MANAGEMENT DECISIONS REGARDING THE VOLUNTARY DISCLOSURE OF INFORMATION: THE PROBLEM OF THE RECOGNITION OF THE FIRM'S INTELLECTUAL CAPITAL AND THAT OF LENDERS' INFORMATION NEEDS

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Abstract

We analyse data on Italian listed companies quoted on the Milan stock exchange which perform R&D (Research & Development) activity. We find there is a positive relationship between R&D activity and voluntary disclosures of additional information that: *a)* regards R&D assets in themselves, in line with theoretical predictions according to which voluntary disclosure makes up for shortcomings in the current financial accounting model; *b)* is relevant to lenders' interests, in line with the fact that quoted Italian firms are highly dependent upon lenders. Owner-managers of quoted Italian firms show, moreover, a significant tendency to augment additional information provided to lenders in the event of losses (negative earnings).

Keywords: Controlling Shareholders, Lenders, Minority Shareholders, Intellectual Capital Information

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1. Introduction

Voluntary disclosure can reduce agency costs in the relationship between financiers (shareholders and lenders), who provide funds (equity and borrowed money), and management, who make the operating decisions (Jensen and Meckling, 1976; Williamson, 1981). We should bear the particular characteristics of the Italian equity market in mind when using the teachings of agency theory. This market shows a high level of ownership concentration across all listed firms. According to Bianco and Casavola (1999), ownership concentration in Italian listed companies is high: on average, the major shareholder has 52% of voting rights, and the three largest shareholders account for 62% of shares and voting rights

Three different classes of major block holders are commonly identified: families with active family members, the state or other public bodies, and coalitions of shareholders with venturesome activity or entrepreneurial backgrounds. Moreover, controlling families are usually very much involved in the activities of the firm as revealed by the regular appointment of family members to the board of directors, or even to CEO positions (Prencipe *et al.*, 2008). The presence of a dominant shareholder in Italian listed firms makes the separation between owners and managers less severe. However, it raises a different conflict between controlling shareholders,

who are the owners and managers of the firm, and minority shareholders.

Considerations regarding the equity market show that, in Italy, voluntary disclosure can be used to reduce agency costs that arise between owner-managers and minority owners, and owner-managers and lenders. Therefore, we present theories which explain the importance of voluntary disclosure for shareholders and lenders and we base our hypotheses upon these.

Disclosure benefits are related to liquidity, costs of capital and analyst evaluation (Botosan, 1997; Healy and Palepu, 2001; Verrecchia, 2001). At the same time, disclosure is not costless because it is associated with the emergence of proprietary and litigation costs (Darrough and Stoughton, 1990). According to the proprietary cost theory, costs relating to disclosure could discourage the dissemination of information (Dye, 1985; Verrecchia, 2001; Prencipe, 2004). Managers could decide to disclose less information to avoid competitive disadvantage and protect investors better (Dye, 2001). Darrough and Stoughton (1990) asserted that if the number and the size of rivals increases, disclosure becomes more costly. Although the effects of disclosure on competitive disadvantage "are complex and difficult to predict" (Guo *et al.*, 2004, p. 323), some authors suggest that firms seek to satisfy financial analysts' and investors' high demand for

intellectual capital information by disclosing value-relevant information (Cerbioni and Parbonetti, 2007; García-Meca and Martínez, 2007; García-Meca *et al.*, 2005). Investors would surely interpret nondisclosure of this critical aspect of a firm's activities and future performance as "bad news" (Milgrom, 1981) and this would imply for example, a significant absence of products under development (a thin pipeline), a failure of clinical tests or limited markets for the anticipated result, consequently reducing the company's value. In a world of complete information, internal mechanisms of accountability might be useless because investors could directly protect themselves; under conditions of an incomplete contract and bounded rationality, however, voluntary disclosures are mechanisms of accountability.

The decision to disclose additional information is typically made in terms of a cost-benefit framework. Proprietary costs are those associated with disclosing potentially valuable information to the firm's competitors. Instead, a positive effect of voluntary disclosure might be a reduction in the cost of capital (Botosan, 1997; Leuz and Verrecchia, 2000) as the result of a reduction in information asymmetry. Eccles *et al.* (2001, Ch. 10) argue that enhanced disclosure levels will probably lower firms' cost of capital, increase analyst attention and so forth.[1]
We choose the practice of R&D as the focus of this work, since, for accounting literature, R&D is the main contributor to information asymmetries between insiders and those outside the firm (Aboody and Lev, 2000). Therefore, we identify and analyse the categories of information, voluntarily disclosed by owner-managers to reduce the information asymmetries between themselves and financiers, whether they finance through equity (minority owners' funds) or borrowed money (debt). We distinguish between two categories of additional information that managers can voluntarily disclosure, each of which focuses on a specific informative need on the part of one of the two categories of stakeholders considered, i.e. (minority) shareholders and lenders. Therefore, we examine the effects of:

- qualitative and quantitative value-relevant information about R&D assets. Since financial information within annual reports is not sufficient as the basis for a reliable evaluation of a company, additional disclosures by management of information about R&D are important to optimise information flows in the capital markets (see Holland, 2002). This is information which can influence share prices because it is related to the possibility of R&D assets

generating future residual (excess) income.[2] For example, if the managers of a company, which is engaged in the development of new drugs, believe these products to be undervalued because the firm's financial statements do not provide external investors with sufficient information about the value of the opportunities which will come with these new drugs, they might make additional voluntary disclosures. These firms would increase disclosure until the additional (marginal) costs of disclosure equaled the associated marginal benefits. It may well be the case that higher disclosure for these firms will result in a lower cost of capital.

