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Value-relevance of expensed and capitalized intangibles –  
Empirical evidence from France

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# **Value-relevance of expensed and capitalized intangibles – a French survey**

## **Abstract**

Significant difference exists between the market value and book value of firms. It could be attributed to the fact that intangible assets are not reflected in the financial statements. Our results indicate a statistical association between the “capitalized goodwill” and the market-to-book ratio, but do not indicate any statistical link with the “expensed intangible intensity” nor the “capitalized intangible-intensity”.

These results support and contradict, for a part, the explanation on the loss of value relevance of financial information, which could be due to the non-recognized intangibles in financial statements. However, the differing French and American accounting treatments of intangible expenditures may explain why these expenses are not taken into account by French capital markets when estimating the value of companies.

**Keywords:** Intangible intensity, Market-to-Book ratio, Value-relevance, Goodwill, Capital markets, Ohlson model

## **1. Introduction**

We have investigated the possible explanations for differences between the market value and book value of a company. Significant differences between the book value and the market value of companies, particularly in high-tech industries, suggest that the financial markets take into consideration certain "elements" which do not appear in financial statements. Many of these elements are presumed to be intangible assets. Our task is to see whether differences in valuation stem from the inability of current accounting rules and practices to provide reliable information on firms' capacity for future wealth creation, in an environment where technology plays an increasingly important role. We propose the hypothesis that this difference can be attributed to the fact that intangible assets are not reflected in financial statements.

First of all, we constructed four indicators of "expensed intangible-intensity" of French firms by sending out a questionnaire. Because French accounting rules allow to capitalize some intangible expenditures and goodwill, we have also built two indicators of "capitalized intangible-intensity". We then tested the association between those indicators and the difference that exists between the book value and the market value of equities, as measured by the market-to-book ratio. Our sample covered a six-year period and comprised 63 French companies listed on the Paris stock exchange.

Our results indicate a statistical association between the "capitalised goodwill" and the market-to-book ratio, but do not indicate any statistical link between the "expensed intangible intensity" nor the "capitalised intangible-intensity" and the market-to-book ratio.

Because of the relevance of accounting goodwill, the results of this study should be of interest to standard-setters in charge of developing relevant disclosure standards for intangible assets (e.g. IAS 38). They should also interest analysts and creditors seeking to evaluate firms' intangible expenditures, executives involved in designing intangible disclosure strategies, and researchers exploring the issues on intangibles.

The paper is organized as follows. Section 2 describes the theoretical basis of our research question, How can we explain the difference that exists between the market and book value of firms? Then section 3 describes the research design of our study, while section 4 provides statistical analysis and the results. Section 5 summarizes the conclusions of the study.

## **2. Theoretical basis**

Most studies of intangibles and capital markets take as their starting point a perceived decrease in the value relevance of financial information. This study follows that line, and stands at the meeting point of two fields of accounting research: the changing value relevance of earnings and book value, and the study of intangibles.

In the history of accounting theory, the information content of accounting earnings has been a major strand of research, begun by Ball and Brown (1968) and Beaver (1968). The question of the relevance of earnings is highly important for users of financial statements but also for researchers, accountants and standard-setters. Earnings are widely considered to be the primary information provided by the financial statements.

According to Lev (1989), the main lessons to be learned from this strand of research are:

- The correlation between earnings and market returns is very low, and in some cases negligible. Furthermore, the nature of the relationship between returns and earnings shows considerable instability over time. These conclusions suggest that the annual and quarterly accounting income is of very limited use to investors.
- Changes in theories and methodologies, made to improve the relationship between income and returns, have been only of little help in understanding how and to what extent the stated earnings are useful as information for investors.
- The possibility that this weak association might be due to a lack of quality in the information reported is an important consideration, even though there are other possible explanations, for example poor specification of the earnings/stock return ratio, or the irrationality of investor behaviour.

Faced with the declining usefulness of accounting earnings, research has identified four types of factor that could explain the changing relevance of earnings and book values. They are:

- The increasing importance of service and high-tech companies, which invest in intangible items,
- The frequency and size of non-recurring items,
- The impact of negative income, and
- The rising number of small companies on the American database “Compustat”.

For the last ten years, various studies have investigated the first of these factors, examining the relationship between intangibles and financial markets (see, Table 1). They have mainly covered companies listed in the USA, and have taken a particular interest in R&D and advertising expenses. This article continues in the same vein of research.

## TABLE 1 ABOUT HERE

Table 1 provides a listing of empirical research papers on the value relevance of intangibles. They are classified by sample and period studied, research question, dependant variable, intangible measures used and R<sup>2</sup>. The main results are the following.

Past work has shown that stock markets consider R&D investments as a significant wealth-creating activity. For example, some event studies show a significantly positive investor reaction to announcements of new R&D initiatives, particularly for cutting-edge high-tech businesses (see Chan et al., 1992). This contradicts the theory that investors take a short-term view, at least where R&D is concerned, and shows that for the markets, R&D expenses are seen as a factor that generally increases a company's value.

Other studies have set out to find non-financial indicators of the value of R&D. For example, reference to a firm's patents provides reliable measurement of the value of R&D. Deng et al. (1999) reviewed the capacity of the various indicators based on citation of patents to predict future returns and market-to-book ratios in several R&D intensive sectors. Four of these indicators are significantly associated with future returns and market-to-book ratios. They are: the number of patents granted to a company for a given year; the intensity of citations of a company's existing patents in subsequent patents; a measurement of the "scientific link"; and the intensity of R&D (R&D expenditures/sales).

Until now, the capitalization of expenditures on internally developed intangibles has been considered risky and seen as a source of error for financial analysis. However, some recent research suggests that capitalization of intangibles can in fact provide useful information for

investors. Aboody and Lev (1998) studied the capitalized software development costs between 1986 and 1995 in 168 IT companies. The results were as follows:

- Capitalized software development costs show a positive significant link with stock returns;
- The balance sheet value of capitalized software is in correlation with market prices;
- Capitalized data on software improve predictions of future income.

These results suggest that despite the subjectivity inherent in the capitalization of software development costs, this treatment does provide relevant information for investors.

