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ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ  
MSc IN ACCOUNTING & FINANCE

**Title**

**THE EVALUATION OF EBITDA, EBITA & EBIT**

**By**

**THOMAS FERFELIS**

**A Thesis submitted**

**to the Department of Accounting and Finance  
of the Athens University of Economics and Business  
as partial fulfillment of the Requirements for the  
Master's Degree**

**Athens**

**29/07/2019**



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## CERTIFICATION OF THESIS PREPARATION

“I hereby declare that this particular thesis has been written by me, in order to obtain the Postgraduate Degree in Accounting and Finance, and has not been submitted to or approved by any other postgraduate or undergraduate program in Greece or abroad. This thesis has been drafted by me and as so, it presents my personal views on the subject. All the sources I have used for the preparation of this particular thesis are mentioned explicitly with references being made either to their authors, or to the URL’s (if found on the internet).”

[STUDENT’S FULL NAME]

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THOMAS FERFELIS

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## 1. Abstract

For many decades both economists and investors are searching for efficient estimate methods to evaluate companies and create investment portfolios. This need became even more intense after the recent Financial Crisis that started in USA (2007) and expanded in Europe and the rest of the world in 2008. Corporate Boards, Investors and the rests of external users of financial statements focus (or at least pay high attention) on earnings metrics.

Considering the extent of assets values reevaluations that happened during the recent Financial Crisis, compare to the years before and the years that followed, analyzing income evaluation measurements that either exclude or include both amortization and depreciation (as most studies do) seems insufficient for this thesis. This thesis is willing to take things a step further from these studies by separating amortization and depreciation and as a result it compares not two but three earnings metrics: EBITDA – EBITA – EBIT.

The sample period of the empirical analysis is the recent decade and the earning metrics performance is examined in three different time periods (crisis period 2008-2010, after crisis years 2011-2017 and the decade in its entirety 2008-2017). All three income measurements portfolios generate the highest ratios during the crisis years but locate market trends and achieve better informativeness after the crisis years. In terms of enterprise ratio distribution and achieving maximum profitability EBITDA performs better than EBITA and EBIT (though this is linked to higher risks as well). In explaining Portfolios Returns and locating trends, EBIT performs better than EBITA and EBITDA and in terms of explaining Pricing Errors and locating trends EBITA performs better than EBIT and EBITDA. It seems that each measurement can exceed the other two in some field. However, EBITDA has the best performance in terms of total informativeness and utility, EBITA comes second and EBIT comes last.

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## 2. Introduction

Economists and analysts are using a variety of variables in order to evaluate companies and the markets in which they operate. Some of the most important are equity, revenue, expenses and operating income. As for operating income, the two major measurements are Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA), and Earnings Before Interest and Taxes (EBIT). However, the last decades, the continuous increase of intangibles intensity (Eisfeldt and Papanikolaou, 2013) has risen the significance of amortization and has turned the Earnings Before Interest, Taxes and Amortization (EBITA) into a valid alternative. Changes in accounting standards, especially those related with merges and buyouts, the increase use of non-GAAP measures and the trend of increasing investments in intangibles assets are just some of the facts that prove the above statement.

Many studies have been published that present EBITDA and EBIT strengths and weaknesses (e.g. Nissim, and Thomas, 2002, Baker and Ruback, 1999), but as long as EBITA goes, very few studies have expanded their horizon over this metric. I consider the participation of EBITA a necessity due to the major changes in the magnitude of amortization. The amortization increases as a percentage of D&A and the need to examine the effects of this expense in order to understand better a company's future perspectives (mostly the ability to maintain and increase profitability), suggests that: a) EBITA exclusion from this thesis would make it "behind its time" and b) that EBITA must be considered a valid alternative which's value matches the value of EBITDA and EBIT.

This thesis presents all three earnings metrics (EBITDA, EBITA and EBIT), evaluates them and compares them according to their ability to generate information regarding equity evaluation. To accomplish that, the recent decade was selected (2008-2017) as the time period of the empirical analysis. In this analysis, the enterprise value is divided with each income measurement and portfolios are formed using 2 different methods.

The first method is forming portfolios based on the ratio performance on base-year (2008), while the second method selects the mean ratio performance during the entire decade. This decade was selected because a) it tests the measurement under challenging economic states and b) it presents their performance according to the modern needs. The year 2018 was excluded cause many companies still proceed to reforms on their financial statements.

The companies of the fifteen countries that first joined the European Union (beside finance companies) were selected as the sample data. From the above sample, I excluded the companies that had insufficient data availability, generated negative Enterprise Value, became inactive or left the stock market.

So, by describing the European economic environment during the decade, analyzing the intangible intensity trend, stating facts and arguments about EBITDA, EBITA and EBIT and their use, selecting methods and comparing their performance over three different time periods (2008-2010, 2011-2017 and 2008-2017), this thesis has come to the realization that:

1. Creating portfolios using the base year (2008) ratio performance surpasses the usage of the decade's mean ratio performance in matters of portfolios consistency, comparison among measurements and informativeness.
2. The years of financial crisis (2008-2010) portfolios generate higher ratios than the years after (2011-2017), but in the years after the crisis they can “read the market trends better” and generate data of higher informativeness value.
3. All three earnings metrics have strengths and weakness and sectors where each one surpasses the others. However, taking their performance in its entirety into consideration, it appears that EBITDA performs better EBITA and EBITA performs better than EBIT. This means that EBITDA explains why it is the most popular of the three metrics.

### 3. The Economic Environment

This thesis evaluates the three earnings metrics EBITDA, EBITA and EBIT. While most studies that evaluate variables or ratios decide to focus solely on presenting their characteristics, theories, the methodology and the sample used for the empirical analysis and its findings, I consider that providing some facts regarding the economic environment of the sample period and its effects on companies and market behavior will help the reader develop a better understanding over this thesis findings and maybe develop his own.