- qualitative and quantitative information for lenders. The asymmetric nature of lenders claims on firms' assets is such that they are not generally interested in information about R&D assets in themselves. Indeed, R&D assets typically do not retain much of their value in the event of bankruptcy/liquidation. Even the excess of firm value over book value often disappears once the firm ceases to be a going concern. This occurs because this excess often represents the value of intangibles whose value is intrinsically linked to the firm itself, and do not have value once the firm is no longer a going concern. Lenders, instead, are likely to have greater demand for additional information regarding everything which may reduce the value of lenders' claims.

Therefore, in the following section, we will present theories which have looked at the consequences that disclosures generate regarding the reducing of agency conflicts that arise between owner-managers and minority owners, and owner-managers and lenders. We elaborate a theoretical framework and various hypotheses for the two categories of information which we have outlined.

In section 3, we present the empirical research, together with description of the data, variables and methodology. The sample comprised a panel of 156 observations, comprised of data which were gathered from the annual reports of 39 firms over the four years from 2008 to 2011 inclusive. From 2005, Italian listed companies increased disclosure in their annual reports. This happened following the IFRS mandatory transition in 2005, and as a result of modification to the rules in the Civil Code (updated article 2428) in 2008. However, although the newly required disclosure regards a wide range of issues, such as key financial and non-financial performance indicators (risks, environmental impact of operations and human resources), there is no clear requirement as to what quantitative or qualitative disclosures should be provided. Finally, the results will be discussed in section 4 and conclusions will be drawn.

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[1] The theoretical argument that disclosures reduce the cost of capital is based on Glosten and Milgrom (1985), Amihud and Mendelson (1986), Merton (1987), King *et al.* (1991). For empirical evidence regarding the negative association between disclosure level and cost of capital, see Botosan (1997), Sengupta (1998), Healy *et al.* (1999), and Botosan and Plumlee (2002).

[2] Residual (excess) income (X_t^a) is earnings in year *t* reduced to a value equal to that of the product between the equity book value for year *t-1* multiplied by the *rf* rate, that is the risk-free rate, e.g. that inherent to the treasury security yield.

2. Theoretical background and hypotheses

Information on R&D to cope with shortcomings of the current financial accounting model

The first framework is based on certain dissatisfaction with regard information on intangibles in corporate financial reports. Information on a firm's innovation or technology cannot be included in financial statements because of identification, recognition, and measurement problems (see Holland, 2002). The inadequacy of financial information is a major incentive to managers to increase disclosure of information about R&D. The reason for this is that the firm's financial statements do not adequately reflect the value created by innovative activities such as R&D and, therefore, the firm (if it did not make voluntary disclosure about this activity) might be unfavourably affected by the myopia of the capital market within the resource allocation process that the market itself performs. Perhaps the most fully exposited version of this line of reasoning is made by Lev (2001), who has conducted several studies specifically into problems inherent in R&D assets (e.g., see: Lev *et al.*, 2005; Aboody and Lev, 2000).

Firms with large amounts of intangibles relative to fixed, tangible assets are handicapped in their ability to obtain financing. Lev and Zarowin (1999, p. 383) suggest that reporting inadequacies may adversely affect investors' and firms' welfare. Cañibano *et al.* (2000, p. 112) add that if financial statements provide investors with biased (conservative) estimates of the firm's value (book value of equity), inefficiencies (myopia) may appear in the resource allocation process. Ignorance of intellectual capital causes investors to have doubts about what may happen in the future and to undervalue shares (Andriessen, 2004). Furthermore, a company with low levels of tangible assets has a lower capacity to guarantee debts (Sotomayor González and Larrán Jorge, 2005). This may cause investors to conclude that the company has a high level of risk and, thus, not wish to invest in it, making it difficult for the firm to access this kind of financing. Hofmann (2005) says that the cost of capital is too high for knowledge intensive companies. Therefore, by displaying their invisible assets, firms might demonstrate that they represent less of a risk than is at first apparent and, in turn, reduce the rate of return required by stakeholders (Sveiby, 1997).