Lev and Zarowin (1999) studied the relevance of financial information by analysing associations over the period 1977 to 1997 between the market price and stock returns, and the key financial variables such as earnings, cash flows and book values. They show that the association between market prices and financial variables was in continual decline over the period in question. More specifically, their study demonstrates that for firms that increased their R&D intensity between 1977 and 1997, the link between earnings and market prices generally grew weaker, while firms that reduced their R&D intensity saw the link between earnings and returns strengthen.

In addition, Aboody and Lev (1998), Chan et al. (1992) and Lev and Sougiannis (1999), all demonstrate that shares in R&D intensive companies are mispriced, usually undervalued.

In conclusion, empirical research undertaken into R&D shows that (1) the contribution of R&D to productivity and share value is substantial, and (2) the financial markets reflect this contribution in their stock prices. However, although investors are generally quick to take

long-term R&D factors into account, there is some proof that R&D intensive companies are under priced.

Following on from this research, our study proposes to examine the relationship between market-to-book ratio and the intangible intensity of French listed companies. This makes a threefold contribution:

- First of all, no survey of this sort has to our knowledge ever been undertaken on French financial markets. It was therefore necessary to construct our own database prior to the study, concerning intangible expenditure data, and accounting and financial data.
- Secondly, we propose to look at the influence of a broader range of intangible expenditures than R&D and advertising expenses alone. This is partly due to the nature of our sample, which covered several business sectors.
- Thirdly, we are looking at the French environment because we expected different results. Actually French and American accounting treatments of intangible expenditures are not similar and the disclosure of financial information is more recent on the French capital markets. These elements could lead to another issue on the question of measurement and reporting for intangibles in financial accounting.

### **3. Research design**

#### *3.1. Hypothesis*

The review of existing literature suggests that investors perceive intangibles as sources of value for a company, even when they are not included in the book value of the company. It can therefore be assumed that the difference between a company's market value and its book value may result from this non-reflection. This could indicate that the market's valuation of a company is largely based on factors that are not recognized for accounting purposes.



Although there may be other reasons for the difference between the book value and the market value difference, such as under valuation of tangible assets based on their historic value, we believe that the non-recognition of intangibles is one of the major causes. Our research question is thus: "To what extent can we explain the difference between market values and book values?" It is based on the research hypothesis: "A difference exists due to the non-recognition of intangibles in the financial statements".

The financial ratio used, the market-to-book ratio, was chosen mainly because of several empirical studies that have demonstrated the existence of a positive association between book-to-market ratio<sup>1</sup> and future stock returns. Nevertheless issue of the "book-to-market phenomenon" is still under question<sup>2</sup>.

Lev and Sougiannis (1996, 1999) propose a new explanation for the association between book-to-market ratio (BM) and stock returns. Using a sample of 1200 companies they show that low BM (high MB) companies have a large R&D capital, while high BM (low MB) companies have low R&D investment. They also point out that the book-to-market ratio is in fact an approximation of the value of a company's innovative capital, which does not appear in the balance sheet. This capital is valued based on the R&D expenditure of the firms in their sample.

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<sup>1</sup> The book-to-market ratio is the inverse of market-to-book ratio.

<sup>2</sup> The following three explanations have generally been put forward for results relating to the book-to-market ratio: (1) The existence of a risk premium: Fama and French (1993 and 1995) conclude that the higher return to large BM stocks are said to compensate for higher risk, such as the risk of financial distress. (2) Mispricing: it has been suggested that the association between book-to-market and future returns is due to systematic mispricing of shares by investors (Lakonishok et al., 1994; Frankel and Lee, 1995). (3) The selection bias: the book-to-market phenomenon probably results from selection bias affecting empirical tests (Kothari et al., 1994).

The principal hypothesis to be tested in this article is that the market-to-book ratio bears a positive and significant association with companies' intangible-intensity.

### 3.2. *Sample and data collection*

The basic underlying problem for this study lies in the measurement of the intangible-intensity of the companies studied. We therefore constructed two kinds of measures for intangible intensity. The first one tries to capture the intensity of intangible expenditures and is composed of four different ratios. The second one express the intensity of recognized intangible investments, i.e. capitalized intangible expenses, it is composed of two ratios.

“Expensed intangible-intensity”, the first ratio of intangible intensity is defined as follow:

$$\text{Intangible intensity (II)} = \text{Intangible expenditures} / \text{Sales}$$

The definition of intangible expenditures is the following: Intangible expenses are those necessary to maintain the value of current intangible assets in addition to those necessary for the creation of new ones. One of the contributions of this study is the inclusion of all kind of intangible expenditures of a company, not only research and development and advertising expenses as in most of the previous surveys. We have collected amounts of intangible expenditures by sending out a questionnaire<sup>3</sup>.

Then intangible intensity indicator has been split into three ratios in function of the nature of intangible expenditures (see Table 2 below):

- a ratio of research and development intensity (RDI),
- a ratio of training expenditure intensity (TRAINI), and
- a ratio of advertising intensity (ADVI).

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<sup>3</sup> See appendix 1

“Capitalized intangible-intensity”, we have measured the “capitalized intangible-intensity” with two ratios (see Table 2 below).

- The first one compares recognized intangible assets with total assets, it is called “capitalized intangible” (CI).
- The second one puts capitalized goodwill together with total assets (GW).

French consolidated statements allow to capitalize some purchased and internally developed intangibles, like R&D costs, goodwill (only purchased goodwill), brands, licenses, patents, etc. (Jeny-Cazavan and Stolowy, 2001). Their activation is submitted to certain conditions and recognition criteria.

Descriptions on the variables used for our study are reported on Table 2.

#### TABLE 2 ABOUT HERE

In France, the income statement presentation usually presents a classification of expenses by nature rather than by function<sup>4</sup>. R&D expenses, like advertising expenses, are not therefore shown in French Group financial statements, in contrast to the situation under US GAAP. All intangible expenditure is distributed between the various operating expenses. For example, software development costs will be divided between personnel costs for the employees who worked on the project, purchases of raw materials for any components, and other relevant items in the same way.