#### 3.a. The birth of financial crisis

The birthplace of the recent financial crisis is the USA and its source the housing loans. From the early-1980 to mid-2000 decade, banks continuously provided high risk housing loans to less and less reliable borrowers, while in the same time their interest rate dropped to historical low prices. There was no real control/check over the banks back then. In search of profit, banks adopted aggressive policies on housing loans promotion that led to an increase number of house buyers. This resulted to a great increase on the market price of houses. To make things worse, banks and hedge funds increased their already great exposure to real-estate and to housing related debt, by creating or buying investment products that their value and their profitability was related to the market value of those houses and the income from housing debt service<sup>1</sup>.

In the beginning of 2007, the first signs of the coming crisis appeared. The effect of the continuous debt increase was that loaners had to spend more and more money for their monthly payments, due to the increasing debts and their interests which led an increase

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<sup>1</sup> According to Aiginger (2009) the last decades the ratio of household debt/ the US GDP increased from 50% to 100%. The housing loans contributed greatly to this debt increase.

of Non-performing Loans (NPLs)<sup>2</sup>. With more and more households getting bankrupt the real estate market took a heavy blow that reduced the market value of houses to the extent that it was way below their mortgage. That led to even more NPLs, houses confiscations and ridiculously drop to value on the above investment products.

Banks, real estate agents and investment funds received heavy losses.

To obtain a better view to the magnitude of these losses, one has to mention BearStearns' hedge funds losses and Lehman Brothers bankruptcy. BearStearns is a bank that had 2 major high-risk investment hedge funds. These funds losses were so great that in June of 2007, BearStearns provided them with \$3.2 billion loans in order to avoid their bankruptcy and help them regain profitability. Yet, by the end of the next month, a 90% capital loss had occurred (Butler 2014).

As for Lehman Brothers, it was the 4th biggest American Bank, with over \$600 billion liabilities and had signed over 900.000 contracts (future contracts, forward contracts, swaps ect.), whose total value is estimated in trillions of dollars (Christoforou 2011). According to many analysts, while other banks were spared Lehman Brothers was left to bankrupt in order to serve as an example that will lead future company boards and investors into a more responsible behavior. However, due to the bank's size, this last incident created a shock that shattered every wall built to restrict the crisis within the US borders, contributed to countless investment postponements and cancellations and proved that the so-called economic truth "too big to fail" is nothing but a lie.

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<sup>2</sup> There are a lot of cases that borrowers could barely pay their monthly obligations to the banks, yet their debt was increasing. In many contracts the first years of the loan (sometimes even for 10 years) the payments were stable and below the amount of yearly interests. So, when this time period ended, they could not adjust their financings. The most interesting is though that it was common knowledge that in most of these cases the bank employees could predict that this might happen, but they approved the loans anyway. Their assumption was that if they cannot afford to pay the loan, they can just sell the house and they can do it in a higher price than the one they bought it, since their market is price keeps increasing. Some analysts even joked by saying "before the crisis even a baboon could take loans from American Banks".

### **3.b. The financial crisis in Europe (2008-2010)**

In 2008 the crisis officially comes to Europe. In 2008, the European countries recorded losses in their stock markets, the bankruptcy of many companies, household income decrease, massive drop in real estate values, consumption decrease, GDP reduction, increase in unemployment, reduced trust on the bank system that lead depositors to withdraw “safety cash”<sup>3</sup>, increase in the value of gold, silver, platinum and diamonds as safe investments choices, unexpected changes in currency exchange rates<sup>4</sup>, political and social instabilities and a variety of other economic problems like investments postponements and cancelations. A good example of the crisis impact is the economic collapse of three major Iceland banks in October 2008: a) Glitnir, b) Kaupthing and c) Landsbanki.

Beside the above, the financial crisis brought to surface the National Debt Issue. European Nations adopted specific policies in order to support the economy such as: buying out and merging key companies, the central bank guaranteed bank deposits, loans guaranteed by the state where provided to businesses, preferred stock was bought to enforce the companies’ equity, the tax and interest rate were reduced and a variety investment supporting laws were issued. For many countries, these policies combined with income reduction, chronic problems in the economy and the already high existing debt lead to a major increase in National deficits and debt. As a result, the value of their bond dropped and the investors demanded high rates for buying new bonds.

Generally, the countries whose economy was based in industrial productivity, exports and were less vulnerable to household consumption changes managed to recover their economy within the three years time period (2008-2010), even if they had relatively

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<sup>3</sup> “Safety cash” is an amount of cash that a depositor does not need for his current transactions yet, he withdraws it anyway, because he believes that there is a chance of bankruptcy or that capital controls might be set. This amount of cash can be either the amount that the depositor deems necessary in order to cover his needs for a mid-time period or even his entire deposits. Factors like potential withdrawal penalties (e.g. interest rate penalty), amount of total deposits and risks estimations (e.g. having his withdrawal cash stolen) affect the amount of “safety cash”.

<sup>4</sup> Table 1 Appendix 2 presents some currency exchange rates for period 2007 - 2017

high debt. However, countries that did not meet these characteristics needed far more time to recover (some are still recovering). In Europe, these countries were mostly located in the southern area and Greece, Italy, Spain and Portugal are the most famous debt crisis cases. During or after the crisis years, all countries proceeded to expenses cuts in order to keep or return their finances back on track and to secure funds. However, high debt crisis countries had to adopt extreme budget cuts and income recovery measurements in order to avoid going bankrupt and loss of any accessibility to future funding. Naturally, austerity measures in broken economies had a huge negative impact to the countries' companies and the stock markets.

