

# **Ebitda as a Criterion for Assessment of the Banks System: The Case of Deutesche Bank, Generali and Unicredit**

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## **Abstract**

This work describes and analyzes the validity of some economic indicators about companies or groups of companies that use capital intensive as a factor of production. In particular, the study aims to investigate the way in which services provided to high capital intensity (capital intensive) and then the profit and profitability reached by some groups in banking, finance and insurance, can be evaluated using the Ebitda criterion (Ebitda Earnings before tax, Depretiation and Ammortization) or other economic indicators that will be analyzed during the work. Economic indicators have often an advantage, but they also have critical issues that will be described during the exposure and depth of work. In addition, the analysis of statistical and macro-econometric relative to Ebitda of three comparable groups of intermediaries sector under consideration (Deutesche Bank, Generali and Unicredit) using a sample of 10 periods (from 2000 to 2009), utilizing the Cobb-Douglas production function, and considering the excessive volatility of some data, allows us to obtain a forecast of the increase of the output to vary the amount of input in terms of physical capital and human capital.

**JEL classification numbers:** F1, F4, D2, D9, M2, M4;

**Keywords:** Ebitda, Capital intensive, International trade, Production Function, Accounting;

## **1 Introduction**

In the research that follows will be used instrumentally theory of factor endowments of capital and labor, the Heckscher-Ohlin, Salvatore (2002), rearranged according to the needs and objectives to be achieved in order to define the validity of the indicator of profitability observed, namely Ebitda. Heckscher-Ohlin, in his theory, is based on a number of simplifying assumptions such as the use of data from two countries, two goods

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products, the analysis of the allocation of two factors of production which are the capital and labor. In addition, the two countries considered using the same production technology and the good X is good for labor-intensive and good Y is an asset to capital-intensive in both countries.

Finally, the two goods are produced under constant returns to scale in both countries. In our case, the study will be based on the fact that the reference countries are Germany and Italy we call capital intensive, the good X we define functions with the symbol L, is a key product-intensive work, will taken as a constant value and calculated as the product of the average income of the financial sector in each country, multiplied by the number of workers employed in individual companies.

Good Y will call K, will be defined by the values of Ebitda in the period under review. While as regards the elasticity of demand for capital or labor, we define  $\alpha = 0.6$  and  $\beta = 0.4$ . This choice stems from the fact that in countries where capital intensive businesses selected for the research, are also capital intensive, and then using the factor endowment capital predominantly, there is a difference in increase of 20% compared to the use of the equipment factorial work. In consideration of the variables mentioned, you will get the total production factor Y is calculated with the function Cobb-Douglas:

$Y = A * K^\alpha * L^\beta$ , the individual components of the function will be analyzed in the following paragraphs, but basically the function does is to estimate the amount of endowment of physical capital  $K^\alpha$  used to produce, from the countries or in our case by the companies, with respect to human capital  $L^\beta$ .

## 2 Selection of Literature

Hence Ebitda's popularity during the internet boom, when investors used it to compare the performance of technology companies in different industries or sectors. Because it is relatively easy to calculate, Ebitda is too often used instead of measures relying on operating cash flow. It can be dangerous to rely too heavily on Ebitda and ignore changes in a company's working capital (Gibson, 2003).

The multiple currents are influenced by general market and expectations of growth in specific sectors.

The multiples represented by the following relations Enterprise Value and Equity Value are typically used in industry but in the last twenty years, the trend is to use them in the banking and financial sector. A study of the second half of the nineties (1995-2001) involving 22 Italian banks described the evolution of multiple considering the multiples used those defined.

Massari and Zanetti (2008) analyzed the performance of one of the multiple P/BV (price/book value) of the banks considered for the reference period.

Fang et al. (2010) suggest that there are risks in combining banking and private equity investing. This researcher compares various transaction and target-firm characteristics of bank deals and non-bank deals. In this research the transaction characteristics are generally similar between the two samples, with the exception that the implied EV/Ebitda ratio is lower in the bank sample, which means that bank-affiliated groups tend to pay a lower valuation.

Fang et al. (2012) find that both the estimated parent bank's (individual) share, as well as all banks' total share of the loans backing affiliated private equity transactions, are

significantly lower during market peaks. The parent bank's individual share is also significantly lower for highly priced deals, as measured by the ratio of enterprise value to Ebitda.

These patterns are consistent with market timing and the notion that banks take advantage of their ability to raise more outside financing when market conditions are favorable, as suggested by Shleifer and Vishny (2010).

The considerations drawn from the literature on the subject of evaluation and efficiency are the basis quantitative analysis developed in order to identify an equivalence scale for the credit sector. The analyzes were conducted using a sample of observations for the period 2000-2009. This set consists of the three companies for which the period under review were available financial statement data and reclassified comparable. The data related to the reporting of the banks have been derived from the base data made available by the Italian Banking Association (ABI). With regard to the estimate of production in terms of efficiency, it is preferred to use a function of Cobb-Douglas. The choice comes from the analysis of the previous results obtained by some researchers who have shown that, with reference to the banking sector, the use of alternative functional forms, such as the multi-model transcendental logarithmic translog (Conigliani, De Bonis, Motta, Parigi, 1991; Goisis, Parravicini, Porrini, 1992) or generalized functional form that uses the procedure Box-Cox (Clark, 1984; Lanciotti and Raganelli, 1988), no results significantly different from those obtained with a traditional Cobb-Douglas function (Ciocca, Giussani, Lanciotti, 1974; Conigliani, 1983). This study, together with the estimate of the parameters that the Cobb-Douglas function allows you to analyze, make it even among the most frequently used functions by many researchers (Tambucci, 1995).

