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# Value Creation in High-Tech: The Case of the Telecommunication Sector

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**ABSTRACT**

Innovation makes investors dream about the future performances of the firm when the expected profitability is greater then the cost of capital. In this case, the company creates value and satisfies its shareholders. The valuation of an innovative project should indeed increase with the value created. In order to examine this hypothesis we focused on the telecommunications sector because of the inverted "v" curve it went through in the past four years in terms of valuation. After defining the methodology, we analyse first the key structural financial items that had an impact on value creation, based on the year 2001 accounts. Secondly, we examine the impact of value creation on the financial performances of the firm (from 1998 to 2002). Our results show that the assets and the structure of the capital have a strong impact on the value creation regarding the nature of the redeployment opportunities. We observed also that value creation has a strong impact on companies' performances but surprisingly only when the market is collapsing.

*JEL: G30, G12, C10*

*Keywords: EVA; MVA; Value creation; Financial structure; Stock return; Intangible asset; Bearish market; Bullish market; Telecommunication*

## I. INTRODUCTION

According to the theory of modern finance, one of the first objectives of the firm is to create value for shareholders. Indeed, in this research we examine what are the key drivers of value creation and whether they have an incidence on the financial performances of the firm.

Numerous studies have analysed the relationship between the "Economic Value Added" (EVA) method and stock return. The research of Stewart (1990) conducted on the representative sample of 618 American companies demonstrated that the correlation between EVA and the stock returns is positive as long as the values of EVA and MVA (Market Value Added) are positive. Negative correlation appears, thus, in exceptional cases, such as liquidation, bankruptcy, recapitalization, etc. This survey also showed that variations of EVA and MVA give better results than their absolute values due to the markedly lowered influence of accounting distortions.

Stern Stewart & Co. conducted other research that focused on the relationships between the basic financial performance measures, such as ROE (Return On Equity), ROA (Return On Assets) and EVA, and stock returns. They examine 100 banking holdings from 1986 to 1995 and concluded that EVA is the most significant indicator. The changes in EVA reflect the changes in the price of stocks in 40% of the cases surveyed, while changes in ROA only 13% and in ROE, 10%. Another survey showed that EVA explains 31% of market value, while NOPAT (Net Operating Profit After Taxes) reflects only 17% of changes. The comparison of EVA and NOPAT with the firms' market value gave even more convincing results. The correlation in the case of EVA was equal to 53% and in the case of NOPAT, 33%.

Lehn and Makhija in their research in 1996 on a sample of 241 American companies from 1987 to 1993 came to similar conclusions, reckoning that EVA is more correlated with stock returns than other indicators, such as ROA, ROE or ROS. The research also demonstrated that companies with more concentrated activity are characterized by higher values of the MVA indicator than those with diversified business portfolios. Another conclusion was that the relationship between EVA and MVA and management changes is inverse, which implies that EVA and MVA are the measures of a strategic importance as they can be considered as reliable signals of strategic changes.

Milunovich and Tsuei (1996) analysed the correlation between MVA and other measures from the computer industry and concluded that EVA is the most correlated indicator with a determination coefficient ($R^2$) equal to 42% against 34% for the growth of PER and 29% for ROE and PER.

As we can see, a lot of research has demonstrated that the EVA and MVA measures frequently reflect the changes in the stock returns. Nevertheless, not all of the surveys came to these results. Dodd and Chen examined a sample of 566 American companies from 1983 to 1992 analysing the correlation between companies' quotations on the stock market and the EVA, ROE, ROA and PER indicators. Surprisingly, the survey showed a determination coefficient ($r^2$) between ROA and stock return of 24.5% and 20.2% for EVA, 19% for residual profit, 7% for ROE and 5% for PER.

Richard Bernstein from Merrill Lynch examined if an increase in EVA leads to an increase in companies' market value. The 50 companies which had the highest absolute levels of EVA earned an annual return of 12.9% between February 1987 and February 1997, while the S&P index returned was 13.1%.