To reduce their debt costs and support their economies, the European Central Bank took the role of the supervisor of other banks, bought national bonds and reduced the interest rate. In 2010 the EFSM, ESM and EFSF were created as mechanisms that will deal with crisis in Europe and help countries achieve economic recovery. Within the decade 2008-2017, a total of 8 countries entered an economy recovery program: Romania, Hungary, Latvia, Cyprus, Portugal, Ireland, Spain and Greece. Each program though was linked to economic supervision and adoption of specific economic policies.

### **3.c. The years after the financial crisis (2011-2017)**

The financial crisis led the investors to look for more secure investments opportunities. In Europe a trend of capital transfers has been recorded. To be more precise, investors, funds and firms transferred capital from southern to central and northern Europe where the bank system was deemed to be more reliable and the economic climate more stable. Bonds rate followed a similar course. Actually, the preference in low risk investments reached this magnitude that the so called “risk safe national bonds” have managed to literally reach a negative rate at some points.

While some countries earned great benefits from the above trends, like the low rates and the capital transfers, managed to reform their economies, reduced their national debt and achieved economic development, others had to proceed to recovery programs. The table below presents these countries, the type of crisis and the program duration.

Country	Greece	Spain	Ireland	Portugal	Cyprus	Latvia	Hungary	Romania
Crisis	Competitive Financial	Real Estate Banking	Real Estate Banking	Competitive Financial	Banking	Banking Financial	Banking Financial	Banking Financial
Program's Duration	2010-2018	2012-2013	2010-2013	2011-2014	2013-2016	2008-2011	2008-2011	2009-2015

However, the number of countries that performed well during the second time period and the total the size of their economy exceeded those that faced major problems. Furthermore, Eurozone has proven that despite cultural and interest diversities it maintained itself and evolved to act more effectively in future.<sup>5</sup> As a result, if we consider/examine Europe as a single unit/economy, we can see that its economy and its companies performed well during this time period despite the difficulties.<sup>6</sup>

<sup>5</sup> Stress tests, Safety Reserves for banks and insurance companies, policies that enforce auditing procedures, debt national supervision, commissions that search for potential crisis and come up with countermeasure policies, EFSM, ESM and EFSF are a few facts that prove that Europe has improved dramatically in Crisis confrontation preparation. This helped deeply the economic climate.

<sup>6</sup> Mnimoniums and Austerity Programs, Difficulties in National Funding, Bond Haircut, Diversity among Nations over the selected Political and Financial actions, strong tendency for Eurozone dissolution (E.G. Potential GREXIT in 2015), Russian Invasion in Crimaia and of course Brexit (2017)

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## 4. Intangibles & Amortization

Time brings change and companies as a living organism evolve in order to be able to survive in this constantly changing environment. Over the last decades the source of all firms' amortization and its percentage compared to earnings and D&A meets constant change. To better understand this phenomenon, one has to understand the new industry trends of investing on Intangible Assets.

Knowledge has become the engine that moves the industry and society towards development. Especially in the new millennium, the trend of evolving the companies' capital composition towards a gradually increasing percentage of intangible assets / total assets, has become extremely intense<sup>7</sup>. These assets often include high value information databases, employee training educating systems, software, marketing assets, technological development techniques, management structures, licenses, customers and suppliers' relationships, patents and other types of intellectual capital (Eisfeldt and Papanikolaou, 2013). The fact that an innovation in software is able to rise a company's value (e.g. Facebook, Google) to billions of dollars, surpassing the value of companies with hundreds of factories and thousands of workers worldwide, demonstrates the modern shift on our economy. Industrial-based economies are either being gradually altered to knowledge-based economies or are evolving into a mixed model that combines elements of both (e.g. USA, Germany, UK).

The dynamic behind the increase of Intangibles assets as a percentage of total assets is located a) partly in the changes in the modern economic environment that create a necessity in increasing the intangibles assets for the sake of company's normal

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<sup>7</sup> Leonard Nakamura of the Federal Reserve Bank of Philadelphia estimated that in the USA, the investments in intangibles assets in 2000 managed to exceed the amount of \$1 trillion and that in the same year, the capitalized value of these intangible assets surpassed the insane amount of \$6 trillion. This estimation was the product of 3 different measures a) an estimating the investments value in R&D software, brand development and other intangibles using accounting methods, b) the payed cost in personnel, like researchers and technicians, who work in order to create intangible assets and c) evaluating the improvements to intangible factors by examining the operating margins.



functionality (this trend is observed in all industries) and b) mainly to the fact that highly demanding knowledge industries like software and AI development, robotics, pharmaceuticals, legal – accounting – auditing – consulting services, clean energy and healthcare have become a pole of attraction for new firms that are fighting to claim a position in these growing and promising developing markets. Many governments support these markets by adopting a variety of policies in their favor.

An interesting fact about intangibles assets is that company buyouts and merges effect their value in accountings books. It is common knowledge that as companies grow and improve their financial state and their market position, they often proceed to merges or companies' buyouts in order to gain advantages over the competition, expand to other markets or raise their future value. However, merges and buyouts result in replacing the former book value of intangibles assets. The estimated fair value at the day of the merge or the buyout becomes their new value.<sup>8</sup> To help the firms estimate and include the value of the intangible assets to their balance sheets, the accounting standards have been revised on 2002<sup>9</sup> and on 2007<sup>10</sup>.

In order to better understand the increase significance of intangibles assets Diagram 1 (Appendix 2) presents the trend of Intangibles as a percentage of Intangibles and PP&E<sup>11</sup> throughout the decade. It is easily observed from this diagram that the percentage ratio for both mean and median has been dramatically increased over the decade while the standard error remained close to zero. On the same time, it must be stated that this dynamic gradually slows off over the time. This is something well expected since no matter how far a company is willing to invest on intangibles assets,

<sup>8</sup> One common example is that of a patent which a company has developed before its buyout. Initially, the patent is not reported on the company's balance sheets but after the buyout the patent becomes recognized according to the prize payed for its acquisition.