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<sup>4</sup> Ding, Stolowy and Tenenhaus (2002) show that only 32 French companies, in the top 100, used the presentation by function in 1998.

We sent out a questionnaire (see, appendix 1) to find out the amount of intangible expenditures for the companies in the sample, and to build up the database necessary for our empirical study.

The initial population of our sample comprised 154 companies listed on the first capital market, monthly settlement (*premier marché*) and 316 on the second capital market (*second marché*), that is to say a total 470 industrial and commercial companies. We did not include companies in the banking and insurance sector, so as to retain homogeneous accounting principles.

The questionnaire was sent to the finance departments of these 470 companies. We asked them to state the amount of intangible expenditures over a 6-year period (1994-1999). This covers: research and development expenses, training expenses, advertising and promotional expenses, software-related expenses, license fees and royalties paid, and other intangible expenditures.

Once the questionnaires had been returned, our sample consisted of 51 companies (or 11 % of the initial population). Then we have extended our sample in gathering information on R&D expenditures in annual reports and in Worldscope database. Finally our sample is composed of 63 companies, which represents 13.5 % of the initial population. 73 % of these companies are listed on the first market and are thus mostly very large companies (see Table 3 below). In fact, 62 % of them are included in the SBF 250 (a share index covering the 250 largest market capitalisations on the Paris Stock Exchange), and 32 % are in the CAC 40 (an index covering the 40 largest market capitalisations).

TABLE 3 ABOUT HERE

The response rate to our questionnaire (11 %) could in part be due to the fact that the groups in our initial population rarely consolidate their data on intangible expenditures. Accounting information on intangible expenditures does exist at the level of the subsidiaries, but is only rarely reported specifically to the parent company. This data is "lost" in the operating expenses. We consider this phenomenon to be independent of the sector concerned, since our sample covers several different sectors: the automobile industry, pharmaceuticals, electricity and electronics, IT, manufacturing, technology, and more. We have tested the adequacy of the responses in comparing the amount of R&D expenses disclosed in the questionnaire with the amount of R&D expenses disclosed in financial statements (when it was available), and we obtained a good level of adequacy.

#### **4. Statistical results**

##### *4.1. Descriptive statistics*

Before examining the existence of a relationship between the intangible intensity ratio and the market-to-book ratio, it is vital to look at the changes in these two ratios for all of our sample over the period studied.

To do this, we applied first the distribution of both ratios (market-to-book ratio and intangible intensity) to our sample and secondly we applied the distribution of market-to-book ratio and all the intangible intensity ratios (expensed intangible intensity ratios and capitalized intangible intensity ratios).

Descriptive statistics are presented successively for the whole years (table 4), then for each year (table 5). Figures 1, 2 and 3 then illustrate the changes in the different intangible intensity ratios and the market-to-book ratio over the period studied.

#### TABLES 4 & 5 ABOUT HERE

The companies in our sample have a market value that is on average 2.5 times higher than book value over the period as a whole, with intangible expenditure representing an average 6 % of sales revenues. We are thus looking at the same phenomenon as that observed on the US financial markets, where there is a difference between the book value and market value, in favour of the stock market value.

It can also be seen that over the period concerned, the mean market-to-book ratio increased regularly (except for 1995), rising from 2.438 in 1994 to 3.631 for the sample. The market value of the companies in the study thus moved further and further away from their book value, up to 3 times higher.

Changes in the intangible intensity ratio, meanwhile, do not follow quite the same pattern in the total intangible intensity, the expensed intangible intensity and the capitalized intangible intensity. The total intangible intensity ratio (figure 1) apparently develops in parallel to the market-to-book ratio, the mean rising from 5.4 % in 1994 to 6.9 % in 1999. The R&D intensity ratio (figure 2) and the capitalized goodwill intensity (figure 3) seems to change in parallel to the market-to-book ratio too. However training intensity, advertising intensity and capitalized intangible intensity appear to remain more or less constant over time in relation to sale (figure 2 and 3).

These data appear to indicate that companies' intangible intensity, R&D intensity and capitalized goodwill intensity develop in a similar way to their market-to-book ratio, as illustrated in graphic form in figures 1, 2 and 3. This supports our theory that there is a relationship over time between the intangible intensity and market values, and more precisely between some determinants of intangible intensity and market values.

FIGURES 1,2 & 3 ABOUT HERE

#### *4.2. Intangible intensity and market-to-book ratio: univariate analysis*

Having demonstrated that the book values of the companies in the sample has fallen steadily further behind their market value, we now want to test any existing relationship between the market-to-book ratio and our measure of the intangible intensity of French listed companies.

The difference between the book value and the market value of a firm appears to be a good indicator of the value attributed to intangible assets by the financial markets. We think that the more intangible intensive a company is, the more investors will tend to attribute to that company a market value higher than its book value. Since intangible expenditure is not recognized in the accounts as investments, we propose the hypothesis that these companies are underestimated in their financial statements.

First, we sought to discover whether a statistically significant link existed between companies' intangible intensity ratios and their market-to-book ratios. We therefore examined the Pearson correlations between the two ratios, taking into account several time differences. A matrix was constructed for correlations between:

- the market-to-book ratio at time  $t$ ,  $MB_t$ ,
- and the intangible intensity ratio at time  $t-\tau$ ,  $\Pi_{t-\tau}$ ,

– where  $t$  ranges from 1994 to 1999, and  $\tau$  is successively a number from 0 to 5.

We tested the significance of these Pearson correlations by Student's  $t$  statistical test. Table 6 below reports the results.

#### TABLE 6 ABOUT HERE

From this table, it is visible that for our sample, and over the period covered, there is no significant correlation between the market-to-book ratio and the intangible intensity ratio. There are several possible reasons for this result.

First of all, there is the possibility that the construction of an intangible intensity ratio covering a range of intangible expenditure (R&D, training, advertising, software, etc) may introduce a bias. This measure could actually be wrong because it aggregates very different kinds of expenses. For this reason, we constructed three other ratios measuring R&D intensity, training intensity and advertising intensity (see Table 2 above).