Aswath Damodaran criticises the use of the EVA method stating that it is still used as a short term, year-to-year measure rather than in terms of the present value of EVA over time. The concept is simplified to the calculation of EVA each year and compared with the previous one. If the latter is lower, the company is considered as creating value for shareholders, which can be completely false. As EVA represents the value creation on existing investments while market value is based on the expectations for future value creation, the market value reflects the expectations of future EVA. It means that whether the stock returns will be high or not depends on what the expected change in EVA was. Even if the EVA announced is higher than a year before, market value can decrease if the expectations were higher. Contrarily, even if EVA is lower or negative, stock returns can be positive if the situation was expected to be worse. This reasoning explains the results obtained by Richard Bernstein.

Summarizing, the results of studies conducted vary markedly as market value is based on the expectations of cash-flow, which means that it fluctuates along with the fluctuations of future cash-flow and, accordingly, future EVA. At a given time, current EVA cannot correctly explain the market value of stocks. The best way to examine the correlation between EVA and MVA is to calculate the absolute value of MVA for several years and compare it with EVA, taking into consideration the fact that the longer the surveyed period, the less negligible are the estimation errors. Finally, we can say that EVA appears to be more correlated with MVA than with the market value of stocks.

Furthermore, these studies were done on large samples of companies of different profiles. Therefore, quotations can fluctuate in opposite directions. Results could be more precise if several studies were conducted with the distinction of homogenous sectors. The analyses of value creation were particularly superficial in the following sectors: telecom equipment providers, mobile telephony operators and ISP (Internet Service Providers). In these sectors, where the activities progressively dematerialized, it's hardly understood why some companies show strong value creation while others create less value or even destroy it.

What are the key drivers and common features of value creators? Is it possible to draw up a profile of a company creating value? In our efforts to answer these questions, we will use a representative sample of companies from the telecommunications sector. Next, we will calculate their value creation and split the sample into two groups: strong value creators and low value creators. Within both groups, we will examine first the key data based on 2001 accounts in order to identify differences and, consequently, conclude about the financial profile of value creators. Secondly, we will examine the relation between the value creation and financial performances of firms.

## II. VALUE CREATION: METHODOLOGY AND CALCULATION

The objective is to compare the financial structure of the companies regarding the following aspects:

1. Within a sector, between companies with high and low value creation, and
2. Between the examined sectors.

In order to achieve these objectives, we have calculated the value creation based on those two measures of revenues:

1. EBIT (Earnings Before Interest and Taxes), defined as turnover less the cost of goods sold.
2. EBITDA (Earnings Before Interest Tax Depreciation and Amortization), defined as the EBIT before depreciation and amortization.

In order to come out with indicators of profitability, we have chosen to use the following denominators:

1. Total assets: it is commonly used but it does not reflect the permanent pool of financial resources.
2. The long-term capital, defined as the sum of equity and long-term debt.

In order to calculate value creation, we compared the profitability of the companies within each sector with the Weighted Average Cost of Capital approach (WACC). The WACC represents the expected return of shareholders and lenders. The more the investment is considered risky, the higher is the WACC. The Betas were calculated at the date of 1 May 2002 on the base of Standard & Poor's 500 Index. Market growth rate is equal to 10.19% and was calculated on the base of the last ten years of stock quotations. Risk-free rate is equal to the interests of American Treasury bond: 5%.

After computing the WACC for each company, we have calculated the two indicators of the value creation:

$$\text{Profitability 1} = \frac{\text{EBITDA}}{\text{Equity} + \text{Long term debt}} - \text{WACC}$$

$$\text{Profitability 2} = \frac{\text{EBIT}}{\text{Equity} + \text{Long term debt}} - \text{WACC}$$

We have limited our survey to the indicators based on long-term financial resources because we considered them as to be the more relevant.

Growing companies in high tech sectors have to invest in specific assets to generate innovation.. According to Hirigoyen and Caby (1998) "Assets are specific when a durable investment has to be undertaken to support a particular transaction and this investment cannot be deployed on another transaction". Williamson (1998) states that if an asset cannot be redeployed, it represents for the other agents a value creation inferior to the value attributed to this asset by its owner. In this context, the more an

asset is specific, the more the liquidation value is uncertain in case of bankruptcy. In order to compensate the risk of non redeployment, investors require a higher rate of return, which in turn increases the cost of capital. Therefore, research started by Williamson and by Harris and Raviv (1990) demonstrated that companies with a lower liquidation value should use less debt and complete their financial resource by increasing their equity.