Lev (2001) makes a number of arguments to support the claim that the current lack of disclosure about intangibles in annual reports has adverse effects on capital markets. Lev argues that current accounting practice leads to the "systematic undervaluation of intangibles" by investors. He points to two papers, one by Chan *et al.* (2001) and the other by Lev *et al.* (2005). Both of these show that shares of firms with relatively higher R&D spending tend to outperform other firms in the years following that spending. The implication is that these firms where previously undervalued by market participants. The market fails to correctly value R&D expenditures at the time they are made because those expenditures are expensed rather than capitalised at that time. Thus, it is assumed that market participants naively respond to the accounting treatment of expenditures and fail to understand that R&D expenditures which are not capitalised may well result in future benefits. Capitalisation, partial or total, is supported by certain regulators (IAS) if the project complies with predetermined success factors. However, Lev (2001) suggests that, given the uncertainty of R&D projects, the option of expanding these costs is used by many managers to avoid having to give explanations about failed projects: "Thus, companies get the best of all worlds from in-process R&D expensing: no price hit at the time of expensing and a significant boost to future reported profitability" (p. 89).

A number of contributions, including those mentioned above, suggest the desirability of different specific accounting/disclosure treatments for R&D assets. Above all, as far as voluntary disclosure is concerned, the indications which emerge are presented clearly and synthetically by Lev (2001, p. 122), who encourages voluntary disclosure of information about R&D.[3]

R&D intensity may proxy for information asymmetry between managers and investors. Aboody and Lev (2000) find that the frequency of and gain from insider trading are greater for firms with higher R&D intensity, suggesting that R&D is a major contributor to information asymmetry. In addition, prior studies suggest that firms with greater information asymmetries are more likely to make disclosures (e.g. King *et al.*, 1990). Thus, the information asymmetry hypothesis also predicts a positive association between disclosure and R&D intensity. Given these conditions, we make the following hypothesis:

H1: Firms with higher R&D intensity make more disclosures of R&D.

To see the problem with this logic, it is worth considering the possibility that the more R&D processes are understood, the more information about the scope and progress of these processes is useful to

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[3] Moreover, he advocates changing the accounting system. His principal recommendation here is to broaden the recognition criterion so that expenditures on intangibles can be recognised as assets to a greater extent. This would be accomplished by relaxing the criteria on reliability (probable future benefits) and control (that the entity has control over the asset). Lev (2003) advocates the introduction of a "comprehensive balance sheet that recognises the creation of those intangible assets to which you can attribute streams of benefits" (p. 20). He proposes the capitalisation of research and development, patents, brands and "sometimes organisational capital".

investors and the more investors ask firms for such processes because they include opportune information which is not typically included in financial reports. According to the American Securities and Exchange Commission (SEC), investors "also need to understand the key milestones for the development of the company and its progress on achieving key operating performance measures" (SEC, 2001). This includes disclosure of general information about the innovation process, including the status of R&D projects, availability of future financing, and whether project development is on schedule. Eventual completion and commercialisation also signify the success of innovation and information about the delivery of marketable products or services helps investors assess the value created by the activity.

The need to provide voluntary information about R&D arises not only because of absent, or partial, recognition on the balance sheet of streams of benefits due to research and development, but also when earnings reported in the Periodic Income Statement are less useful in assessing firm value.

Indeed, most approaches to equity evaluation rely on information from the income statement and use that information to forecast future revenues, earnings, and cash flows. Managers have greater incentives to disclose additional information when financial information, such as earnings, is less useful for evaluating firms (Gu and Li, 2003; Chen *et al.*, 2002).

Since negative earnings are less useful for evaluating firms (Collins *et al.*, 1997; Hayn, 1995), we also expect firms to increase disclosure of innovation when they report losses. In fact, investors are likely to have greater demand for additional value-relevant information to supplement the information on earnings in the event of losses. Moreover, for R&D-intensive firms, losses are often indicative of the absence of revenue during early stages of the innovation process. Given that early-stage innovations tend to be associated with more uncertain prospects and, hence, more uncertain future earnings, disclosures of innovation are likely to be more useful to investors for assessing the value of such firms.[4]

Thus, we expect managers to have greater incentives to make disclosures about their innovation activities when they experience losses. This is our second hypothesis:

H2: Firms reporting operating losses make more disclosures of R&D

The empirical evidence regarding the importance of voluntarily disclosed information about R&D does not reach unequivocal conclusions. For example, Arvidsson (2003) analyses 105 analyst reports on

knowledge-intensive companies in Nordic countries. Her disclosure scores show that financial analysts focus primarily on information regarding R&D. In contrast, Larrán Jorge (2001) and García-Meca *et al.* (2005) do not find much information in this category in analyst reports, because there is little voluntary disclosure of this information in the country they examined, i.e. Spain.

Voluntary disclosure and lenders' informative requirements

Italian listed companies represent an ideal setting to investigate the influence of lenders on voluntary disclosure because of a characteristic which is unique to them. Indeed, Italian listed firms are leveraged at about 50%, indicating that debt financing is a prime source of funds (Prencipe *et al.*, 2008).