We then applied the same methodology to examine the relationship between these ratios and the market-to-book ratio, over the same period and for the same sample. The results are reported in tables 7, 8 and 9.

#### TABLES 7, 8 & 9 ABOUT HERE

In the same way as for the overall intangible intensity ratio, the results for the R&D intensity, training intensity and advertising intensity ratios show that there is no statistical relationship between the market-to-book ratio and those intangible expenditures by companies.



It can thus be concluded that the non-existence of a statistical link between the intangible intensity of companies measured by the all-inclusive intangible intensity ratio is not due to a bias in the construction of the ratio, since the same results occur when using R&D, training or advertising expenditures alone.

Does this mean that on the French markets, the rise in the market-to-book ratio and the fall in value relevance of accounting data are unrelated to the non-recognition of intangibles in accounting terms? We do not think so.

Our research question is to see if the non-recognition of intangible investments could explain the rise of market-to-book ratio. Our earlier results could be explained by the fact that our intangible expenditures (gathered by questionnaire) are an information not available for investors. This is why, we have also studied the relation between the market-to-book ratio and our two measures of capitalized intangible intensity, which are intangible assets and goodwill recognized on balance sheet compare with total assets. These two ratio are actually available for any investors. We then applied the same univariate analysis to examine this relation over the same period and the same sample. The results are reported in tables 10 and 11.

TABLES 10 & 11 ABOUT HERE

In the same way as for the other intangible intensity ratios, the results for the “capitalized intangibles” show that there is no statistical relationship between the market-to-book ratio and the recognized intangible assets. On the other hand capitalized goodwill shows some positive and significant correlations with market-to-book ratios. This result leads to the following conclusion: non-individualized intangible assets (represented by goodwill) seem to be more relevant for financial analysts on French Stock markets than individualized intangible assets.

The financial information driven by capitalized goodwill seems to be more reliable than others for investors.

In contrast to other earlier surveys, carried out on US stock markets, this study covers French companies, listed on French markets, and there is a fundamental difference in the way information on intangibles is presented in the two national accounting systems. While it is true that in France, as in the USA, most intangible expenditure is charged to expenses for the year, except for certain software development costs (in both countries) and certain R&D expenses (in France only, subject to strict conditions), there is a sizeable difference in the income statement presentation of this expenditure. Although under US GAAP, intangible expenditure such as R&D expenses and advertising expenses are not considered as investments, they are nevertheless identifiable in the income statement and can be a useful element of information for investors. However, in French accounting principles, there is no separate disclosure of such expenses in the income statement, and the information is not easily therefore available to investors<sup>5</sup>.

#### *4.3. Multivariate analysis*

Having demonstrate that the capitalized goodwill shows a significant and positive correlation with market-to-book ratio, we now want to test this relation with a multivariate linear regression in controlling for size, growth, profitability and risk factors. Luskarten and Thomadakis (1987) showed that the cross-sectional relation between the market value of the firm and a variety of companies characteristics is dependent upon market conditions. Such features as advertising and R&D intensity, market share and the rate of growth can impede or facilitate entry or exit, depending upon the direction of investor expectations. Similarly,

recent empirical work suggests there may be an overall market risk factor plus stock-market risk factors related to firm size and the ratio of book-to-market value (Fama and French, 1993). In our study, stock-price beta is considered as a potentially relevant overall market risk factor which may supplement the valuation effect of tangible assets, among other risk factors.

Our model was motivated by recent empirical work on earnings models, in which the market value of the company is regressed on alternative measures of earnings, and other relevant information (Aboody and Lev, 1998, p. 172; Zhao, 2002, p.158). as we would test the relevance of intangible intensity on market-to-book ratio, we have replaced market value by market value on book value (cf. Deng, Lev and Narin, 1999, p. 25).

First, we have tested the two following regressions (1) and (2), where market-to-book is, accordingly, a function of earnings to book value and other information, represented by the various intangible intensity measures and control variables. Equation (1) includes total intangible intensity ratio and both measures of capitalised intangible intensity, and equation (2) includes RDI, TRAINI and ADVI ratios instead of II ratio because of their co-linearity (see Table 12).

TABLE 12 ABOUT HERE

$MB_{i,t} = a_0 + a_1 II_{i,t} + a_2 CI_{i,t} + a_3 GW_{i,t} + a_4 MV_{i,t} + a_5 GR_{i,t} + a_6 ROE_{i,t} + a_7 BETA_{i,t} + e_{i,t} \quad (1)$
$MB_{i,t} = b_0 + b_1 RDI_{i,t} + b_2 TRAINI_{i,t} + b_3 ADVI_{i,t} + b_4 CI_{i,t} + b_5 GW_{i,t} + b_6 MV_{i,t} + b_7 GR_{i,t} + b_8 ROE_{i,t} + b_9 BETA_{i,t} + e_{i,t} \quad (2)$

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<sup>5</sup> Even if French companies must report their R&D costs in their management report, it wasn't the case for companies of our sample.

With,

- $YR_{i,t}$ :
- $HTECH_{i,t}$ :
- $MB_{i,t}$  : company  $i$ 's ratio of market value to book value of equity at fiscal year end  $t$ .
- $II_{i,t}, RDI_{i,t}, TRAINI_{i,t}, ADVI_{i,t}$  : the expensed intangible intensities for company  $i$  in year  $t$ .
- $CI_{i,t}, GW_{i,t}$  : the capitalized intangible intensities for company  $i$  in year  $t$
- $MV_{i,t}$  : size of company  $i$  measured as total market value at the end of year  $t$ .
- $GR_{i,t}$  : rate of growth for company  $i$  measured as change in sales between  $t$  and  $t-1$ .
- $ROE_{i,t}$  : the earnings-to-book ratio of company  $i$  in year  $t$ .
- $BETA_{i,t}$  : risk, CAPM-based beta of company  $i$ .

Then we have selected variables with a combining forward and backward regression. and we have obtained our final model, regression (3).

$$MB_{i,t} = c_0 + c_1 GW_{i,t} + c_2 MV_{i,t} + c_3 GR_{i,t} + c_4 ROE_{i,t} + c_5 BETA_{i,t} + e_{i,t} \quad (3)$$

Table 13 provides the regression estimates for our final model, and results for equation (1) and (2) are presented in tables 14 and 15.