Companies that belong to the telecommunications sector must particularly invest in specific assets. Therefore, we have decided to divide the sample into three categories according to the level of redeployment of their assets:

1. Telecom equipment – It is a product oriented activity with mainly tangible assets
2. Mobile operators – intermediate level
3. ISP – It is a service-oriented activity and assets are mainly intangible.

## III. VALUE CREATOR AND DESTROYER: A DESCRIPTIVE ANALYSIS

### A. Telecom equipment: a sector with a possible redeployment of assets

Our sample of telecom equipment providers consists of 53 companies. Retained companies have at least 60% of their turnover concentrated in one activity. Their revenues come from electronics, cable and terminals: Lucent, Cisco, Alcatel as well as many smaller ones such as the Arris Group. As telecom activity does not constitute their core-business, we have decided not to include Sagem, Philips, Sony, Siemens and Panasonic in our analysis.

First of all, by analysing the turnover, the EBIT and the EBITDA of the telecom equipment companies, we can observe six giants in this sector: Motorola, Lucent, Alcatel, Nokia, Ericsson and Cisco. These six companies also show the best performance in terms of Net Income. However, as we will find out later, despite many similarities, they do not create the same value.

Tables 1 and 2 represent the key figures for the value creators and value destroyers based on the two value creation calculations (EBIT and EBITDA):
These four groups can be described as:

1. EBITDA+ and EBIT+: represent companies of strong value creation, respectively EBITDA and EBIT; and
2. EBITDA- and EBIT-: represent companies of poor value creation, respectively EBITDA and EBIT.

The analysis of Table 1 is as follows:

*Turnover:* Companies with strong value creation have a higher turnover than companies that are value destroyers.

*EBITDA and EBIT*: We can observe that companies that show significant differences between EBIT and EBITDA are classified into the group EBIT-. For instance, Motorola's EBITDA amounts to 5816 million euros while its EBIT is equal to merely 2679 millions euros (EBIT = 46% of EBITDA).

Net Income before Extraordinaries: Both calculations of value creation give similar results: Companies with high value creation have higher incomes than

companies with low value creation. With the estimations based on EBITDA, it seems that companies with high value creation have fewer assets than low value creation companies. This observation is strongly significant when we exclude the six giants (Motorola, Lucent, Alcatel, Nokia, Ericsson, Cisco).

*Total Current Assets and Total Long Term Assets:* Results vary according to the calculation, it is not possible to identify a significant trend. Nevertheless, when we exclude the six giants, we can state that the lower total Current Assets and or long term Assets a company has, the more it creates value.

*Working Capital:* Value creators have a lower working capital than value destroyers which can lead to the conclusion that these companies markedly support their activity with outsourcing. We can also suppose that value creators manage inventories more efficiently.

*Total Current Liabilities and Total Long Term Liabilities:* The statistics pertaining to both of these confirm the rule that the smaller the balance sheet, the higher value creation. Nevertheless, companies of high value creation have fewer long-term debts. Linking it together with the fact that they have less equity, we can confirm the conclusion concerning small balance sheets. The conclusions about the current liabilities are less visible, however, we can notice that, excluding the six giants, strong value creators have fewer current liabilities.

**Table 1**
Key financial data for the telecom equipment companies

| | EBITDA+ | | EBITDA- | | EBIT+ | | EBIT- | |
|---|---|---|---|---|---|---|---|---|
| | aver | med | aver | med | Aver | med | aver | med |
| Turnover | 6139 | 1640 | 4875 | 1290 | 7484 | 2614 | 5227 | 1284 |
| Net Income Before Extraordinaries | 573 | 119 | -2502 | 28 | 857 | 183 | -2862 | 14 |
| Total Assets | 6673 | 1404 | 8206 | 2039 | 8764 | 1930 | 8148 | 2027 |
| Total Assets* | 2515 | 1070 | 5131 | 2027 | 2694 | 1071 | 4630 | 1826 |
| Total Current Assets* | 1556 | 518 | 3081 | 1273 | 1629 | 580 | 2869 | 1171 |
| Total LT Assets* | 957 | 344 | 3545 | 732 | 1065 | 343 | 3430 | 804 |
| Working Capital | 1223 | 388 | 2060 | 996 | 1542 | 586 | 1858 | 894 |
| Shareholders Equity* | 1587 | 603 | 3893 | 1371 | 1750 | 600 | 4955 | 1644 |
| Total Current liabilities* | 655 | 210 | 1365 | 402 | 652 | 220 | 1150 | 391 |