Much of the debt research has developed with the agency-theoretical view of the firm that Jensen and Meckling (1976), Fama and Miller (1972), and Myers (1977) have articulated. Three central ideas emerge from this literature. First, owner/managers have incentives, ex post, to engage in actions to further their own interests to the detriment of outside capital providers. Second, outside capital providers will price protect their claims in anticipation of this behaviour. Third, owner/managers anticipate price protection and are willing to incur monitoring and bonding costs, ex ante, to restrict lenders' ability to engage in such behaviour.

Smith and Warner (1979) expand on these ideas, postulating that four categories of agency conflicts arise between debt holders and equity holders. First, there is a conflict of interest between these two stakeholders over dividends. Debt holders are concerned that equity holders could increase their dividend payments, thereby reducing the resources available to payoff debt holders' claims. Second, there is a conflict over future increases in debt levels that reduce the probability that the lender will be repaid. The third and fourth sources of conflict relate to asset substitution and underinvestment. Following a debt issuance, firms often have incentives to shift their asset mix toward riskier investments, resulting in a wealth transfer from debt holders to equity holders. Alternatively, as firms approach default, they may choose to forgo positive net present value (NPV) projects because the benefits would accrue primarily to the firm's creditors rather than to its equity holders.

Studies of the conflicts between insiders and lenders can not ignore the specific nature of R&D assets to which our work refers. Some of the literature has underlined what the critical elements of intellectual capital disclosures are and we believe that some of these critical elements may be of great relevance from the lenders' prospective.

In the theories of the firm as a 'set of contracts' (Baker *et al.*, 2002), the contractual position of lenders is profoundly different from that of

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[4] Mansfield and Wagner (1977) estimated that, in R&D projects, the improvement in the mean probabilities of success was about 8-9% as products moved toward later stages of innovation.

shareholders. The returns on investment are already fixed for the firm's lenders. However, once managers have obtained debt financing, they could switch to higher risk investment opportunities than those discussed with lenders, reducing the value of lenders' claims. Therefore, it is logical for lenders to have greater demand for additional information with regard anything that may reduce the value of their claims. Following this line of reasoning, with respect to R&D assets, lenders' attention is more focused upon the options that managers will have to switch to higher risk investment opportunities in the future than upon the stream of probable and future residual (excess) incomes which can be associated to current R&D assets.

Firms with more intangible assets have more "growth options", that is more investment opportunities to choose between over time. From this perspective, innovative activities such as R&D are among the main contributors to "growth options" (Skinner 2008). The more growth options grow, the more risk for lenders increases. In the future, these funds can easily be switched to higher risk growth opportunities by firms' managers. Firms which have a higher number of growth options available face greater challenges and risks than other firms. For example, once managers have obtained some financing, they could profit by switching investment from the projects proposed, when asking for the finance, to opportunities which present greater risk, so reducing the value of the lenders' claims (Smith and Watts, 1992).

The asymmetric nature of lenders' claims on firms' assets is such that they are generally only willing to lend to the firm to the extent that it has tangible assets because these assets typically retain much of their value in the event of bankruptcy/liquidation. Conversely, the excess of firm value over book value often disappears once the firm ceases to be a going concern. This occurs because this excess often represents the value of intangibles whose value is intrinsically linked to the firm itself, and do not have value once the firm is no longer a going concern. With regard all this, the best summary of the debt holders' point of view was given in 2002 by the then president of the Federal Reserve Alan Greenspan when talking about the failure of Enron: "As the recent events surrounding Enron have highlighted, a firm is inherently fragile if its value added emanates more from conceptual as distinct from physical assets. A physical asset, whether an office building or an automotive assembly plan, has the capability of producing goods even if the reputation of the managers of such facilities falls under a cloud. The rapidity of Enron's decline is an effective illustration of the vulnerability of a firm whose market value largely rests on capitalised reputation. The physical assets of such a firm comprise a small portion of its asset base. Trust and reputation can vanish overnight. A factory cannot." (Quote taken from Lev, 2002).

Other characteristics of many intangibles reinforce the idea that lenders are unlikely to be interested in additional information about R&D assets in themselves. For example, many intangibles are characterised by difficult-to-enforce property rights issues - it is hard to prevent others from appropriating and enjoying the benefits associated with intangibles; employees may leave the firm, taking valuable intellectual capital with them etc. In addition, it is less likely that secondary markets will exist for many intangibles, making independent assessments of value difficult to obtain.