### **3 Critical Points and Limitations in the Use of Ebitda**

Ebitda is an economical enterprise increasingly used in the analysis of financial statements to measure the business cash flow, Ebitda or actually if we want the MOL (Italian acronym) has many critical points, according to many analysts is a valuable tool to measure the cash flows. And necessary to affirm that the different schools of thought of many business economists interpret differently this aspect, then there are various theories on the subject. For example, Fred Hickey, editor of "The High-Tech Strategist", responds to criticism that see Ebitda as a false representation of cash flow business.

Experts do not believe in this interpretation, but thinks that in order to evaluate the cash flows, profits and turnover cannot be removed interest and tangible and intangible assets (Buscemi and Yallwe, 2014). Other economists think that it is possible to accurately measure the flow of cash through the Ebitda, if a company engages a part availability interest expense or equipment purchases. This same economic indicator, is often used as an accounting device to show the longevity and productivity, sometimes at odds with reality accounting, to demonstrate to investors the good performance of the company on the market. This interpretation has its basis in companies listed on a stock market, where it is retrieved capital through the sale of part of its own shares for investors who believe in the growth of analyzing the financial statements disclosed by the same (this aspect was represented even in a report by Moody's Investors Service in New York Pamela Stumpp). Ebitda, as mentioned, is an easy to manipulate using accounting techniques that alter the costs, revenues and the depreciation of fixed assets over time. Thus, as can be seen from the report "Putting Ebitda Into Perspective", it is not always useful to use Ebitda to

determine the cash flows, but often you have to use economic indicators more complex but with higher reliability rate.

Other critical issues stem from the fact that in business, Ebitda does not measure net income, do not measure liquidity and is not recognized as a tool for analysis of corporate financial statements in IFRS. For example, Ebitda is an inadequate tool for many industries, because it ignores the value attributed to brand that values the uniqueness of the company, according to the report by Moodys cited, cannot be a tool for assessing the potential profitability of a firm to produce is bound to use new technologies in the short term might otherwise go out of business.

Ebitda is now used by all companies also by small company, but unfortunately, the use of Ebitda has evolved and is often used as the only tool for measuring the business cycle of companies, first was used for evaluate a high rate of receivables, secondly as an analytical tool for companies long-lived (Stumpp at Moody's Investors Service in New York).

Of the 147 companies that have declared bankruptcy in 1999 and monitored by Moody's, many of these had received bank loans or other financing based on the volume of Ebitda.

An interpretation given in the report that relates Ebit with Ebitda is defined by the large amount of operating profit (Ebit) contained in gross operating profit (Ebitda), the higher this ratio the more the cash flow is high. These are the main results of the paper.

#### **4 Indicators of Analysis of the Growth Rate of the Company (ARRs Method Accounting Rates of Returns)**

This method of economic analysis developed by two economists Resende and Zeidan (2006) used nine economic indicators to test the growth rate of the company or sector. The work written by two economists is cited as the conclusions are the same of the critical points of which were mentioned in the previous section, namely, that the indicator Ebitda considered as a single reference data is not always expressed the ability to create profit, profitability, and therefore the real economic conditions, financial and accounting firm, but sometimes, to get consistent estimates and actually attributable to real growth rate and/or longevity company should be changed to more complex indicators. In our case, to study empirically the data of the three banking groups, financial and insurance in reference will use economic indicators chosen methodically, which will be described later both theoretically and used in estimating data for the three institutions took in reference research.

#### **5 The Cost of Equity and the Method of Multiple**

The cost of equity can be determined either by referring to a type indicator mainly accounting which the ROE (Return On Equity) is through the use of more complex, but more reliable economic models, such as, for example, the CAPM (Capital Asset Pricing Model), market multiples or the APT (Arbitrage Pricing Theory). The model to be used more time in the practice of large financial institutions is certainly the CAPM, which binds the expected return of any financial asset that has a market (or an investment project) to its systematic risk component, namely that no further eliminated using the portfolio diversification.

In the work that follows will not use the CAPM, because besides being a very complex indicator to which we should devote an entire work, the same does not use in its formulations economic indicators related to our original study, and in particular in the lead is not used Ebitda.

The multiples method involves the determination of the value of the capital of an enterprise on the basis of negotiated prices (in organized markets or M&A) for securities representing shares in the capital of comparable companies.

This method involves building relationships (multiples) that are based on a relationship between the prices of shares of comparable companies and an economic variable company (net income, Ebitda, turnover etc.). Such relationships are then applied to the same economic variable to be evaluated to determine the company, depending on the approach used, the enterprise value or the equity value. In fact, as in the case of the evaluation with the DCF, even in market multiples will have two distinct approaches: the first is the Asset Side, leading to estimated enterprise value and subtracting the net debt, to that of the Equity Value; the second is the Equity Side, which leads directly to the estimate of the Equity Value. Belong to the first approach multiples such as EV/Sales, EV/Ebitda and EV/Ebit; belong to the second, however, multiple such as Price/Earnings or Price/Book Value. The multiples are determined with reference or a sample of listed companies homogeneous than that to be evaluated (approach of comparable companies) or M&A made in the past involving comparable approach (comparable transactions). The empirical part of this paper will focus on the first approach, namely, the Asset Side. In a first step we will address three or multiple multipliers and an economic indicator calculated according to the following relationships:

**EV/Ebitda**

**EV/Ebit**

**EV/Sales**

**Ebitda Margin (%) = Ebitda (MOL)/Profit**

From the foregoing emerges the criticality, in applying the multiples method, the selection of comparable, which may differ from the company to be assessed for size, activity, profitability, leverage and risk profile. Given the fact you state that the choice of the three banking groups/insurance analyzed below, namely, Deutsche Bank, Generali and Unicredit.