* Figures are in million euros and concern all companies excluding the six giants

**Table 2**
Balance sheet profile of the four groups of telecom equipment companies

| | EBITDA+ | | EBITDA- | | EBIT+ | | EBIT- | |
|---|---|---|---|---|---|---|---|---|
| **Assets** | % | RV | % | RV | % | RV | % | RV |
| Total LT Assets | 31,3 | 449 | 35,4 | 752 | 36,6 | 614,8 | 43,3 | 896,2 |
| Total Current Assets | 68,7 | 986 | 64,6 | 1372 | 63,4 | 1062 | 56,7 | 1174 |
| Working Capital | - | 387 | - | 996 | | 587 | - | 894 |
| | | | | | | | | |
| **Liabilities** | | | | | | | | |
| Shareholders Equity | 70,1 | 844 | 65,1 | 1376 | 72 | 1212 | 73 | 1547 |
| Total LT Liabilities | 7,65 | 92 | 13,2 | 280 | 4,2 | 71 | 6 | 134 |
| Total Current Liabilities | 22,5 | 268 | 21,7 | 459 | 23,8 | 398,9 | 21 | 448 |

The analysis of Table 2 is as follows. As far as assets are concerned, we can observe that, regardless of the way of calculating value creation (based on EBIT or EBITDA), high value creators have fewer long-term assets. They also seem to have fewer fixed assets, which can confirm the hypothesis that they outsource.

Their working capital is also lower, which can prove good management of inventories as well as accounts receivable and payable. When we survey the liabilities, we can only observe that companies with high short-term assets are value creators. It seems that this way to finance activity generates lower costs of capital.

We were able to create a profile of a value creator in the telecom equipment sector by excluding the giants. Nevertheless, after an analysis we notice that this group is very heterogeneous and it is very difficult to come to precise conclusions about the features of value creators. For instance, Nokia and Cisco finance their activity with long-term debts in comparison with Ericsson but all four of them create value according to calculations based on EBIT. The group of giants needs further and deeper analysis to provide rational conclusions. By excluding the giants, we can summarize the profile of a value creator in the sector of telecom equipment as follows:

1. Value creation increases with the revenues: turnover, the EBIT, the EBITDA and the net income
2. Value creation decreases with the total assets as well as with the fixed and current assets
3. Value creation decreases with the working capital
4. Value creation decreases with the equities and the long-term debts
5. Value creation increases with the current liabilities.

### B. Mobile operators: a sector with a partial redeployment of assets

In this group, we focus on mobile telephony operators. The basic sources of their revenues are subscription and communication time fees. This sector is currently in a phase of transition between two technologies. The most popularly used GPRS (General Packet Radio Services) or 2.5 generation technologies have reached their maturity

while UMTS (Universal Mobile Telecommunication System) has not yet seen sufficient acceptance. Companies that have already invested in the new technology are deep in debts looking forward to the development of the market.

Within this sector, we can distinguish the following four types of companies:

*World-wide actors*: i.e.: Vodafone, Orange and Telefonica Mobiles. Their activity portfolios are still strongly diversified and their turnovers are higher than one billion euros. Vodafone, the greatest world-wide operator is considered to be the champion of goodwill.

*Regional actors: i.e.: Sprint and MMO2. They act on a smaller scale and their* position is less risky than the position of world-wide operators.

*Chinese actors*: This is very specific, presently one of the few developing national markets. Its growth rate amounts to 20% of the growth of the whole sector. Currently, the only participants are China Unicom and China Mobile. Nokia and Samsung are doing their best to enter the market of equipment providers (the latter is more successful).

*Purely local players*: i.e.: Rural Cell Corps. They profit from regional niches, such as American countryside areas, which were not covered by huge operators. Their strategy is to satisfy particular needs and personalize services.

