENSITY	DECREASERDINTENSITY
DECREASERDINTENSITY		
LDECREASERDINTENSITY	0.260*	0.252*
	(0.121)	(0.121)
INCREASECURRENTLIABILITIES	0.0481	0.0417
	(0.129)	(0.130)
INCREASEGROWTHOPPORTUNITIES	0.00834	-0.00108
	(0.127)	(0.128)
INCREASEACCPATENTSGRANTED	-0.355**	-0.359**
	(0.124)	(0.125)
INCREASEGDPUSA	0.248	0.214
	(0.131)	(0.133)
YEART	-0.108***	-0.102***
	(0.0197)	(0.0200)
LOGMVE	0.00550	0.0158
	(0.0391)	(0.0397)
SIC28	0.284	0.298
	(0.219)	(0.219)
SIC35	0.0818	0.0902
	(0.203)	(0.203)
SIC36	0.0539	0.0688
	(0.198)	(0.199)
SIC37	0.0613	0.0823
	(0.242)	(0.242)
SIC38	0.349	0.382
	(0.240)	(0.241)
SIC73	0.154	0.166
	(0.278)	(0.279)
PRIORNEGATIVESURPRISE		0.200
		(0.126)
_cons	0.255	0.0390
	(0.418)	(0.440)
N	1163	1163
pseudo R^2	0.031	0.033

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

XXX