TABLES 13, 14 & 15 ABOUT HERE

Our results confirm that neither expensed intangible intensity ratios nor capitalized intangible ratio are useful for investors. The regression coefficients are not significant. But we find that capitalized goodwill shows a positive and significant correlation with market-to-book ratio for our sample and in controlling for size, growth, profitability and risk of the firms. Our controlling factors present significant and positive association with market-to-book ratio as in previous empirical studies. Accounting goodwill seems to be a value relevant information for

investors and it captures the intangible intensity of the company on the French capital markets.

## **5. Conclusion and directions for future research**

In this article, we have tested the hypothesis that the differences between the market value and book value of a company could be due to the non-recognition of intangible assets in financial statements.

The conclusions we have reached are as follows:

Following the same pattern as the market-to-book ratio on US stock markets (Lev and Zarowin, 1999), this ratio has also undergone a considerable rise over the period and for the sample concerned by this study. This development not only represents a change in the economic value creation process; it also demonstrates the fall in relevance of traditional financial measurements.

Finally, in contrast to previous American research, we have shown that there is no correlation between the intangible intensity, R&D, training and advertising intensity ratios or capitalized intangible intensity (intangible assets / total assets) and the market-to-book ratio. These results are valid only for our sample and the time period studied. Nevertheless, the accounting measure of goodwill shows positive and significant correlations with market-to-book ratio in controlling for other information. Then non-individualised intangible assets, represented by goodwill, seem to be more relevant for investors on French capital markets than individualised intangible assets or intangible expenditures. The financial information driven by capitalized goodwill seems to be more reliable.

A first limitation of our study is thus already clear: the sample is only representative of very large French businesses, rather than all listed companies. However, according to Connolly and Hirshey (1990), firm's size does not appear to influence the relationship between R&D expenditure and the firm's stock value. *“Size alone does not emerge as an important determinant of R&D effectiveness, when it's measured using a market value criterion”*.

However, these initial results for the French market do not fundamentally challenge the influence of intangibles as an explanation for the falling value relevance of traditional financial information. The difference in accounting treatments of intangible expenditures in France and the US (not separately identified in French income statements, separately identified in American income statements) may be the reason why these items are not taken into account by the French markets in their valuation of companies.

This difference in accounting treatment provides a plausible explanation for the fact that our results contradict previous research: it does not mean that these results are invalid. What is now required is to test this hypothesis, by searching in annual reports for the presence or absence of information on intangible expenditures of the firms in the sample, then testing the link between this new variable and the market-to-book ratio.

In view of these preliminary results, therefore, we recommend that businesses should disclose their intangible expenditures, reporting them as an individual item in the income statement at least, since several surveys have shown that there is a positive link between a company's intangible intensity and its value on the markets.

Unfortunately, studies on the French financial markets are for the time being too few, and further research is needed. There would appear to be an urgent need for more stringent testing of the falling relevance of financial information and the explanation of this situation by the intangible phenomenon. It would be interesting to test the relationship between the market-to-book ratio and variables measuring information published by companies on their intangibles, for example, the presence of a separate report on the company's R&D activities or investments in employee training.

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## APPENDIX 1: QUESTIONNAIRE

### EXPLANATION OF COMPANY VALUE

*All data requested concern the consolidated figures.*

*We propose the hypothesis that non-recognized intangible assets can explain the difference between book value and market value. Therefore, the requested items concern the expenses of your company, except for R&D and Software expenditures, for which we wish to know the amount on the balance sheet.*

#### **1. Research and development expenditures**

R&D expenditures are expensed as incurred except in certain conditions.

	1994	1995	1996	1997	1998	1999
R&D expenditures expensed (KF)						
R&D expenditures capitalized (KF)						

#### **2. Training expenses**

	1994	1995	1996	1997	1998	1999
Training (KF)						

#### **3. Advertising, promotion and marketing expenditures**

There are two different accounting treatments for advertising expenditures in France:

- expensed;
- capitalized as Company start-up costs.

	1994	1995	1996	1997	1998	1999
Expensed advertising expenditures (en KF)						

#### **4. Software expenditures.**

There are three different accounting treatments for software in France:

- expensed;
- capitalized as an intangible asset, in account 232 "Intangible assets in progress";
- capitalized as an intangible asset, in account 205 "Concessions and similar rights".

	1994	1995	1996	1997	1998	1999
Expensed software expenditures (KF)						

#### **5. License fees and royalties paid.**

For example: fees and royalties paid for patents, franchises, copyrights, etc.

	1994	1995	1996	1997	1998	1999
Licenses and royalties paid (KF)						

#### **6. Expenses for voluntary certification under quality standards**

	1994	1995	1996	1997	1998	1999
Expenses allocated to quality (KF)						

#### **7. Other intangible expenses**

Please indicate whether any other expenses not already mentioned in the questionnaire contribute to the creation of intangible items for your company. If so, please fill in the table below, stating the nature and amount of the expenses.