The study has been made on the sample of 37 mobile operators. Companies range from small ones, such as Nextel Partners with a turnover of 150 million euros to NTT Do Co Mo with 33,114 million euros. Average turnover in the sector is 4,983 millions euros. Average EBITDA amounts to 1,644.5 million euros while the median is equal to 327.5 million euros.

As far as EBIT is concerned, we come to the following observations:

1. Average EBIT is 729.1 millions euros, we can observe a decrease of 85.3 % in comparison with turnover.
2. Median of EBIT is equal to 146 millions euros, we can notice a decrease of 97.07 % in comparison with turnover and of 55.4 % compared to EBITDA.

The difference between EBIT and EBITDA, which results from depreciation of assets and goodwill is almost identical in terms of median and average. Depreciation and goodwill constitute more than 50 % of operating profit while they do not exceed 40 % in the case of telecom equipment providers.

Average Net Income is a loss of 119 million euros while in terms of median it amounts to a profit of 71 million euros, which implies that some companies suffer serious losses. This negative average reflects the very unstable condition of many companies.

As far as the balance sheet is concerned, total Assets range from 277.711 billion euros for Vodafone to 311 million euros for Airgate. The average is 21.408 million euros while the median is equal to 3,831 million. Companies such as Orange, Sprint, China Mobile, China Unicom and mostly Vodafone have markedly increased the average of total assets.

Contrary to equipment providers, the fixed assets of mobile operators constitute the most important part of their assets. The median is 2,659 million euros and the

average is 13,800 million euros. In terms of median fixed assets represent 70% of total assets in terms of average – 64%.

As far as sources of financing are concerned, in most cases long-term debts are more important than short-term ones. The exceptions appear in large groups where long-term debts are lower than short-term ones, however the differences are not considerable.

Equities of companies examined are not very high, the median is about 694 million euros and the average is 12.5 billion euros. The difference is huge because of such companies as: Vodafone, AT&T wireless and NTT Do Co Mo. Nevertheless, we cannot ignore the fact that these numbers do not reflect the decrease in telecommunication companies' market value observed in 2002.

As in the case of telecom equipment providers, we have calculated value creation based on EBIT and EBITDA and, next, distinguished the four groups of companies: companies with high value creation according to EBIT and EBITDA (groups EBIT+ and EBITDA+), and companies with low value creation according to the same indicators (groups EBIT- and EBITDA-).

Table 3 presents key financial data for three of the four groups distinguished. After examining Table 3, we come to the conclusion that the profile of value creators in the mobile operator sector is similar to the profile of telecom equipment providers. Only the short-term debts point as a favorable difference for the mobile operators. Besides, results tend to demonstrate that value creators have fewer intangible assets.

**Table 3**
Key financial data of mobile operators for the groups EBITDA+, EBITDA-, EBIT+

| | EBITDA+ | | EBITDA- | | EBIT+ | |
|---|---|---|---|---|---|---|
| | aver | med | aver | med | aver | med |
| Turnover | 6130 | 1897 | 2390 | 852 | 4978 | 1140 |
| Net Income Before Extraordinaries | 1153 | 164 | -97 | -55 | 68 | 76 |
| Total Assets | 15563 | 3831 | 26503 | 3494 | 21033 | 3662 |
| Non Current Assets | 9869 | 3379 | 22744 | 2834 | 16307 | 3107 |
| Total Current Assets | 5694 | 545 | 3759 | 659 | 4726 | 621 |
| Working Capital | 566 | 20 | 323 | -162 | 444 | -39 |
| Shareholders Equity | 6766 | 1570 | 17839 | 661 | 12471 | 694 |
| Total Current Liabilities | 5128 | 559 | 3436 | 692 | 4282 | 633 |
| LT Debt | 3061 | 1334 | 4441 | 1735 | 3736 | 1488 |

### C. Internet service providers (ISP): a sector with low reusable assets

Thinking in terms of types of companies present in this sector, we can make one general distinction: companies serving individuals and companies serving corporate customers. The first group gives their customers a possibility to use several e-mail addresses, catalogues, Internet portals, chat rooms, etc. Their profits come from subscription fees or shopping on-line commissions while communication services are usually free. In the case of corporate customers, the basic goal is to provide them with secure access to the Internet or to services such as videoconferences.