### **5.1 Study of the Indicators of Profit and Profitability**

A study conducted by a researcher named Celia (2004) on some economic indicators of profit and profitability for companies Italian champion has announced the results considered interesting from a scientific point of view. The sample, relative to companies not listed on a financial market with a turnover of between 25-50 million eur and with sales of over 50 million eur; while for those listed on a financial market there was no limit turnover. For the three broad groups of companies were analyzed, for what interests our elaborate indicators of profitability: Ebit margin, Ebitda margin and Net margin and profitability indicators: ROI and ROE. The absolute values obtained, starting from profitability, allow us to say that there is a higher operating efficiency of listed firms than in non-listed companies.

In particular, the Ebitda margin, recording a best condition of listed firms (median 11.8%,

mean 13.7%) compared to non-listed companies (median 7.7%, average 9.1%). With regard to non-listed companies, are the small firms to have higher operating efficiency, both in terms of data that median average. In detail, the Ebitda margin was 7.7% for the enterprise median entire sample (the average is equal to 9.1%), to 10.7% for the median firm small business size (the average is equal to 11.4%) and to 6.5% for the enterprise median of those with a turnover exceeding 50 million eur (the average is equal to 8.4%). As for the return on investment, the results are amazing, despite the increased operational efficiency listed companies remunerate their capital invested less than do the non-listed companies. The median value of the ROI, the indicator of total return on invested capital, is equal to 1.6% for listed companies and to 2.5% for non-listed companies and the situation is even more striking and paradoxical in the case of the average values (- 5.6% for listed, + 4.9% for non-listed). Within the sample of non-listed companies are once again the small firms to record the highest values with an average ROI equal to 6.9% (since the median is equal to 4.7%). The ROE indicator of the return on equity, confirming the lower return on the capital of listed companies (median 3.6% and average -2.9%) compared to non-listed (median 6.1% and average 7.7%).

Assuming that the macro analysis conducted was not just about a sector but all sectors of the marked (manufacturing, utilities, financial, industrial, etc.), the findings show a comparison in terms of capitalization, profitability and profitability of listed companies in a market and of unlisted companies. From this emerges a greater profitability and better management of the financial aspects by the companies listed.

## 6 Data Selection

The review that follows will function as to describe the construction of the data used in paragraph 7 to implement the model. The sample for the empirical study refers to a sample consisting of ten year periods intervening between 2000 and 2009. The study covers three main groups of banking, finance and insurance, and working in the field of service provision. The decision stems from the fact that these companies operate in the market by providing services, and then using to produce a major amount of the capital factor. The three companies are analyzed: a German, namely Deutsche Bank and the other two Italian, namely Unicredit and Generali. The research data comes from a choice of homogenize the same in order to observe the oscillations Ebitda or indicators Economic and business relationships built through that link Ebitda with other balance sheet values.

Much of the data were extrapolated from the budgets of the companies examined by the use of databases ABI, other data such as wages and salaries, to avoid distortions arising from the analysis of budget data incorporating awards productive or other benefits, were taken from the OECD database by country of origin. For example, as can be deduced in the following paragraphs, to build the amount of labor employed  $L$ , as a factor of production, so part of our input in the production function, we used the values of wages and salaries arising from the national average of individual states Germany and Italy.

The rationale for this choice is the fact that observing the aggregate data entry wages and salaries in the budget of the three companies, it should be noted that in some easily annuity there is a distorted representation of the number of workers and therefore not in line with the trend data. For example, if the ratio wages/workers for the year 2006 amounted to 30 thousand eur and in the following year amounted to 60 thousand eur,

clearly in 2007, in the item wages and salaries, there is an additional component that not the result of the increase in income of workers but dispensing awards or benefits which in our case should be empirical to distort the results themselves.

Finally, in the description of the data, when we refer to companies in question: Deutsche Bank, Unicredit and Generali, when possible, to avoid being repetitive, it is called "Groups".

## 6.1 Productivity per Worker

In the representation will be analyzed following the trend in productivity of each worker in terms of Ebitda for the three groups studied specifically. The analysis covers the years intervening between the 2000-2009 and tends to highlight the relationship between Ebitda

and the number of workers using the ratio  $\frac{Ebitda}{n. worker}$ . The graph n. 1 it should be noted immediately that the performance of Generali and Unicredit is very similar and at levels lower than that of Deutsche Bank. The statistical analysis of the sample of 30 observations, showed interesting results that will be detailed later. As can be noted, examining the graph n. 1 Deutsche Bank reaches peak productivity per worker in terms of Ebitda in 2007, reaching 213,856 € against the minimum reached by Generali in 2002 amounted to € 5,268. The average value of output per worker is equal to € 92,396 and the sampling distribution has greater frequency in a range between 50,000 and 100,000 €, so with a median value of € 72,038. Also the values of  $Moda < Median < Media$  shows that the distribution is positively skewed to the right and presenting a lower frequency of middle and extreme, with a higher frequency of the intermediate, is also platykurtic or hyponormal, this aspect is highlighted also on the value of Kurtosis = 2.62 less than 3.

More simply we can say that in this case the curve of kurtosis is compressed downwards. Summarizing the results, we can say that companies that produce industry, in terms of Ebitda, a smaller amount of approximately € 50,000 per worker/year, are not efficient. It may be observed that outcome values, apparent hereinafter, relative to average wages and salaries that are below the threshold of 50,000 €, if not the company would produce a loss.