There are numerous theories regarding intellectual capital and some of these are highly critical. For example, the notion of intellectual 'capital' is criticised by Gowthorpe (2009) as an incomplete terminology that emphasises only certain aspects of intellectual assets and fails to take into account the 'dark side' of the asset base, intellectual liabilities. In particular, it is clear that the basic formulation underlying the balance sheet is: Assets-Liabilities = Capital. It appears that the notions of intellectual capital that have been devised to date only equate intellectual capital with intellectual assets, ignoring the potential impact of intellectual liabilities. There has been some relatively limited recognition in the intellectual capital literature that intellectual liabilities might be important factors in assessing firm value (Caddy, 2000; Harvey and Lusch, 1999). For example, Harvey and Lusch (1999) attempt a classification scheme for intangible liabilities which includes factors such as high employee turnover, discrimination and poor product/service quality. Companies are, presumably, the beneficiaries of many significant intellectual asset elements such as employee know-how, structural capital and relational capital. However, virtually all such elements might be destroyed by a single and singularly ill-advised remark (see Moore (2005) for examples). All this leads critics to conclude that intellectual 'capital' is an incomplete terminology. It flatters companies and their management by its concentration upon assets, without an equivalent examination of liabilities. Moreover, risk elements are relatively under-examined in both theory and practice, and there are no elaborate reporting models associated with risk that are equivalent to those describing so-called 'intellectual capital'.

We use the above arguments about the options (which increase as R&D intensity grows) available to managers by switching investment to opportunities which present greater risk, the value of intangibles which are intrinsically linked to the firm itself (and do not have value once the firm is no longer a going concern) and the incapacity to take into account the 'dark side' of intellectual capital (i.e. the intellectual liabilities) and, on the basis of these arguments, we theorise that, as R&D intensity increases, lenders are likely to have greater demand for further (diverse) information beyond that on R&D assets in themselves

(considered in the previous section to be of interest to shareholders). In situations like that for Italian listed companies, where companies' dependence on lenders is high (high leverage), the incentive becomes very strong for owner-managers to seek to satisfy that demand by disclosing information on other aspects of the firm's operations which may interest lenders, given that they might reduce the value of these lenders' claims . Therefore, our hypothesis is:

H3: Firms with higher R&D intensity make more disclosures of information to lenders.

When earnings are less useful, it is likely that disclosure of additional information, particularly which concerns the financial leading indicators, can provide lenders with the information they need. Our prediction that firms will make more disclosures when current earnings are less informative is also extended to lenders. Since, a great lack of informativeness is characteristic of negative earnings, we hypothesise that:

H4: Firms reporting operating losses make more disclosures of information for lenders.

3. Method: sample selection, variables and measurements, descriptive and univariate statistics and the regression model

Our sampling data was drawn from the information that firms provide to stakeholders in their annual reports. Although the annual report is only one major means of corporate reporting, it serves as a good proxy for the level of corporate disclosure provided by a firm, because annual report disclosure levels are positively correlated with the amount of disclosure provided via other media (Lang & Lundholm, 1993). Annual reports can thus be considered to be one of the most important sources to capture corporate information disclosures.

We use two databases to carry out the analysis: the AIDA and Datastream databases. A method was adopted to identify firms listed on the Italian stock exchange that might be useful in testing the formulated hypotheses. To choose firms for the sample, we used data and the "filter" functions from the AIDA database. This database was used just to select the companies. Financial and insurance companies were excluded. All of the companies remaining were ordered according to the size of the ratio between average values of R&D capitalised on balance sheet (be more precise, under IAS 38 only assets arising from "development" must be capitalized, whereas, when it is incurred, expenditure on research will be expensed in the income statement) and turnover as revealed for the years 2008, 2009, 2010 and 2011. Only companies above the median on

the list were chosen for the subsequent phase. These companies constituted 50% of listed Italian non-financial and non-insurance companies with higher R&D asset values (percentualised with respect to their turnover). Not all of the companies could be included in our sample given that it emerged from a manual analysis of their annual reports that some of them had presented incomplete information regarding R&D costs for one of the four years we observed. At the end of these phases, only 39 firms could be considered useful for the following investigation. The data for each firm was gathered from the annual report, for each of the four years covered by the period 2008–2011. Therefore, the sample comprised a panel of 156 observations (39 firms over four years).

The financial and non-financial data in the annual report needed for the statistical tests was collected manually from the annual reports of the sample firms. These were available both on the Italian stock exchange internet site and in the "investor relations" section of certain corporations' websites. Finally, the Datastream database was used to collect the firm-specific data of stock market values.

Dependent variables

To test hypotheses H1 and H2, we study a disclosure index relative to Research and Development (RD.INF variable); while to test hypotheses 3 and 4, we study a disclosure index relative to information for lenders (FIN.INF variable).

We calculate the disclosure index relative to Research and Development (RD.INF variable) as García-Meca *et al.* (2005) did, in other words, we give a score of one to each item disclosed beyond the set of items considered as communicable by the firm from an established list (Table 1). Therefore, each index is the percentage of the actual score revealed to the total score that the company may communicate. This method has often been applied to measure the release of voluntary information in annual reports, for instance by Adrem (1999).

With regard the disclosure index relative to information for lenders (FIN.INF variable), we used the voluntary disclosure instrument developed by Meek *et al.* (1995) as well as the teachings of Smith and Warner (1979), already cited in the framework, postulating that four categories of agency conflicts arise between debt holders and equity holders to measure the extent of voluntary disclosure by companies. The items of voluntary disclosure items, which this study adopts, are listed in Table 2. In particular, voluntary disclosure of information for lenders for each firm was calculated by giving a score of one to each item disclosed over the set of items considered as communicable by the firm from the established list (Table 2).