The average turnover in the ISP sector is 1,029 million euros while the median amounts to about 54 million euros. Such a difference implies the presence of huge companies with significant turnovers (Cable & Wireless, AOL, NTL inc). 20 among the sample of 31 companies had a turnover lower than 75 million euros. The average of EBITDA is 102 million euros, but if we consider EBIT, companies suffered 325 million euros loss on average. Only 3 companies had positive EBIT (AOL, Iinet Limited and Cable & Wireless).

In Table 4 we present our observed value creation for the groups: EBITDA+, EBIT+ and EBIT-.

**Table 4**
Key financial data of ISP for the groups +, EBIT+,EBIT-

| | EBITDA+ | | EBIT+ | | EBIT- | |
|---|---|---|---|---|---|---|
| | Aver | med | aver | Med | aver | med |
| Turnover | 2193 | 309 | 1883 | 54 | 170 | 24 |
| Net income before extraordinaries | 127 | -104 | 250 | -87 | -122 | -79 |
| Total assets | 8821 | 3343 | 6409 | 3343 | 398 | 161 |
| Non current assets | 58.50% | 58.50% | 49.30% | 51.50% | 60% | 54.50% |
| Total current assets | 41.50% | 41.50% | 50.70% | 48.50% | 40% | 45.50% |
| Working capital | 17.60% | 19% | 34.80% | 34% | 15.30% | 15.40% |
| Shareholders equity | 56.90% | 56.10% | 73.10% | 68.60% | 60.20% | 58.30% |
| Total current liabilities | 24.70% | 21.10% | 16.70% | 14.60% | 25.60% | 18.10% |
| Non current liabilities | 18.40% | 17.50% | 10.20% | 4.30% | 14.20% | 6.90% |
| Fixed assets-tangibles- | 26.30% | 19% | 15.40% | 4.80% | 26.10% | 26.20% |
| Intangible incl. Goodwill | 13.60% | 5.10% | 15.10% | 12.90% | 10.90% | 9.30% |
| Goodwill | 12% | 3.90% | 12.20% | 9.80% | 5.90% | 5.80% |

Figures are in million euros
Figures in % are in proportion to the total assets

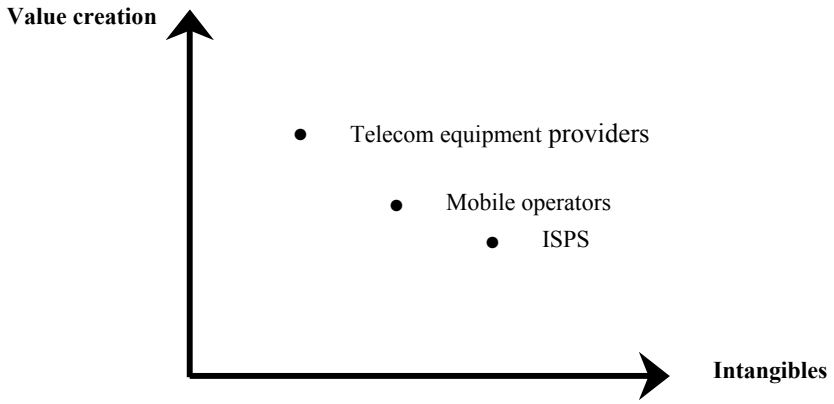
The profile of the ISP value creators illustrated in Table 4 is different compared to the equipment providers and mobile operators. Value creators have more assets, more equity and fewer short-term debts than value destroyers. Moreover, we can observe that intangibles and goodwill are more important for value creators. The other indicators do not differ from the other sectors in terms of value creation. Indeed, the value creation is also increasing with the turnover.

As far as the relationship between value creation and intangibility of assets is concerned, having calculated and compared value creation of tangible and intangible assets in equipment providers and ISP sectors (Table 5), we come to the hypothesis that value creation is inversely proportional to the importance of intangibles. This is illustrated in Figure 1.