<sup>9</sup> The SFAS 141 & 142 revise has: a) put an end to the pooling-of-interests method, b) demanded a much more accurate identification of intangibles assets that distinct them from company's goodwill c) allowed companies to avoid goodwill amortization

<sup>10</sup> The SFAS 141 revise has majorly altered the philosophy of the previous acquisition methodology

<sup>11</sup> PP&E = Plant Property & Equipment



the existence of tangibles assets will always be a requirement for a company's existence. As so, no matter the market (e.g. USA, Europe, Asia ect), it is fair to expect that after reaching the percentage of 40% (or even sooner), the Intangibles/ (Intangibles + PP&E) ratio will continue to increase with a decreasing pace.

Regarding amortization, Table 2, Diagram 2 & 3 (Appendix 2) contain a variety of data. Table 2 presents the ratio of amortization to EBITDA and D&A (for decade 2008-2017). According to table 2, high knowledge-based industries have high Amortization/ D&A ratio while low knowledge-based industries have low Amortization/ D&A ratio. In addition, Amortization/ EBITDA ratio does not follow a specific trend. This can be explained from the following facts:

- a) There is a huge diversity in EBITDA performance between the two time periods (2008-2010, 2011-2017) for each industry.
- b) Due to the rapid changes in economic environment throughout the decade, most firms proceeded to asset value and usage utility reevaluation and performed adjustments. As a result, the yearly estimated amount for each industry's depreciations and amortizations was adjusted accordingly.

These two facts also explain why where the ratio of Amortization/ EBITDA ratio during the decade does not follow a specific trend (Diagram 2). In addition, the ratio of Amortization/D&A is gradually increasing during the decade.

The skepticism over the comparison and evaluation efficiency of a single earning metric combined with the continues increase of amortization significance gives birth to A new approach for the users of Financial Statements. This approach contains to study the results of depreciation and amortization separately generating a deeper understanding over their significance as an expense and obtain a more accurate view over a company financial status. To accomplice that the user need emphasize to three measurements of operating income.

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## 5. EBITDA – EBITA – EBIT

### 5.a. The three earnings metrics

EBITDA, EBITA and EBIT are well known around the globe as the three earnings metrics. An alternative definition is the three income measurements. The reason that the number three is indicated in both cases is the fact that they are the most famous measurements and the economist concentrate a tremendous amount of effort into analyzing these metrics and the information they provide. Their common characteristic is that all three metrics add to earnings both interests and taxes. According to some studies, the philosophy is based on the belief that outflows relevant to earnings must be added back to them in order to present the firm's true performance and profitability. Sengupta (1998) support this argument over the interests and Laux (2013) over taxes.

Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) is presented in more studies and thesis than the other two and most firms have a preference to EBITDA as a method to inform the public over their financial state – earnings<sup>12</sup>. It is relatively easily calculated from the data that balance sheets and income statements contain. Economists consider it is an alternative of earnings and depending on the circumstances, net income. EBITDA is commonly used as a way to estimate a company's ability to pay back debt in mid-term, profitability comparison and stock value estimation. One of 1980s characteristic was a trend for buyouts and merges. EBITDA was widely used for firms' value estimations and for leveraged buyouts (LBO). Precisely, many companies examined other companies that were in need of

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<sup>12</sup> Analysis prove that firms, in their annual reports for 2017, mention EBITDA at least once by a rate of 24.8% and at least three times by a rate of 14.8%. As for press releases, this rate becomes 17.8% and 16.5% accordingly. This preference is based on two factors: a) most analysts and investors prefer the use of EBITDA and b) can create a "better company image" to the public. Since its amount is bigger than EBITA and EBIT it can be used to present an image of a higher profitability firm to people who will not study in deep a company's financial statements, especially for high D&A companies.

reforms and financing and proceeded to LBO. The use of EBITDA was excessive that period, as a method of estimating a company's ability to pay back the debt.

Earnings Before Interest, Taxes and Amortization (EBITA) is commonly used as EBITDA's alternative. It is usually calculated as EBITDA minus Depreciation or as EBIT plus Amortization. Assets value decreases over time and Depreciation is what records these losses on a company's accounting books. A common expression for Depreciation is: "It's the wear and tear on the equipment and facilities". Oil production, manufacturing and telecommunications industries invest a major amount of their funds available in equipment and infrastructure. EBITA measurement, which contain depreciation, may be preferable for companies that have substantial capital expenditures since it presents a better view over their ability to maintain profitability against factors that generate high depreciation effects .

Earnings Before Interest and Taxes (EBIT) presents total profitability. Most commonly, it is calculated as revenue minus operating expenses. EBIT is actually the operating earnings/ profit. EBIT is mostly used for companies with high significance fixed assets. The Physical Property, Plant, and Equipment (PP&E) is usually financed through debt which results to high-interest expenses in yearly bases. Capital intensive industries have usually high-debt companies, but the amount and the intensity of the debt differs. With EBIT, investors exclude interest while observing the effect of PP&E amortization on profitability.

### **5.b. Comparison**

EBITDA is the metric that excludes both Depreciation and Amortization expenses from earnings when measuring operating income. There is a constant debate between economists who deeply support this exclusion and the economists that stand against it and support the usage of EBIT over EBITDA. I present some really strong arguments from both sides.