	1994	1995	1996	1997	1998	1999

**APPENDIX 2: QUESTIONNAIRE**  
**INDUSTRY GROUP AND COMPANY NAME**

<b>Industry 1</b>	<b>Industry 2</b>	<b>Companies</b>	
<b>Traditional</b>  (50 companies)	<i>Aeronautic civil/Defence (2)</i>	Latécoère Thales	
	<i>Automobile (5) :</i> Auto Manufacturers, Auto Parts & Equipment	Faurecia Michelin PSA Renault Valéo	
	<i>Consumer Goods (14) :</i> Food, Textiles, Cosmetics/Luxury, Other consumer goods	BHV Bic Christian Dior Clarins Danone Grandvision Interparfums	L'Oreal LVMH Marie Brizard S.A. Moulinex Seb S.A. Skis Rossignols S.A. Smoby
	<i>Industrial (22) :</i> Equipment goods, Basic products, Chemistry	Air Liquide Beneteau CNIM Cie de Fives-Lille Coparex International CS Communication & Systems S.A. Etablissement Gantois Gevelot Groupe Guillin Legrand MACC	Pechiney Precia PSB Industries Rocamat Rubis Saint Gobain Schneider Sidel Sté Forges Stéphanoises Sté Elf Aquitaine S.A. Total-Elf-Fina
	<i>Services (7) :</i> Media, Telecommunication, Community Services	Accor Canal + Lagardère Lebon Pinault-Printemps-Redoute Suez-Lyonnaise des Eaux Vivendi	
<b>High-Technology</b>  (13 companies)	<i>Engineering (3) :</i>	Altran Technologies Coflexip SA Compagnie Générale de Géophysique	
	<i>Software (2) :</i> Software development	Atos Origin S.A. Lectra Systèmes	
	<i>Hardware (4) :</i> Technology hardware	Alcatel Bull Radiall STMicroelectronics NV	
	<i>Biotech (4):</i> Biotechnology, Pharmaceutical	Aventis Bourgeois SA Guerbet Sanofi-Synthélabo	

Table 1: Literature review

	Author/Reference <sup>6</sup>	Sample & period	Research question	Dependant variable	Intangible measures	R <sup>2</sup>	Conclusions
1	Connolly and Hirschey, Economics Letters, 1990	390 firms drawn from the 1977 Fortune 500.	The influence of firm size on R&D effectiveness	MV/S : normalized market value (S = sales)	Unexpected patents R&D intensity Advertising intensity	0.6 to 0.8	Size alone does not emerge as an important determinant of R&D effectiveness, when measured using a market value criterion.
2	Chauvin and Hirschey, Journal of Accounting and Public Policy, 1994	2 693 firms 1989-1991	Are accounting goodwill numbers a useful proxy or instrument for the size and duration of economic goodwill?	Goodwill Net Income Market Value	Goodwill Advertising, R&D Intangible assets	0.31 to 0.65	Advertising and R&D exert a positive influence on goodwill. Positive market-value influence of accounting goodwill numbers.
3	Amir and Lev, JAE, 1996	14 cellular companies 1984-1993	Value relevance to investors of financial and non-financial information	Stock price Market-to-book ratio	Earnings, book values, and cash-flows. POPS (a growth proxy), Market Penetration (an operating performance measure).	0.03 to 0.83 0.83 to 0.94	Financial information is largely irrelevant for share valuation. Non-financial indicators are highly value-relevant.
4	Moussu and Thibierge, Research Paper, 1996	1457 European firms 1992	Relevance of an accounting proxy.	Tobin's Q	Capitalized intangibles	0.0	There is no significant linear relationship between Tobin's Q and intangible assets.
5	Collins, Mayden and Weiss, JAE, 1997	115 154 firm-year observations 1953-93	Value-relevance of earnings and book values over time using Ohlson's model.	Market price R <sup>2</sup> (primary metric to measure value-relevance)	Earnings and Book value Time, % of firms in intangible intensive industries, % of firms with negative earnings	0.636 to 0.931	There is little evidence of a systematic change in the value-relevance of earnings and book values over the past 40 years.
6	Aboody and Lev, JAR, 1998	163 software companies, 1987-95	Value relevance of software capitalization	Stock returns, Market price, Future earnings	Capitalized software development costs Software development expenses	0.24 0.57 0.3 0.15	Capitalization-related variables are significantly associated with capital markets variables and future earnings;
7	Deng, Lev and Narin, Financial Analysts Journal, 1999	388 firms (chemicals, drugs, electronics and "others") 1985-95	Companies whose patents are frequently cited tend to be more successful innovators and perform better in capital markets	Future stock returns Market-to-book ratio	4 patents attributes (citations, number, science link, technology cycle time)	0.28 to 0.42  0.79 0.81	Most of the patent attributes are statistically associated with subsequent stock returns and market-to-book ratios.
8	Lev and Sougiannis, Journal of Business Finance and Accounting, 1999	1 200 firms 1975-89	Is the innovative capital of companies the off-balance sheet asset underlying the book-to-market ratio?	Stock returns	Estimation of R&D capital by regression. Book-to-market ratio	0.039 to 0.054	R&D capital is associated with subsequent returns. For firms intensive in R&D, the R&D capital subsumes the book-to-market effect.
9	Lev and Zarowin, JAR, 1999	1977-96	Value relevance of financial information in relation to all available information.	Stock returns Market price	Accounting income Cash-flows Earnings and book value	0.3 0.16 From 0.9 to 0.55	R&D intensity (related to the rate of change of the business) is related to a lower information value of earnings

<sup>6</sup> JAR, Journal of Accounting Research ; JAE, Journal of Accounting and Economics.

Table 2: Variables used

Nature	Label	Name	Definition
<b>Dependant Variable</b>	MB	Market-to-Book ratio	Market value at the end of fiscal year / Book value
<b>Expensed Intangible Intensity</b>	II	Intangible intensity	All intangible expenditures / Sales
	RDI	R&D intensity	(R&D and software expenditures) / Sales
	TRAINI	Training intensity	Training expenditures / Sales
	ADVI	Advertising intensity	(Advertising, licenses and quality expenditures) / Sales
<b>Capitalized Intangible Intensity</b>	CI	Capitalized intangible	Capitalized intangible assets / Total assets
	GW	Capitalized goodwill	Capitalized goodwill / Total assets

All intangible expenditures are defined in the questionnaire (see appendix 1).  
The item "Other intangible expenses" in the questionnaire has never been fulfilled.