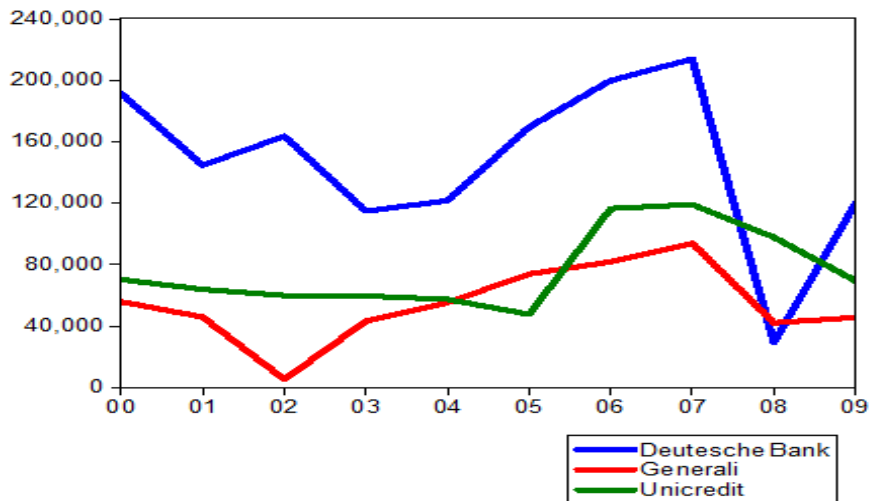


Figure 1: Productivity per worker (in terms of Ebitda)

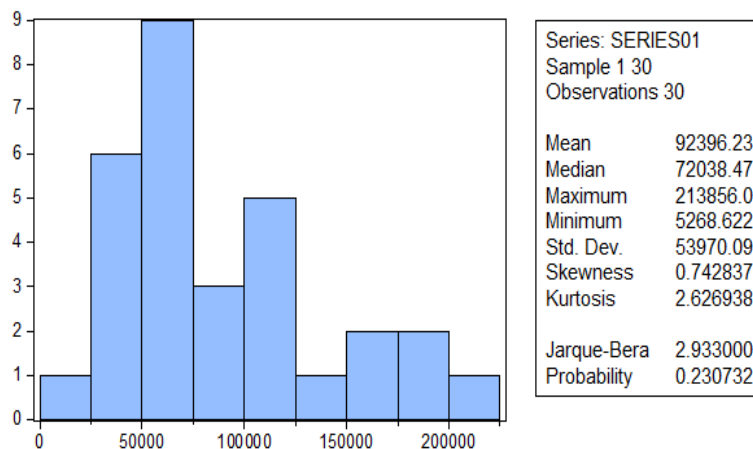


Figure 2: Descriptive statistics of the ratio Ebitda/

## 6.2 Ebitda Margin Analysis

The Ebitda margin is the ratio between Ebitda in our case Ebitda and revenues. Having an intermediate result in the numerator is not influenced by fiscal policy and financial decisions, this indicator is in the practice of business valuation the most widely used indicator to understand the operating profitability of the company, separating it from the financial and investment. So this indicator measures the percentage of operating income in terms of Ebitda compared to revenues of a company. Over the Ebitda margin is higher, the company has a high productivity. This means that the company is able to produce more profits in proportion to their turnover. From the graph n. 3 shows clearly that Deutsche Bank from 2000 to 2005 at a level of Ebitda margin higher Generali and Unicredit, then proceeding with a dramatic decline until 2008 when the trend reverses, but basically cannot get over the other two groups until 2009. By referring to the chart



analysis n. 3, which highlighted the fact that Deutsche Bank had increased production in terms of Ebitda per employee, we need to think again noting clearly that by introducing revenues to calculate the Ebitda margin, the situation changes dramatically. Furthermore, from the graph n. 4 which shows changes in Ebitda of the three groups from 2000 to 2009 it is clear that the Generali has minimal levels of productivity than the other two groups when, looking at the graph n. 3, we can say that from 2000 to 2005 is in line with Unicredit and since 2007 has even margins above Deutsche Bank. This means that the significance of the technical indicators can be manipulated with the individual work items that are used to represent the profitability or profitability of the business with the most varied formulations.

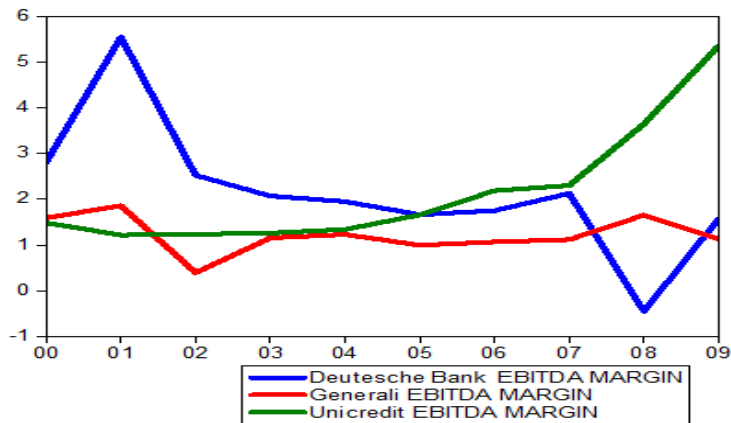


Figure 3: Incidence Ebitda/Profit or Ebitda margin

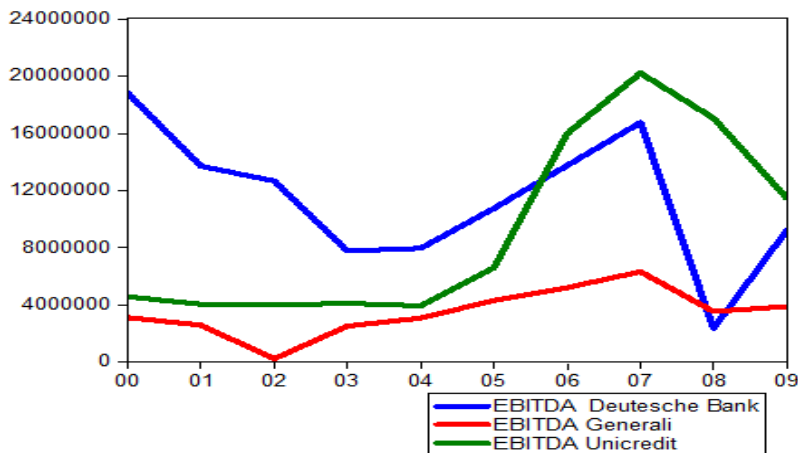


Figure 4: Ebitda trend from 2000 to 2009 of the three groups (data in millions of Euro)