Table 1. List of the items used to measure disclosure index relative to R&D (RD.INF)

Goal, objective of R &D
Patents and licenses acquired in the course of innovative R&D activities
Future projects regarding R&D
Implementation, continuation, or termination of R&D projects
Basic research
Product design/development
Patents pending
Relation with current innovation *(e.g.* strategic new initiative, enhancement of existing technology)
Form of R&D venture *(e.g.* alliance with other firms, contracting with government or other firms)
Human capital and details on research teams
Time frame of the innovation *(e.g.* years to complete)

Table 2. List of the items utilised to measure disclosure index relative to financial information for lenders (FIN.INF)

Policies relative to dividend payments
Amount of financing or spending that is required as part of the plans and strategic projects undertaken
Investment risks
Qualitative comments on profitability
Liquidity ratios
Restatement of financial information
Statement of strategy and objectives – financial
Impact of strategy on current results
Impact of strategy on future results
Forecast of cash flow
Value added data
Value added ratios
Qualitative value added information

Independent variables

We also use:

- RD.INT = R&D intensity, the ratio of R&D expenditure to sales;
- LOSS = a dummy variable equal to 1 if net income before extraordinary items is negative, and 0 otherwise.

Our hypotheses predict a positive coefficient on RD.INT (H1 and H3) and LOSS (H2 and H4).

Control variables

We selected control variables on the basis of prior studies into voluntary disclosure. Therefore, we use:

- SIZE, large firms are likely to provide more information because of investors' demand for information, lower average costs of collecting and disseminating information and increased demand for outside capital (Hossain *et al.*, 1995). We calculate SIZE as the natural logarithm of the total amount of assets at the end of fiscal year

- LEV, firms with high debt levels are expected to incur higher monitoring costs. As a consequence, managers of high debt companies might try to reduce these costs by disclosing more information in the annual reports (Ahmed and Courtis, 1999). Therefore, we calculate leverage as the total amount of debt over the total book value of equity.

- ROE, companies with high profitability could have incentives to make more corporate disclosures (Raffournier, 1995) because doing so would underscore their good performance to investors. Following Malone *et al.* (1993), Raffournier (1995), Gul and Leung (2004), and Garcıa-Meca and Martınez (2005), we use return on equity as a measurement of performance.

- M/B, it is market-to-book ratio (growth) measured by the ratio of market value to book value of equity. High growth firms use voluntary disclosures as a viable method for bridging a potential information gap due to higher asymmetry between managers and investors.

Table 3. The descriptive statistics for disclosure indices relative to R&D and financial information

Year 2011	Mean	Median	S. D.
FIN.INF	63.12%	61.58%	12.32
RD.INF	22.46%	33,33%	15.32
Year 2010	Mean	Median	S. D.
FIN.INF	59.22%	53.84%	10.69
RD.INF	21.16%	16.66%	14.39
Year 2009	Mean	Median	S. D.
FIN.INF	55.13%	53.84%	11.28
RD.INF	17.66%	16,66%	15.11
Year 2008	Mean	Median	S. D.
FIN.INF	71.78%	69.23%	12.69
RD.INF	23.34%	33.33%	15.97

Descriptive and univariate analysis

In table 3, we report the descriptive statistics of the extent of information revealed in annual reports. For example, we note that, in 2011, firms voluntarily disclosed, on average, information about 63.12% of the items relative to information for lenders. Instead, only 22.46% of the items relative to RD were disclosed by the listed companies included in the sample.

Table 4 shows certain significant correlations. RD.INF with ROE, RD.INF with M/B, RD.INT with M/B, LOSS with FIN.INF and FIN.INF with SIZE are significantly correlated ($p < 0.05$). LEV with FIN.INF, RD.INT with RD.INF and RD.INT with FIN.INF are strongly correlated ($p < 0.01$). FIN.INF with M/B, RD.INF with SIZE and FIN.INF with ROE are weakly correlated ($p < 0.1$).

Table 4. Correlation matrix

variables	1	2	3	4	5	6	7	8
RD.INF	1							
FIN.INF	0.099	1						
RD.INT	0.199**	0.213 **	1					
LOSS	0.081	0.171 *	0.051	1				
SIZE	0.113 †	0.159*	0.037	0.051	1			
LEV	0.034	0.229**	0.064	0.019	0.013	1		
ROE	0.141*	0.109†	0.071	-0.041	0.052	0.033	1	
M/B	0.153*	0.108†	0.163*	-0.033	0.058	0.029	0.023	1

Notes: Pearson's product-moment correlation coefficients.
*N = 156; 1-tailed: † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$*

The regression models

We estimate two linear regressions by ordinary least squares. The first linear regression is on the disclosure index of information about R&D (RD.INF variable) and will test H1 and H2. The second linear regression is on the disclosure index of information about information (FIN.INF variable) and will test H3 e H4.