Supporters of D&A expenses exclusion claim:

1. While D&A are extremely important expenses for every company, there is some “some liberty in estimating assets useful lives and salvage values”. This “liberty” also exists when measuring assets costs, deciding their amortization policy (e.g, if they should be subjects or not) and when measuring impairment losses. Generally, managing the amount of D&A is easier in Intangibles assets than in Tangibles assets. In any case, earnings management through D&A “miscalculations” is not an unusual phenomenon which reduce the informativeness of financial statements and cannot be specified due to its variation over both companies and time.
2. Revenue is a dynamic variable that presents the continues changes over the company’s financial state. It reflects current prices while the majority of expenses are static and present values on historical costs. Assets Depreciation is affected by the assets age and the country’s yearly inflation rate. Since both factors are dynamic there are depreciation distortions. Furthermore, firms reported and economic earnings can be different since the timing that the firms select to purchase assets varies according to their needs. As so, combining static and dynamic variables decreases the comparability of earnings between time periods.
3. Regarding assets replacements, all companies have at least some control over the timing of their outflows or they might postpone investments to capital expenditures. This fact raises EBITDA credibility as measurement of a company’s short-term debt service ability. However, one must state that in mid-term and especially in long-term, ignoring D&A generates risks.



4. Sometimes, even if financing costs should be presented separately on company's statements, they are not excluded from depreciation. Buildings, are good examples of tangible assets that a company usually needs years to complete and uses debt to partly or even entirely to fund their construction. This procedure continues until the building process ends and the assets get ready.<sup>13</sup> Later, this interest becomes subject to depreciation creating a distortion for EBIT. Finally, depending on the how a company funds and designs the building process, a different mixture of capitalizing interest and reporting assets or depreciation may occur creating earnings comparison issues.
5. D&A expenses are not suited for examining highly capital-intensive and leveraged companies that have high amortization and depreciation expenses. These trends become more intense if the companies present low or negative profitability. The reasons are a. that negative earnings create evaluation difficulties for the analysts and b. that they are deeply in debt, with high interest expenses. These facts that give birth to a need of estimating the amount of earnings available for debt payments.

On the contrary supporters of D&A expenses inclusion claim:

1. In manufacturing firms, the use of EBITDA gives birth to a noticeable error (Nissim, 2017). The total amount of D&A is not located only in the cash flow statements but in cash flows and in SG&A expenses, in E&D expenses and in cost of goods sold (COGS receive the greatest amount). Furthermore, part of D&A expenses can be added in both work in process and finished goods inventories sections of the firm's balance sheet. So, the cash flow statement D&A, which is added to EBIT in order to calculate EBITDA, includes capitalized amounts that they haven't been expensed leading to an overstated EBITDA. This effect is balance by prior year D&A that were capitalized and

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<sup>13</sup> Naturally, most companies decide to include interest on their assets value. This way they improve their financial statements affecting the market value of their shares and company's board bonus.



expensed the current year (mainly in COGS) but are excluded from current years income. This mobility of D&A expenses over variables and accounting years creates errors that reduce the informativeness of EBITDA.

2. Considering that EBITDA focuses on labor expenses and ignores assets related costs and that capital and labor intensity differs among companies, its use may provide the common investor with false assumptions over a firm's enterprise value. Furthermore, while operating leases affect EBITDA, capital leases and debt financed assets purchases do not. So, in addition to EBIT, assets management decisions (renting vs acquisition) and capital intensity can make two companies with similar economic profitability have high diversity in EBITDA.
3. The exclusion of D&A makes an income measurement more vulnerable on earnings management policies. By adding unrelated costs to assets as building, improvement or purchasing costs, a company can improve its income statement by including them to its balance sheet. Two common examples are a) adding the personnel's training expenses over the usage of a new machine on its purchase costs and b) machines, plant and buildings repair and maintenance expenses to be reported as improvement costs. While these policies affect both EBIT and EBITDA, the inclusion of D&A on the earning metric allows an overtime correction, since these capitalized period costs will be eventually expensed, while by adding to earnings the amount of D&A creates permanent errors. Generally, low or negative profitability companies that face credit difficulties can be really creative in finding ways to increase EBITDA.<sup>14</sup>

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<sup>14</sup> EBITDA is widely used from investor, funds and bank institutions as a measurement for estimating a firm's ability to pay back debt in the mid-term. A higher EBITDA might raise a firm's chance to get a loan.

However, there are also economists who support the inclusion of Depreciation expense and the exclusion of Amortization expense, supporting the usage of EBITA (known as the middle ground). Taking the above arguments into accounting they claim that illustrating the depreciation effects on earnings generates more advantages than disadvantages. The main arguments of this debate are:

1. Most Intangibles assets that a company internally generates will not affect its estimated value and earnings, since expenses related on developing Intangibles can rarely be amortized. However, when a company acquires another company, intangibles assets are recognized, a certain life time gets estimated and the amortization begins. That means that EBIT will be understated compared to EBITA. This can be understood by the following example: Company A acquires company B in order to improve her position in its market. They are identical, invest in R&D every year (15 million euros), have no amortizations and present the same EBIT and EBITA (50 million euros) for the current year. After the buyout company A has to recognize intangible Assets (pc software and patterns, 70 million euros total value) and amortizations (10 million euros for the current year). While before the buyout the combined EBIT and EBITA is similar (100 million euros) after the acquisition of B from A, EBIT will be understated (EBIT = 90 million euros and EBITA = 100 million euros).
2. The example above is highly criticized because it is functional under the assumption that the benefits of a company's past investments on developing intangible assets will be equal the costs of current investments on developing intangibles. In fact, newly founded companies tend to have low or negative income, low revenue and their development investment costs/ revenue ratio is usually high. In time, both numerator and denominator increase. More precisely, the "natural" course is that after a few years the denominator gains higher percentage increase than the nominator (decreasing the above ratio). As



companies mature, they reach scale and achieve profitability. This allows them compensate for previous years expenses and losses. Therefore, amortization expenses exclusion on the years before a company's acquisition but inclusion of its earnings will lead to overstating its ability to generate profits.