Table 3: Sample's characteristics

	Share Index			Market Share	
	volume	%		volume	%
CAC 40	20	32 %	First market	46	73 %
SBF 120	30	48 %	Second market	14	22 %
SBF 250	39	62 %	New market	1	2 %
Others	24	38 %	Others	2	3 %
<i>Total</i>	<i>63</i>	<i>100 %</i>	<i>Total</i>	<i>63</i>	<i>100 %</i>

Table 4: descriptive statistics – all years

	MB	II	RDI	TRAINI	ADVI	CI	GW
N	378	378	378	378	378	378	378
Mean	2,49279	,06085	,04044	,01477	,00564	,06492	,06932
Median	1,76587	,03305	,02251	,00161	,00000	,01830	,02817
Std. Deviation	2,90458	,12805	,05253	,09332	,01590	,10543	,08932

Table 5: descriptive statistics – ratio's evolution

Mean of	MB	II	RDI	TRAINI	ADVI	CI	GW
1994	2,43756	,05418	,03853	,01120	,00445	,05829	,06332
1995	1,63514	,05960	,04002	,01469	,00489	,06248	,06791
1996	2,21128	,05801	,03682	,01557	,00562	,06700	,06586
1997	2,42488	,06062	,03889	,01544	,00629	,06680	,07174
1998	2,61650	,06379	,03965	,01695	,00719	,06748	,07358
1999	3,63138	,06887	,04871	,01474	,00542	,06744	,07353

*Table 6: Pearson Correlation Matrix (intangible intensity)*

	MB94	MB95	MB96	MB97	MB98	MB99
II94	-.031 (,808)	-.104 (,420)	-.111 (,386)	-.065 (,611)	-.098 (,443)	-.064 (,616)
II95		-.103 (,421)	-.133 (,300)	-.097 (,449)	-.117 (,360)	-.086 (,504)
II96			-.131 (,307)	-.099 (,441)	-.109 (,393)	-.069 (,589)
II97				-.102 (,428)	-.110 (,390)	-.069 (,593)
II98					-.099 (,438)	-.057 (,659)
II99						-.046 (,720)

. Pearson Correlation  
 (.) Sig. (2-tailed)  
 \* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).

*Table 7: Pearson Correlation Matrix (R&D intensity)*

	MB94	MB95	MB96	MB97	MB98	MB99
RDI94	,036 (,781)	-.101 (,431)	-.033 (,796)	,017 (,896)	-.056 (,660)	-.025 (,846)
RDI95		-.116 (,366)	-.075 (,557)	-.030 (,817)	-.099 (,440)	-.072 (,574)
RDI96			-.066 (,605)	-.029 (,823)	-.080 (,535)	-.030 (,816)
RDI97				-.034 (,793)	-.073 (,572)	-.024 (,850)
RDI98					-.050 (,695)	,004 (,976)
RDI99						,011 (,929)

. Pearson Correlation  
 (.) Sig. (2-tailed)  
 \* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).

Table 8: Pearson Correlation Matrix (training intensity)

	MB94	MB95	MB96	MB97	MB98	MB99
TRAINI94	-.063 (,621)	-.075 (,560)	-.125 (,327)	-.111 (,386)	-.104 (,418)	-.073 (,571)
TRAINI95		-.078 (,544)	-.129 (,313)	-.117 (,363)	-.107 (,404)	-.076 (,556)
TRAINI96			-.131 (,308)	-.118 (,357)	-.108 (,400)	-.076 (,553)
TRAINI97				-.118 (,357)	-.108 (,400)	-.076 (,554)
TRAINI98					-.108 (,399)	-.076 (,555)
TRAINI99						-.075 (,560)

. Pearson Correlation  
 (.) Sig. (2-tailed)  
 \* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).

Table 9: Pearson Correlation Matrix (Advertising intensity)

	MB94	MB95	MB96	MB97	MB98	MB99
ADVI94	-.043 (,737)	-.003 (,981)	-.059 (,646)	,028 (,827)	,020 (,875)	-.010 (,937)
ADVI95		-.006 (,964)	-.075 (,557)	,011 (,933)	,004 (,972)	-.018 (,891)
ADVI96			-.103 (,421)	-.010 (,937)	-.027 (,835)	-.024 (,852)
ADVI97				-.010 (,939)	-.029 (,823)	-.022 (,865)
ADVI98					-.014 (,911)	-.011 (,933)
ADVI99						-.020 (,876)

. Pearson Correlation  
 (.) Sig. (2-tailed)  
 \* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).

Table 10: Pearson Correlation Matrix (Capitalized Intangibles)

	MB94	MB95	MB96	MB97	MB98	MB99
CI94	-.039 (,764)	,092 (,471)	,108 (,399)	,152 (,235)	,070 (,585)	,087 (,499)
CI95		,120 (,350)	,169 (,186)	,190 (,136)	,098 (,443)	,099 (,439)
CI96			,173 (,174)	,194 (,129)	,133 (,299)	,147 (,250)
CI97				,157 (,219)	,138 (,279)	,178 (,162)
CI98					,130 (,309)	,172 (,178)
CI99						,150 (,242)

. Pearson Correlation  
 (.) Sig. (2-tailed)  
 \* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).

Table 11: Pearson Correlation Matrix (Capitalized Goodwill)

	MB94	MB95	MB96	MB97	MB98	MB99
GW94	-.011 (,931)	,139 (,279)	,282* (,025)	,357** (,004)	,486** (,000)	,448** (,000)
GW95		,070 (,586)	,164 (,199)	,243 (,055)	,365** (,003)	,318* (,011)
GW96			,141 (,271)	,219 (,085)	,318* (,011)	,270* (,032)
GW97				,221 (,082)	,343** (,006)	,347** (,005)
GW98					,398** (,001)	,356** (,004)
GW99						,329** (,008)

. Pearson Correlation  
 (.) Sig. (2-tailed)  
 \* Correlation is significant at the 0.05 level (2-tailed).  
 \*\* Correlation is significant at the 0.01 level (2-tailed).



Table 12: Correlation Matrix of Intangible Intensity variables

	II	RDI	TRAINI	ADVI	CI	GW
II	1,000 (.)	,711** (,000)	,927** (,000)	,263** (,000)	,016 (,764)	-,084 (,102)
RDI		1,000 (.)	,419** (,000)	-,038 (,463)	-,126* (,014)	-,004 (,938)
TRAINI			1,000 (.)	,212** (,000)	,045 (,388)	-,092 (,075)
ADVI				1,000 (.)	,279** (,000)	-,128* (,013)
CI					1,000 (.)	-,127* (,014)
GW						1,000 (.)