### 6.3 The Method of Multiple

The multipliers referred to as “equity side” includes interest expense (initial configuration is represented by net income – “levered”) and can be expressed in absolute terms or per share value. These indicators will be used to avoid moving away from crucial

representation of the results. The study will cover only multipliers defined “asset side” who pose the numerator is the difference between the market value of equity and net debt (debt - cash) which, in turn, took the name of “enterprise value” (EV), while the denominator is contextualised one of the following business variables:

- a)  $Ebit = (\text{operating income} - \text{operating costs})$
- b)  $Ebitda = (Ebit + \text{Depreciation})$
- c)  $NOPAT = Ebit * (1-t)$  at  $t = \text{tax rate}$
- d)  $UFCF = Ebitda - \text{maintenance investments}$
- e)  $S = \text{sales}$
- f)  $R = \text{operating income}$

Is correct to know all the indicators, but those analyzed concern the relationship between EV (enterprise value) and Ebit, as well as the ratio between Ebitda and revenue. Denominators “asset side” exclude interest expense (starting from the operating result – “unlevered”) and are expressed in absolute value. Another precaution to be followed in the construction of multiple (or “asset” and “equity”) lies in the fact that the quantities company that are in the denominator, to be truly meaningful, they must first be purged of balance sheet items extraordinary and non-recurring, that is will operate the process of “normalization”. Then, once identified and calculated the multiplier, or the group of multipliers, which is believed to be more representative, as the evaluation of the validity of the data through different tests. The final value will be given by the product of the multiplier chosen for the economic variable of each company for which you want to determine the validity of the indicator Ebitda. You will also be asked, of course, due care in maintaining the necessary consistency between the multiplier and economic variable (example:  $EV/\text{Sales Average}$ , resulting from comparable firms, must be multiplied by the value  $S$  (sales) company for which you want to operate the estimate). However, you can achieve that, from the results of two or more multipliers obtained from the average of the data related to companies defined as “comparable” may derive results very far from each other after application of the multiple economic variables corresponding to the company under study. Our empirical case has as its primary objective is to find the values of the multiplier ideal for the “bank-finance and insurance” refer to companies whose securities are listed on a stock market. To produce this result is necessary prior to the choice of the reference companies asking, therefore, considerable care to identify those characteristics that must have similar businesses, and in particular a clear and necessary degree of similarity with the other companies in the sector to evaluate. In our case, the investigation has turned to companies characterized not only by the corresponding productive sector, too, from the European geographical context, size and degree of development, and, by some elements for which it is possible to identify an effective relationship comparison and analogy, including:

- a) the growth rate of cash flows;
- b) degree of risk;
- c) level of indebtedness;
- d) rate of variability of corporate performance choice.

The objective at this stage of data analysis is to build a special table that are listed comparable companies, the evaluation of the three economic indicators containing real data ( $EV/Ebit$ ,  $EV/Ebit$ ,  $EV/\text{Sales}$ ), and as a final result to obtain a range, in correspondence with each indicator/bank, that is an ideal value that would allow an economist to evaluate the productivity and profitability of a hypothetical entity of the same field taken into consideration. After the statistical manipulation of the data, shown

in the graphs n. 5, 6, 7, 8, 9, 10 and by performing an analysis of the results mean, median and standard deviation was possible to obtain an ideal evaluation of multiple specially constructed for our research. The first result that can be seen from the statistics of the three multipliers, since the asymmetry is positive, then the right, which characterizes the sampling distributions. In particular, the single data analysis will be used to correlate the data thus obtained, giving rise to the standard values of multipliers which will serve for the evaluation of the company “x” chosen. It will be necessary to check the table and possibly exclude those companies (and their data) that although characterized, at least at first glance, to be elements of comparability, in the present reality of the multipliers are very distant from the general average, but above all values of (multiple) relating to the company under study. The sample for the observation of each indicator/multiple consists of 30 observations. In particular, as shown in the graph n. 5 is from n. 8, Generali has a level EV/Ebit minimal compared to Deutsche Bank and Unicredit, which essentially have a remarkably similar pattern, except in the period after 2007 and until 2009.

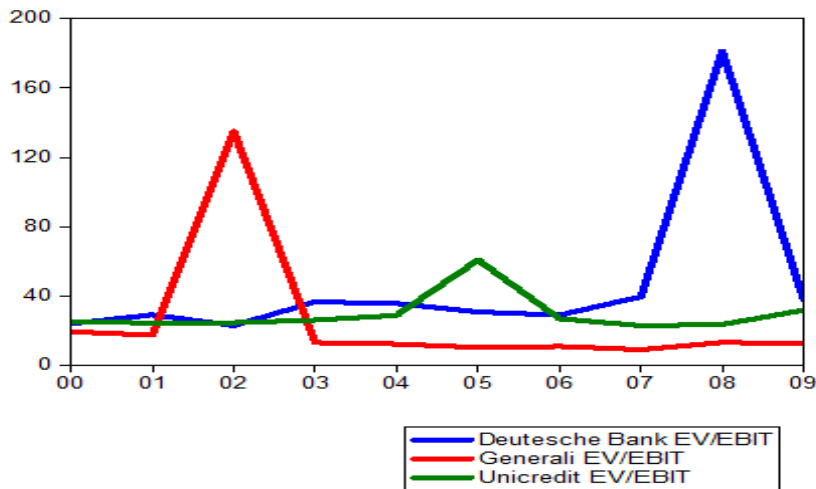


Figure 5: Analysis by the method of multiple (EBIT)