3. Finally, analysts argue that while the effects of expenses should be taken into consideration, they must be excluded when the possibilities of expenses manipulation are beyond a certain degree. Auditing depreciation expenses is easier than amortization expenses. Depreciation expenses can be manipulated to some point but auditors can check accounting policies through a variety of factors and demand corrections. This procedure is far more difficult over amortization expenses. Therefore, EBITA is considered a more valid measurement than EBITDA.

To sum up, all three income measurements have both strength and weakness. To better estimate their informativeness abilities and test the result of their usage on the actual market I develop a certain methodology.

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## 6. Evaluation Methodology

In order to be able to compare the information that EBIT, EBITA and EBITDA can provide in terms of equity valuation, I calculate three ratios that are equal to the Enterprise Value divided with each of these three measures of Operating Income.

I next report in detail the procedure used for calculating the above ratios. These ratios will be used in order to create portfolios from which I will use later in order to extract data, analyze them and come to conclusions.

### 6a. Equity Evaluation History

The roots of Equity Evaluation Technics are hundreds of years old. A century ago, the stocks values were based on metrics such as P/E and P/B multiples, but the dividend yield<sup>15</sup> was the main player. Analysts claim that until 1958 “The emphasis on dividends was well placed, as the yields on stocks remained consistently above those of investment-grade bonds”. The investor of that time started to realize that bonds had low risk compare to stocks and thus stock should yield more dividends than bonds. This realization however did not affect the market to the expected extent and stock dividend yields remained below bond yields. Only the financial crisis half a century later changed that fact.

Merton Miller and Franco Modigliani made a great contribute in the economic thought in 1961 with their paper “Dividend Policy, Growth, and the Valuation of Shares”.

They asked the following question: “What does the equity market discount?” To this question they considered four possible answers: a) the possibility of creating value in the future, b) the stream of earnings, c) the current profitability and d) stream of dividends. All four of them collapsed when checked in the model of stock value as a value of future cash flows .The reason is that the model is based on researcher’s

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<sup>15</sup> To begin with, Benjamin Graham and David Dodd’s (1934), Security Analysis, “suggested the dividend rate and record, earning power, and asset value are the basis for common stock valuation”. Later John Burr Williams (1938) formed and presented to the public a dividend discount model.

estimations that affect the output greatly. Even if there are correction methods, this problem leads most practitioners to avoid the discounted cash flow (DCF) model. Nowadays, Practitioners and analysts are concentrating in multiples, since they are considered a summary of an entire valuation process.

Enterprise Value/ Earning Metrics are the extremely popular multiples<sup>16</sup>. The reason is that Enterprise Value (EV) itself is an important information for both analysts and practitioners that can be calculated with a variety of methods. The method is selected regarding the needs and the effort that one is willing to pay. When a ratio is added its informativeness gets even higher. As I presented before, all three metrics have strengths and weaknesses. To get a better view, most analysts choose to examine at least two (EV/ Income Measurement) ratios.

### 6.b. Enterprise Value (EV)

The most common and simple way to calculate Enterprise Value (EV) is:

$$EV = MC + TD - C$$

Where:

MC = Market Price

TD = Total dept

C = Cash & Cash Equivalents

However, this method is not proper for this study which is trying to take a step deeper into the evaluation of the three measures of Operating Income.

Therefore, the calculation of the Enterprise Value (EV) is generated by the following formula:

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<sup>16</sup> A survey discovered that in a sample of nearly 2,000 investors, 93% is using multiples as a part of the evaluation procedure and from this 93% a total 77% uses EV/EBITDA

$$EV = MVE + CC + PS + TD - EXCSTI - EMI - OLT I$$

Where:

MVE = Market Value of Equity

CC = Contingent Claims

PS = Preferred Stock

TD = Total Debt

EXCSTI = Excess Cash & Short-Term Investments

EMI = Equity Method Income

OLTI = Other Long-Term Investments

The market value of equity (MVE) is measured by multiplying the number of Common Shares Outstanding (CSO) with the Market Price of each Share (MPS) at the end of each year.

$$MVE = CSO * MPS$$

The methodology for selecting the approach which is used for estimating the Value of Contingent Claims is discussed in Appendix 1.

The Value of Preferred Stock (PS) is estimated by using the perpetuity model. Specifically, I divide the Preferred Dividends (PD) with the Cost of Equity Capital (CEC).

$$PS = PD / CEC$$

The Cost of Equity Capital is equal to the sum of the Median Beta (MBETA) of each Industry<sup>17</sup>, the Equity Risk Premium (ERP) provided from Damodarans Webpage<sup>18</sup> and the Risk-Free Rate (RFR).

$$\text{CEC} = \text{MBETA} + \text{ERP} + \text{RFR}$$

The Risk-Free Rate is equal to the 10Year Bond rate of Germany, for the Companies whose headquarters are in Countries within Eurozone (11 countries out of 15 have Euro as their currency). For the rest (United Kingdom, Sweden, Denmark and Ireland) the Risk-Free Rate is equal to their own 10Year Bond rate. This method was selected because it is commonly accepted that Germany a) is the most stable country financially b) has currently the lowest Bond Rate c) affects more than anyone the economic policy of the Entire Eurozone and d) investors in the Eurozone consider the German Bond as to the most secure (Risk Free) investment.

As for the estimation of Excess Cash and Short-term Investments, most analyst choose to remove from all cash, cash equivalents, and short-term investments the value of debt, assuming that if a company manages to pay back its debts, there will be remaining funds which can be used to generate operating income.

$$\text{EXCSTI} = \text{CSTI} - \text{DEBT}$$

However, since in many cases we face two major problems regarding the estimation of ST Liquid Funds:

- a) the book and fair value of the tax basis is usually different (with the book to be usually way lower than the fair value)<sup>19</sup>
- b) most companies use a fair amount of these funds in order to operate

<sup>17</sup> Table 3 Appendix 2

<sup>18</sup> <http://pages.stern.nyu.edu/~adamodar>

<sup>19</sup> The usage of historical cost for short term investments and the earnings of foreign subsidiaries are the two main reasons for this phenomenon

Considering the information available on Datastream and the adjustment that must be done, I select a different approach for estimating the Excess Cash and Short-Term Investments. The amount of Cash, Cash Equivalents, and Short-Term Investments required for a firm to withhold is related to: 1) Revenue 2) Industry Characteristics.