Regression analysis of disclosure indexes

In "model 1", we carry out the analysis on the basis of the following multiple-regression:

[Model 1] $RD.INF = \alpha_0 + \alpha_1 RD.INT + \alpha_2 LOSS + \alpha_3 SIZE + \alpha_4 LEV + \alpha_5 ROE + \alpha_6 M/B + \varepsilon$

Table 5. Model 1: results of regression analysis of RD.INF

Standardised regression coefficients are displayed in the table. N = 156	Model I
Control Variable	
SIZE	0.871*
LEV	0.354
ROE	0.412
M/B	0.975*
Independent Variable	
RD.INT	0.749**
LOSS	0.386
R^2	0.112
Adj R^2	0.076
Fsign	3.119**

*Note: **, *, indicate significance at 0.01 or 0.05 level, respectively.*

Table 5 presents the full regression results (model 1). The regression produces an adjusted R^2 of 0.076, which shows that a moderate percentage of the variation in the disclosure about R&D can be explained by linear variations of the variables within this model. From among the control variables, the SIZE variable is significant at the 5% level. The positive coefficient indicates that larger companies disclose more R&D information. This result is consistent with empirical evidence on voluntary disclosure according to which larger companies disclose more voluntary information about R&D than smaller companies (Arvidsson, 2003). According to the univariate findings, the market-to-book ratio (M/B) variable is found to be significant in the multivariate regression results (at the 5% level). Leverage (LEV) has not a significant impact on the extent of the disclosures about R&D. This result is consistent with other findings suggesting that the relationship is not significant (e.g. Giner, 1997; Ho and Wong, 2001; Ferguson *et al.*, 2002; Arvidsson, 2003).

With regard the independent variables, our hypotheses predict a positive coefficient on RD.INT (H1) and LOSS (H2). However, only RD.INT has a significant impact (at the 1% level) on the extent of the disclosure of R&D, therefore H1 is supported. On the other hand, no significant impact (of at least 5%) is registered for LOSS, therefore H3 is not supported.

The model is fit since *Fsign* is 3.119, significant at the 0.01 level.

In order to test our model, we measured the variance in the inflation factor (VIF) of each independent variable in the regression model. VIF values were found to be equal to 2.1, therefore the absence of multicollinearity is confirmed.

Finally, we test the results of the multiple OLS regression analysis by using the Breusch-Pagan test (Breusch and Pagan, 1979). The Breusch–Pagan test is used to test for heteroskedasticity in the linear regression models. The residuals are estimated and after this, an auxiliary regression analysis of the squared residuals is carried out on the independent variables. The results of these auxiliary regression show that the null hypothesis of homoskedasticity can be accepted in the model, both on the basis of the F-Statistic and on the basis of the test statistic $N \times R^2$.

In "model 2", we carry out the analysis on the basis of the following multiple-regression:

[Model 2] $\quad FIN.INF = b_0 + b_1 RD.INT + b_2 AGE + b_3 SIZE + b_4 LEV + b_5 ROE + b_6 M/B + \varepsilon$

Table 6 presents the full regression results (model 2). The regression produces an adjusted R^2 of 0.097. It shows that a percentage of 9.7% of the variation in the disclosure of information for lenders can be explained by linear variations of the variables within this model. The SIZE variable is significant at the 5% level. Finally, more significant effects are noted for M/B and LEV variables ($p < 0.01$).

With regard the independent variables, our hypotheses predict a positive coefficient on RD.INT (H3) and on LOSS (H4). Both of the variables are found to have a significant impact on the extent of the disclosure of additional information for lenders. In particular:

- RD.INT is significant at the 1% level, therefore H3 is supported
- LOSS (significant at the 5% level), therefore H4 is supported

The model is fit since *Fsign* is 3.761, significant at the 0.01 level.

In order to test our model, we measured the variance in the inflation factor (VIF) of each independent variable in the regression model. VIF values were found to be equal to 2.7, therefore the absence of multicollinearity is confirmed.

Finally, we test the results of the multiple OLS regression analysis by using the Breusch-Pagan test. The results of this test show that the null hypothesis of homoskedasticity can be accepted in the model, both on the basis of the F-Statistic and on the basis of the test statistic $N \times R^2$.

Table 6. Model 2: results of regression analysis of FIN.INF

Standardised regression coefficients are displayed in the table. N = 156	Model 2
Control Variable	
SIZE	0.511 *
LEV	0.619 **
ROE	0.197
M/B	0.591**
Independent Variable	
RD.INT	0.619 **
LOSS	0.201 *
R^2	0.132
Adj R^2	0.097
Fsign	3.761 **

*Note: **, *, indicate significance at 0.01 or 0.05 level, respectively.*

4. Discussion and conclusion

As revealed in the literature, voluntary disclosures can have some disadvantages for the company, especially in terms of the costs of preparing and disseminating additional information.