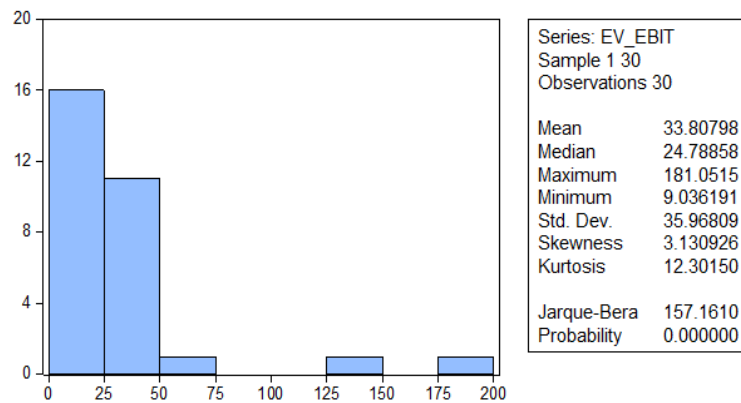


Figure 8: Descriptive statistics EV/Ebit

The multiple given by the relation EV/Ebitda presents a slightly different situation. We

can see from the chart n. 6 is from n. 9, for the three groups will show more or less favorable moments in the decade of reference. As regards the values of the multiple in reference, we can observe that the average value is 31, the median value is 23 and the standard deviation is about 32.

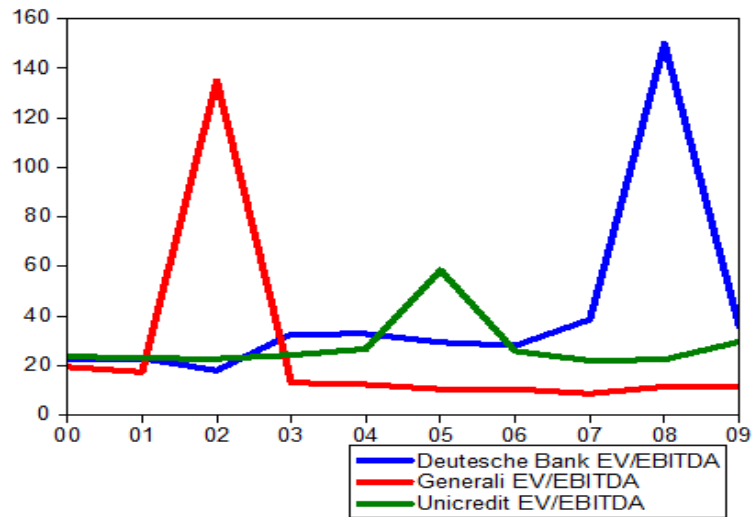


Figure 6: Estimated by the method of multiple (Ebitda)

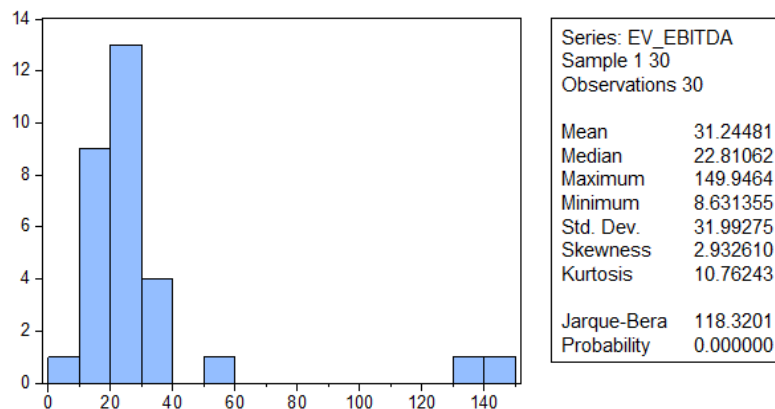


Figure 9: Descriptive statistics estimate EV/Ebitda

With regard to the multiple given by the relation EV/Sales it can be seen that the values are close to zero, in particular for Generali, for the whole reference period, while Deutsche Bank and Unicredit have a remarkably similar pattern, except in the period elapsing between 2004 and 2006, where Unicredit with peaks of maximum. These traits we see in the graph n. 7. While the graph n. 10, there was a statistic that describes the EV/Sales, with an average value equal to 5, median value of 6 and a standard deviation of 4.

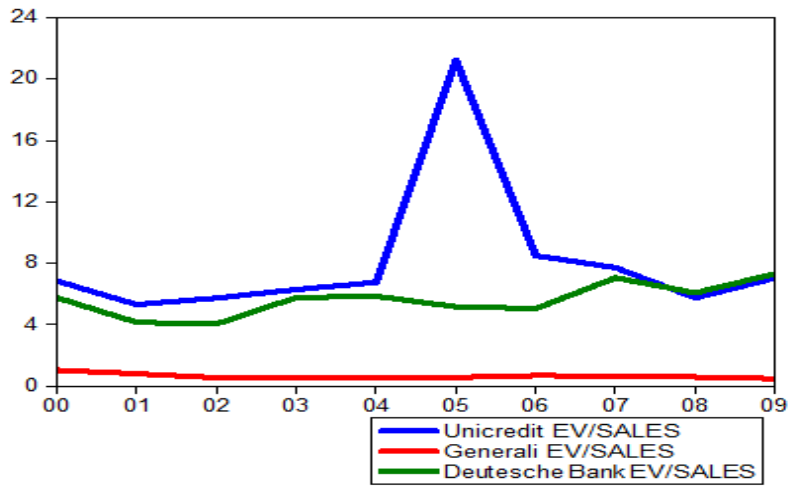


Figure 7: Estimated by the method of multiple (EV/Sales)