**Table 5**
Value creation and assets tangibility in the sectors of equipment providers and ISP

| | Value creation | | Tangibles (millions of euros) | | Intangibles (goodwill included) | |
|---|---|---|---|---|---|---|
| | EBITDA+ | EBIT+ | EBITDA+ | EBIT+ | EBITDA+ | EBIT+ |
| EP | 0,38 | 0,26 | 1528,87 | 1591,96 | 484,36 | 717,36 |
| ISP | 0,016 | -0,216 | 3124,11 | 1396,45 | 2658,85 | 1234,25 |

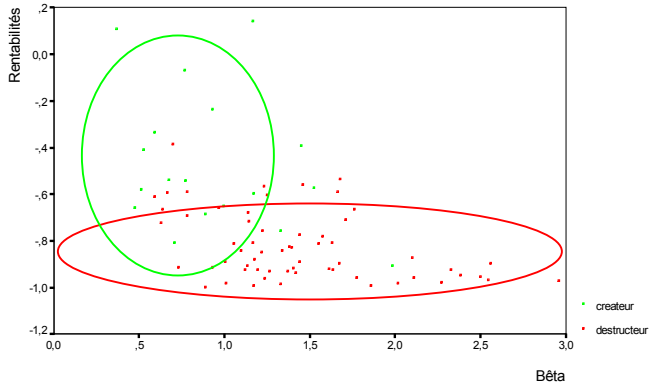
**Figure 1**
Value creation and assets intangibility



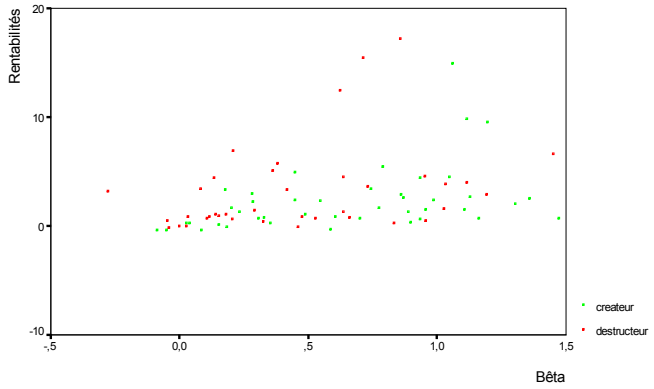
## IV. VALUE CREATION AND FINANCIAL PERFORMANCE

From January 1998 to January 2000, companies in the telecommunication sector experienced significant growth in profitability. The average performance was 284.55 % with a standard deviation equal to 39.29%. Profitability in the sector ranges from –33.7 % to 1827% and the median was 152.1%.

**Figure 2**
Market financial performances of companies in the Telecom sector




Bear market from 2000 to 2002




Bull market from 1998 to 2000

In order to examine the relationship between value creation and financial performance of companies in the period of this bull market (in our case from January 1998 to January 2000) and in the period of bear market (from February 2000 to February 2002), we have measured:

1. The incidence of the value creation on the companies' performance during both of these periods.
2. The incidence of the value creation on the risk beta of companies during both of these periods.

## A. Incidence of the Value Creation on Company's Performance

*Bull market:* In this period of spectacular market performance, the comparison of the average profitability of companies creating value with companies destroying value does not lead to any precise conclusions. Surprisingly, value creators seem to be less profitable on average (239.4%) than value destroyers (316.7%). Nevertheless, these results have to be considered statistically insignificant, as we have estimated the error of 5% while testing the differences of the average.

*Bear market:* In this period the companies experienced a dramatic decrease in profitability. The average reached the level of –72.53%. However, in this case we can notice that the average profitability of value creators is –46.99% while value destroyers are two times less profitable (-83.01% on average). The test of statistical significance showed an error of 1%. We can, therefore, state that in the period of market decrease value creators show better financial performance in terms of profitability than value destroyers.

## B. Value Creation and Models of Financial Profitability Forecasts

We will attempt to define in this section the relationship between value creation and companies' performance based on the logistic regression model. This method will enable us to examine the relationship between a qualitative variable Y and a set of quantitative variables $X_1 \ldots X_K$. We assume that the dependent variable is equal to 1 if the profitability is higher than –82% (basing on the median for years 2000 and 2002) and 0 if it is lower.