Voluntary disclosure can also put a firm at a competitive disadvantage due to increased competition. On the other hand, more voluntary disclosures are also seen to improve stock performance (Healey *et al.*, 1999) and produce a higher stock price correlation with future earnings (Gelb and Zarowin, 2000).

The decision to consider R&D was not casual, but suggested by the fact that R&D is the main contributor to information asymmetries between financiers (shareholders and lenders), who provide funds, and managers, who make the operating decisions.

We looked for theories identifying possible information which it is opportune to disclose in order to reduce informative asymmetries. We found that opposing areas of literature made contributions which were suited to our aims:

• On the one hand, the literature refers to dissatisfaction with regard the limited information (about R&D) included in financial statements and, therefore, encourages further voluntary disclosure of information about R&D. Therefore, we measure the information that managers voluntarily provide about R&D;

• on the other hand, the literature denies that lenders are interested in information about R&D, suggesting that they look for more information than just that on intangibles. Therefore, we measure the voluntary disclosure of such more information.

We hypothesised that the benefits that firms gain from voluntary disclosure increase when investments in R&D assets grow (H1 e H3) and when earnings are negative (H2 e H4). Looking at the stakeholders to whom corporate communication is directed, hypotheses H1and H2 refer to shareholders, while hypotheses H3 and H4 refer to lenders. Since the effects of disclosure on competitive disadvantage "are complex and difficult to predict" (Guo *et al.*, 2004, p. 323) and the quantifying of competitive disadvantage in terms of models is particularly complicated, we follow the line of reasoning made by Cooke (1989), according to which, when a firm chooses to make voluntary disclosures, it can reasonably be assumed that the benefits are perceived of as exceeding the costs.

From a valuation (or shareholders) perspective, which emphasises dissatisfaction regarding information about R&D included in financial statements, we elaborated:

• hypothesis (H1), according to which firms with higher R&D intensity make more disclosures of R&D, since the value created by R&D which is not reflected in balance sheet measurements increases;

• hypothesis (H2), according to which firms that report losses make more disclosures of R&D, since negative earnings are less useful for evaluating intangible assets such as R&D.

From the prospective of lenders, who are generally only willing to lend to the firm to the extent that it has tangible assets because these assets typically retain much of their value in the event of bankruptcy/liquidation, we elaborated:

• hypothesis (H3), according to which as R&D (to which higher levels of informative asymmetry are associated) intensity increases, lenders will look for additional information about the firm operations (not strictly linked to R&D assets), particularly those concerning the financial leading indicators. In conclusion, the hypothesis is formed that firms with higher R&D intensity make more disclosures of information which will satisfy lenders informative needs.

• hypotheses (H4) that in firms which make losses, voluntary disclosure may make up for a lack in financial information in annual reports, providing lenders with the further information they require.

To test our hypotheses, we analyse a panel of 156 observations (39 firms over the four years from 2008 to 2011). The data for each firm was gathered from annual reports of sampled firms which were also listed on the Italian stock exchange in Milan. The findings support H1, H3 and H4, while H2 is not supported.

Our analysis shows that firms find it convenient to make voluntarily disclosures of both information about R&D assets (H1) and information for lenders (H3). This means that the intensity of R&D positively influences the management disclosure of additional information (in annual reports) about R&D for shareholders and other information for lenders. H4 is also supported and this means that the lack of earnings has an impact on disclosure of additional information for lenders. Lenders base their decisions about giving credit on information from the income statement and use that information to forecast future revenues, earnings, and cash flows. Our analysis confirms that lenders have greater demand for additional information to supplement the information on earnings in the event of losses. The opposite occurs in the shareholders' prospective, given that H2 is not supported by this analysis. Therefore, for shareholders, the lack of earnings does not mean that the income statement loses its usefulness in assessing firm value. It is likely that the approaches to equity evaluation which rely on information from the income statement will work well in evaluating companies, at least from the shareholders' point of view, even for firms with substantial R&D spending. This result is consistent with that which Penman (2007) demonstrated, i.e. that approaches based on income statement work well in evaluating companies, even those for which relatively large amounts of value are attributable to intangibles

Our study is not without its limitations. The models employed are only capable of explaining a part of the complexity of the entire phenomenon. In particular, the full models in Table 5 and 6, although statistically significant (p< 0.01), only explain, respectively 7,6% of the variance of the "voluntary disclosure about R&D" phenomenon and 9.7% of the variance in the "voluntary disclosure of information for lenders" phenomenon. Indeed, we need to bear in mind the fact that voluntary disclosure are complex phenomena and that the types of information we used (listed in tables 1 and 2) only represent a limited part of the variables affecting the behaviour of managers who voluntarily decide to provide additional information for the benefit of shareholders and lenders. Finally, the data for this study were gathered in Italy. Therefore, special attention should given when generalising about other national contexts on the basis of my discoveries.

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