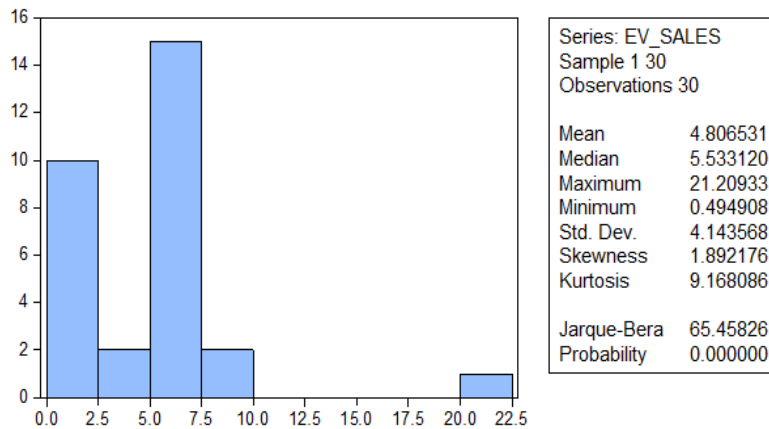


Figure 10: Descriptive statistics estimate EV/Sales

## 7 The Model

In the empirical part to analyze our data we use an estimate of the output of the production function Cobb-Douglas, starting with the following wording:

$Y = A * K^\alpha * L^\beta$ , and log-linearizing and including a stochastic disturbance, we can estimate by the following derivation:

$$\ln Y = \beta_0 + \beta_1 \ln K + \beta_2 \ln L + u$$

where the estimated parameters are:  $\beta_0 = \ln A$ ;  $\beta_1 = \alpha$ ;  $\beta_2 = \beta$

To normalize the data will use the logarithmic transformation of the whole time series. To analyze the parameters related to the production of the three groups (Deutsche Bank,

Generali and Unicredit) and to calculate the total factor productivity for the sample 2000-2009, taking as reference the data in two countries, Germany and Italy was used the function production of Cobb-Douglas formulated according to the description that follows:

$$Y_{it} = A_{it} * K_{it}^{\alpha} * L_{it}^{\beta}$$

where:

$Y_{it}$  is the value added in terms of output produced by the group  $i$  at time  $t$ ;

$K_{it}^{\alpha}$  is the stock of physical capital in terms of Ebitda used group  $i$  at time  $t$ ;

$L_{it}^{\beta}$  is the amount of the factor of production in terms of work done by the group  $i$  at time  $t$ , calculated by multiplying the number of employees by the average per capita income in the country of origin;

$A_{it}$  is a constant value that expresses the second Hicks technological change and introduces a stochastic component in the model.

Technological change is represented by the following equation:

$$A_{it} = \rho^{a_i \gamma_t \xi_{it}}$$

then our log-function is the following:

$$\ln Y_{it} = a_i + \gamma_t + \alpha \ln K_{it} + \beta \ln L_{it} + \xi_{it}$$

Really in our model will adopt a number of assumptions that are likely to significantly reduce the applicability to all circumstances, an example certain limits are as follows:

- the elasticity of substitution between labor and capital is equal to one;
- to changes in relative prices, the capital intensity varies in the same way, that is a limitation to the use of the function in economic analysis;
- is a static function and does not include, therefore, the technical progress.

Such criticism is overcome by modifying the function through the insertion of a trend  $t$ , in our case exponential, as described before:

- assumes the unrealistic assumptions of perfect competition;
- very often assumes the hypothesis of constant returns to scale. Consequently, the Cobb-Douglas is a linear function homogeneous of degree  $\alpha + \beta = 1$ .

In empirical tests that sum is, however, often be significantly different from 1.

Overcoming the assumption of constant returns to scale occurs through specific production functions, such as the CES function (Constant Elasticity of Substitution).

That said, the function will use to process the data and analyze the results, with the limitations that follow, will be as follows:

$$\ln Y = \beta_0 + \beta_1 \ln K + \beta_2 \ln L + u$$

## 7.1 $R^2$ and the Standard Error of the Regression

The descriptive statistics commonly used in multiple regression are (Stock and Watson 2005): the standard error of regression, the regression  $R^2$  and  $R^2$  correct. All three

statistics measure the goodness with which the OLS estimation of the regression line or multiple describes fits the data. The  $R^2$  and the standard error of the regression are two measures of goodness with which the regression line of OLS interpolates the data. The  $R^2$  varies between zero and one, and measuring the fraction of the variance of  $Y_{it}$  that is explained by the fluctuation of the input. The standard error of the regression measures the distance of  $Y_{it}$  from its predicted value. In our case the values of regression of  $Y_{it}$  is equal to: Bank Deutsche  $R^2 = 0.582$ , Unicredit  $R^2 = 0.299$  and Generali  $R^2 = 0.491$ . In view of the fact that a value of  $R^2$  close to one indicates that the regressor and able to predict well  $Y_{it}$ , output, while a  $R^2$  close to zero indicates that the regressor and not able to predict so  $Y_{it}$  reliable, we can say that the prediction of output Deutsche Bank and Generali is moderately reliable, while the Unicredit being very close to 0 is not trusted. The standard error of the regression, or SER (Standard Error of Regression), and an estimator of the standard deviation del'errore regression. Since the regression errors are not observed, calculated using the SER and their corresponding samples, the OLS residuals. The values of the standard deviation of the regression are equal to: Deutsche Bank SE= 0.660, Unicredit SE= 0.716 and General SE= 0.727. The reasons for a standard error so high are described by the fact that the sample size is very small.  $R^2$  grows every time you add a new variable to the regression, an increase in  $R^2$  does not mean that adding a variable actually improves the model fit. In this sense, the  $R^2$  gives an overestimate of the goodness of the regression. A solution to correct this effect is given by deflation or reduction of  $R^2$ . This is the function that performs the  $R^2$  correct. The values of  $R^2$  correct, relevant to our empirical case are: Deutsche Bank  $R^2$  correct= 0.462, Unicredit  $R^2$  correct= 0.099 and Generali  $R^2$  correct= 0.346.