N = 378

. Pearson correlation

(.) Sig. (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

Table 13: Market-to-book ratio in function of goodwill and control factors (all variables included)

$MB_{it} = c_0 + c_1 GW_{it} + c_2 MV_{it} + c_3 GR_{it} + c_4 ROE_{it} + c_5 BETA_{it} + c_6 HTECH_{it} + e_{it}$										
	$c_0$	$c_1$	$c_2$	$c_3$	$c_4$	$c_5$	$c_6$	$R^2$	Adj. $R^2$	F
Coefficient	1.009**	3.109*	7.765 <sup>E</sup> -09**	0.019**	0.020**	0.660*	0.772*	0.181	0.167	12.677
t	4.231	2.007	3.741	2.860	3.034	2.602	2.286			
Sig.	.000	.046	.000	.004	.003	.010	.023			.000

\* Indicates significance at the 5% level.

\*\* Indicates significance at the 1% level.

MB: Market-to-book ratio

GW: Capitalized Goodwill Intensity (Capitalized Goodwill / Total Asset)

MV: Size (year end market value)

GR: Rate of Growth (one year change in sales)

ROE: Earnings-to-book ratio

BETA: risk (CAPM based beta)

HTECH: Sector (Dummy variable)

We have obtained similar results in using ln(MV) in the regression.

Figure 1: market-to-book and intangible intensity ratio

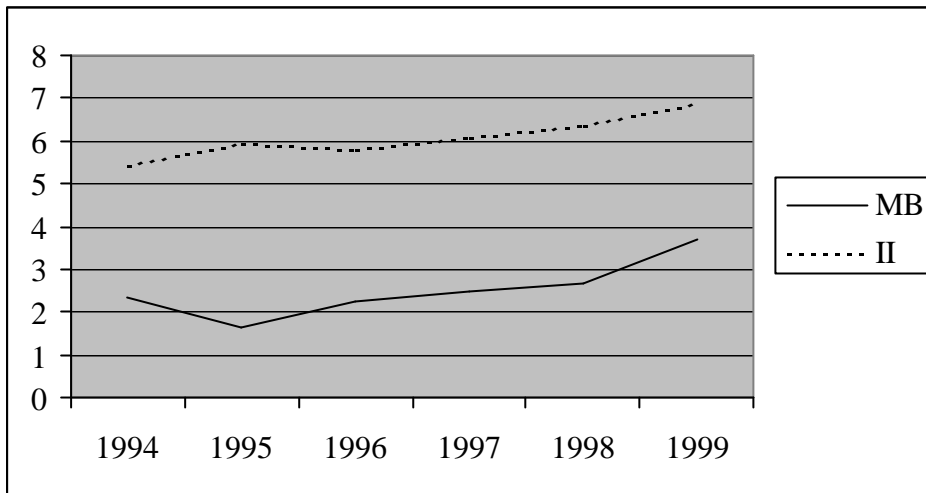


Figure 2: market-to-book and expensed intangible intensity ratios

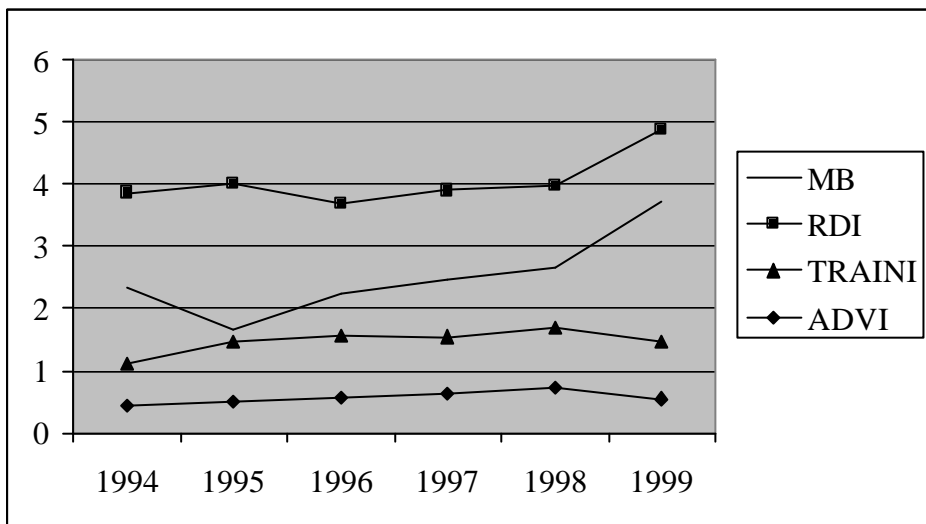
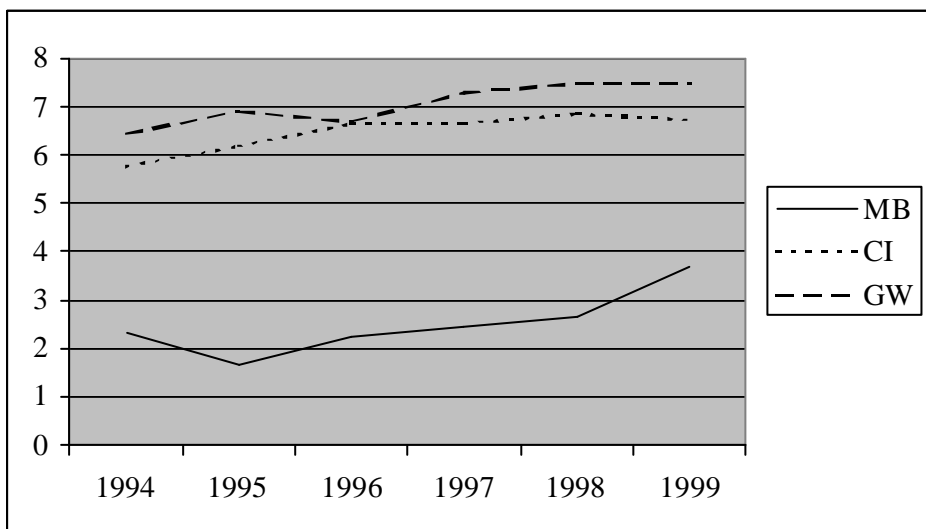


Figure 3: market-to-book and capitalized intangible intensity ratios



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