Taking these two facts into account and knowing that any firm would prefer to keep Excess Cash and Short Term Investments than dealing with the possibility of insufficient liquidity and operating difficulties, I estimate the amount of Excess Cash and Short Term Investments (EXCSTI) as the amount of Cash and Short Term Investments (CSTI) minus the Short Term Required Liquid Funds (STRLF).

$$\text{EXCSTI} = \text{CSTI} - \text{STRLF}$$

The Short Term Required Liquid Funds (STRLF)<sup>20</sup> is calculated as the company's Revenue (REVENUE) multiplied by a Ratio. The Ratio must be equal to the company's Cash and Short Term divided by the company's Revenue and in order to avoid extreme ratios, the mean percentage derived from the lower quartile of the distribution from the industry of each firm is selected for every company.

$$\text{STRLF} = \text{REVENUE} * \text{RATIO}$$

$$\text{RATIO} = \text{CSTI} / \text{REVENUE}$$

Of course, since Excess Cash and Short-Term Investments cannot take a price below zero. In the extreme case that a company's Short Term Required Liquid Funds > Cash and Short-Term Investments the minimum available estimation of the company's Cash and Short-Term Investments of the year is selected instead.

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<sup>20</sup> According to Bates, Kahle, and Stulz (2009), an industry's characteristics and trends can explain to a large degree the correlation between cash withholding and cash flows. The need for Liquid Funds becomes more intense if a) a firm has difficulties in obtaining credit and b) a firm has high fixed costs and a high revenue reduction is accompanied with a relatively low-cost reduction.

The book value of Total Debt, Equity Method Income and Other Long-Term Investments at the end of each year is used for the estimation of the Enterprise Value. Though using the fair value instead of the book value would be preferable, unfortunately Datastream does not provide enough detailed data in order to generate a secure fair value estimation.

### 6.c. Enterprise Value Multiples

To evaluate the three valuation measurements of Operating Income: EBIT, EBITA and EBITDA I first find the Enterprise Value, using the method I described before, and then I divide this Value with each of these measurements. I follow the above procedure for a ten years period (2008-2018).

At first, using these three multiples seems an effective comparison method, however there is a possibility that a mitigate error appears. Therefore, certain adjustments can be done. When a price comparison numerator like Enterprise Value is used along with a flow denominator like EBITDA which is generated throughout the year, an alteration of the capital that generates the denominator within the year will result to errors. To deal with this error I adjust the EV multiples using as in the example below.

We take two firms – X and Y – that are in the same industry have the same EBITDA, invested Capital and Enterprise Value Consider. One could consider these firms identical in every way possible. In 30/12/20X9 the X firm issues equity in order to proceed to a big investment project. A raise in the Estimate Value occurs as a result of this investment project, however EBITDA will be unaffected because this investment had not the time to contribute in 20X9 earnings at all. As a result, the comparison

between X and Y firms EV/EBITDA will be problematic. To solve this problem an adjustment that takes under consideration potential changes in equity must be generated. Precisely, a Capital Growth Factor (CGF):

$$\text{Adjusted EV/ EBITDA} = (\text{EV/ EBITDA})/ \text{CGF}$$

$$\text{CGF} = W_s * (\text{Outstanding Shares/ WA Shares}) + W_d$$

For  $W_s$  and  $W_d$  weights we divide the Value of Equity (VE) and Total Debt (TD) with Total Assets (TA).

$$W_s = \text{VE/ TA}$$

$$W_d = \text{TD/ TA}$$

Ideally,  $W_d$  would be multiplied with a ratio that estimates debt changes like:

$$R_d = \text{Year End Debt/ Average Debt.}$$

However, the average debt was not an available data. So,  $R_d$  was equalized with 1.

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## 7. Sample – Data - Portfolios

The companies from the fifteen countries that first joined the European Union, known widely as the Europe of fifteen, for a ten years period (2008 – 2017), were selected as this thesis sample. The countries are presented in the panel below.

Countries				
Austria	Belgium	Denmark	Finland	France
Germany	Greece	Ireland	Italy	Luxemburg
Netherlands	Portugal	Spain	Sweden	United Kingdom

Athens University of Economics and Business provided access to Datastream which became the main source of data that were used for this thesis. The few other data sources that were used are mentioned in References. Data are usually collected and examine with one of the three following methods 1) annually, 2) monthly and 3) Quarterly. I selected the annual method and used Stata Program for data processing.

From the above sample, Financial Companies, Companies that Enterprise Value (EV) reached a negative price, those that became inactive within the decade or left the stock market and those that the data available were not sufficient enough to be included in the sample without creating comparison errors among time periods or portfolios<sup>21</sup> where excluded from this sample.

<sup>21</sup> E.g. The Datastream database includes EBITDA and EBIT variables but not EBITA. There were companies that had different EBITDA and EBIT values on 2008 but the Amortization and Depreciation amounts were not available on Datastream, making the calculation of EBITA for those companies impossible, thus leading to smaller EV/EBITA portfolios (method 1). Other companies had the amount of some variables available (variables necessary for Enterprise Value estimation) only the years after the crisis (2011-2017). Obviously, cases like those were excluded from the sample.

For each of the three measures of Operating Income five Portfolios composed with the same number of companies were formed. After calculating the Enterprise to Operating Income Measures multiples two methods of forming portfolios were selected.