## 7.2 The Production of the Three Groups of Banks

In this case the output or production calculated with the criterion described up to now, we can highlight from the graph n. 11 that, in spite of the fluctuations of the indicators that we met during the analytical and descriptive of our dat. The production of the three business realities is represented by a remarkably similar pattern in the decade under consideration. In more detail, we can observe from the graph n. 11 that the values of production, in absolute terms, oscillate between a minimum of 15 and a maximum of 17 during the reference period. This means that regardless of the number of employees in each individual situation, regardless of the geographic location of the business, in consideration of a fluctuation in salaries and wages calculated according to the statistical average of the country/reference year, and in consideration of a process production characterized by many similar elements (capital intensive, the same production sector, etc.), the productivity potential and profitability of firms in question is not significantly different, in fact the trend is almost in line with expectations stated. To investigate the relationship between input and output in our production function is Cobb-Douglas test was used for statistical Wald, placing a restriction, namely, that the use of capital K is equal to 60% (3/5) compared to productive work factor L which is equal to 40% (2/5). The Wald test is a statistical test, typically used to determine whether an effect exists or not. Therefore, it is examined whether an independent variable has a statistically significant relationship with the dependent variable, in our case has been correlated with the production Y inputs K and L in consideration of the use of the elasticity of the two

inputs, then inserting the restriction above. The results will be exposed in the following conclusions.

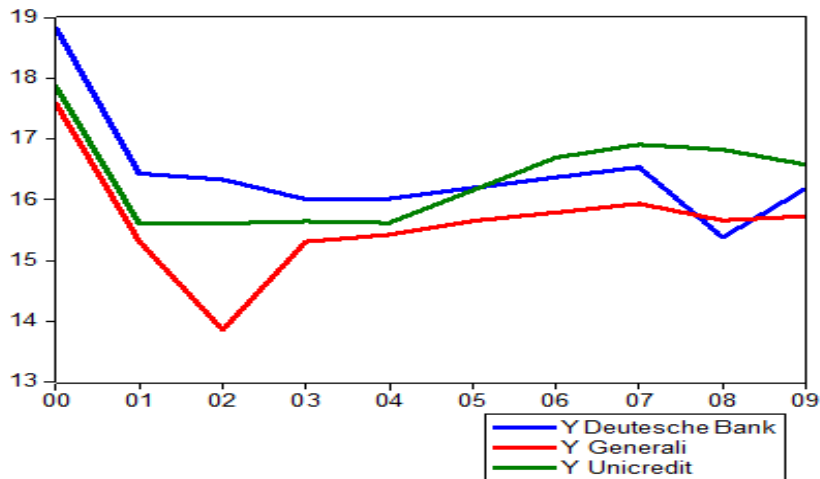


Figure 11: Trend productivity of the three groups

## 8 Conclusion

The study carried out to indicate that the financial ratios can provide useful signals about the behavior of the banking group and its results but not completely suitable to detect the relative position of a company compared to other companies in the same sector without adopting specific measures.

These indexes do not allow to properly compare the results achieved by the banks because they do not take account of their diversity, the economic environment of the country, origin of the structural profile, geographical location and financial aspects of the company. The study of the assessment tool companies has allowed us to analyze the reliability and the critical methods to assess and to identify the trend of a company. During the research it became clear that a single assessment tool cannot be highly representative of the economic situation of a company. The problem stems from the fact that to achieve a level of optimal evaluation tools require complex analysis, but sometimes only the knowledge of these tools requires a heavy commitment to the management and to the company in terms of cost as investors are not able and do not have the tools to be able to do this analysis. In summary we can say that for a correct use of a tool such as Ebitda we have to find a confidence interval constructed by a range of similar indicators from the analysis in context of companies with same characteristics than to compare. To operate in this sense it is necessary to take care in the choice of the productive sector, size, growth rate, level of indebtedness, geographical location, listing on the stock market. Moreover, it is important to make an analysis of all variables that apparently represent the company in a situation that often does not correspond to the economic reality of reference. Carried out this operation, you can proceed extrapolation of business data to be analyzed and they can be compared with those of another company. Basically, if a company is found with high levels of Ebitda and other indicators of profitability or profit, does not mean that reality is



operating according to a logic aimed at growth, or at least in the short term cannot be said with certainty are produced profits. The Wald test used in the paper allows us to state that the relationship between input and output, in the proportions assumed by  $Y = \frac{3}{5} K \frac{2}{5} L$ , is reliable for the values of the Generali Group, moderately reliable for values of Unicredit and not very reliable for the values of Deutsche Bank. The project highlights the relationship between the values being tested and those of alter reality similar company. This aspect is confirmed by the estimates of the production function and values of residuals. In the proposed results, the residual values can be considered “white noise”, and acceptable, because the trend is contained within the confidence bands or confidence intervals. While the other observed values have a remarkably similar pattern, therefore suitable to estimate our sample

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