As the model contains only one dependent variable, it is called a "simple logistic model" and its defined as : $P(Y=1/X) = (e^{\beta 0+\beta 1X}) / (1 + e^{\beta 0+\beta 1X})$.

The coefficients estimated on the basis of given data are denoted as β. If the logistic regression contains more independent variables, it is called "multiple" and expressed as: $P(Y=1/X) = (e^Z / (1 + e^Z)$, where $Z = \beta 0 + \beta 1X1 + \beta 2X2 + \ldots + \beta PXP$.

*The test of the estimated coefficients:* In order to examine them, we looked at the Wald statistic. We used also the R statistic to measure the partial correlation between dependent variables and each independent variable:

$$R = \pm\sqrt{((\text{Wald statistic} - 2)/-2LL)}$$

The results of logistic regression (see annex) demonstrate that there is a significant relationship between value creation and the financial profitability of the companies. The goodness of fit is high and is confirmed by the classification rate of 78.6%. The estimated parameters of the model are statistically significant. Particularly, the coefficient of value creation based on EBIT is equal to 5.9694. The Wald statistic is 13.0567, which implies an error much lower than 1%.

After introducing into the model the estimated parameters, we came to the conclusion that a company that produces a 5% value creation (based on EBIT) has 70% chance of being more profitable than an average company while a company destroying 10% of value has 40% chance of having a profitability higher than the average.

We can notice that the indicators of value creation based on EBIT are more reliable than those based on EBITDA. The indicator based on EBITDA seems not to be applicable to our model because none of the estimated parameters are statistically significant. Therefore, we can state that value creation calculated on the basis of EBIT has the best predictive power while introducing it into a logistic regression model.

### C. Impact of Value Creation on Beta

*Bull market:* The average beta of companies creating value is 0.49 while in the case of value destroyers it is equal to 0.42. Therefore, destroyers seemed to be less risky and, as we have seen before, have a better performance. Nevertheless, the tests of differences show a t-value of 1.86 and indeed, an error exceeding 5. We can, thus, conclude that the results obtained are comparable with the results of the profitability study. During the market growth period, we cannot observe any significant relationship between value creation and the level of risk of a company.

*Bear market:* In the period of market decrease the results are significant. The companies that create value have on average a beta of 0.93 while the greatest value destroyers have a beta of 1.42. Results are statistically significant. The test of independence, t-test, enables us to validate the results with an error of less than 1% and a t-value equal to 4.01. Hence, we can confirm that in the period of market decrease there is a relation between the indicators of value creation and the companies' risk.

## V. CONCLUSION

This article has facilitated the identification of value creating activities within three distinguished sectors (telecom equipment providers, mobile operators and ISPs). It has also demonstrated that there is a strong negative relation between the level of value creation and the importance of intangible assets.

Moreover, we have identified the EBIT as the best indicator of value creation and its positive relation with the companies' market performance and beta on a bear market. In the era of a bull market, the value creation does not determine the performance and the risk of companies in the telecommunications sector.

Further research will be undertaken in order to explore the factors that have an incidence on companies' market performance and risk by taking into account intangibles.

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## ANNEX

*Logistic regression results:*

| | |
|---|---|
| -2 Log Likelihood | 78,272 |
| Goodness of Fit | 76,012 |

| | Chi-Square | df | Significance |
|---|---|---|---|
| Model Chi-Square | 32,347 | 1 | ,0000 |
| Improvement | 32,347 | 1 | ,0000 |

*Classification Table for RENTAB*

| *Observed* | | | | |
|---|---|---|---|---|
| *rLow* | *0* | *45* | *8* | *84,91%* |
| *r H* | *1* | *10* | *21* | *67,74%* |
| | | | *Overall* | *78,57%* |

---------- Variables in the Equation ----------

| Variables | B | S.E. | Wald | df | Sig | R | Exp(B) |
|---|---|---|---|---|---|---|---|
| CV-EBIT | 5,969 | 1,652 | 13,0567 | 1 | ,0003 | ,3162 | 391,2773 |
| Constant | ,3818 | ,3267 | 1,3659 | 1 | ,2425 | | |