1. The companies were sorted from lowest to highest EV/ Operating Income Measure ratio in 2008 and the five Portfolios were selected accordingly.
2. The companies were sorted from lowest to highest mean of EV/ Operating Income Measure ratio throughout the decade and the five Portfolios were selected accordingly.

Because the first three out of ten years, that this thesis has selected as its sample period, are the years of the great financial crisis, it is valid to examine which portfolio selection method will generate better results. To be able to accomplish this task, both methods will be evaluated in three time periods.

- a. The three years of the Financial Crisis (2008 - 2010)
- b. The seven years after the Crisis (2011 - 2017)
- c. The entire decade (2008 - 2017)

## 8. Empirical Analysis

To evaluate EBITDA, EBITA and EBIT, first I have to compare the data that two methods I use to create Portfolios provide and select the one I deem to be more valid. Then I compare the informativeness they provide on equity evaluation with this method.

### 8.a. Comparing Method 1 & 2

In all three time periods, the ratio's price range is quite higher when the mean ratio method is used. Considering that the panels ratio is the mean of the ratio prices that each portfolio has in every time period, this proves that method 2 can better distribute the sample among portfolios regarding their ratio performance at each time period. For example, regarding EV/EBIT ratio, method 1 generates a price range of (-6.91, 17.95) in time period 1, (3.07 , 10.01) in time period 2 and (0.34 , 12.23) in time period 3, while method 2 generates (-18.98 , 30.91) , (-13.73 , 25.64) and (-15.16 , 27.34) price ranges accordingly. On more factor that proves method's 2 superiority over ratio distribution is that portfolio 4 in both EV/EBITA and EV/EBIT ratios a higher ratio in 2011-2017 time period than portfolio 5.

Regarding Pricing Errors (PE) and Portfolios Return (PRET), what matters most is if a method creates portfolios that follow some certain trend and if this trend can lead analysts and academics to economic conclusions or help other users in making investing decisions. While method 1 creates trends over both PE and PRET and produce data that can lead to conclusions (they will be analyzed in sector 7.b.), method 2 fails to produce such results. Considering the chaotic difference on both companies' financial performance and the stock markets' performance between the two time periods is understandable why the mean ratio method cannot generate portfolios that follow a certain trend.

In general, portfolios created by using the second method have a lower t-statistics price range that portfolios created by using the first method. This is due to the better distribution of the (EV/ Operating Income Measurement) Ratios.

The MVE variable does not follow a specific trend, yet one must notice that while in Panel B and Panel C method 1 has lower MVE at Portfolios 1 and 5 for all 3 time periods, in Panel A we do not witness this effect. I believe that the cause of this diversity is the intensity of depreciation. In year 2008 firms had to reevaluate their assets accordingly and proceed to depreciations. These depreciation amounts exceeded by far the size of the depreciations they did the years before or the years that followed. The greater the depreciation the less the company's profit and by default the more the MVE will decline. This trend can be seen in the comparison of MVE between method 1 and 2 because method's 1 portfolios 1 are entirely consisted of companies that had negative earnings (EBIT and EBITA) in 2008, while portfolios 5 are mostly consisted of companies with low (yet positive earnings). However, EBITDA is unaffected from depreciation and as so EV/EBITDA ratio portfolios do not reveal this effect. Actually, in addition to the other two ratios, 20% of EV/EBITDA ratio portfolio 1 is consisted of companies have positive EBITDA in 2008.

Finally, in both methods, no trend can be located for both Price to Book Value ratio (P/B) and Beta. There is a diversity on the price ranges that each method generates but their comparison does not lead to certain conclusions.

Taking under consideration all these facts I deem the first method to be more valid for academics, analyst and investors since the existence of trends can lead to better informativeness, it presents how portfolios formed according to crisis effects will react in the future, the allows better comparison among EV multiples and can generates a variety of conclusions for the user.

## 8.b. Evaluating EV multiples

Considering that the portfolios are formed according to the companies' ratios in 2008, the first thing one must examine is if the portfolios of each EV multiple can maintain their initial trend (from lower ratio to higher ratio). As we can observe from Panel A, B and C for 2008 - 2010 and 2008 – 2017 all the Operating Income Measurements maintain their initial trend. **However, if we focus on 2011 – 2017 time period we can see that only in EBITDA multiple portfolios maintain their trend. For EBITA and EBIT multiple portfolio 5 has a higher ratio than portfolio 4 (by 0,01 for EBITA and 0,15 for EBIT).** Also, as I mentioned before, companies that generated negative EV during the decade were excluded from the sample. As a result, the ratio can be negative only due to its denominator. For any company  $EBITDA > EBITA > EBIT$  which means that less companies should have negative EBITDA denominator and as so, their ratio should be closer to 0. Yet in all three time periods Panel A has the lowest ratio in method 1. This is due to the fact that Panel's A portfolio 1 manages to gather most of the companies that present the negative profitability (according to the earning metric) not just for year 2008 but for the entire decade.

Next, I am going to examine the Portfolios Return ratio. What I consider fascinating is how much higher this is ratio at the first (2008-2010) and compare to the second time period (2011-2017). Three factors are responsible for this phenomenon:

1. Even if financial crisis “officially” spread in Europe on 2008, stock markets took a major blow from it before the end of 2007. That Lead to an extreme decrease in stock prices before 2008 that is not present in the first time period. Afterwards, this extreme decrease had to be corrected and stock prices had an extreme increase before 2011 leading to price High Price returns.<sup>22</sup>

<sup>22</sup> E.g. European company A has Market Price 100€ in 09/ 2007 and has investments in the USA. The crisis dropped the stock market value to 80€ (31/12/2007). With the crisis being spread in Europe its market Value reach 25€ in 31/12/2008 and as economy starts to recover it becomes 40€ in 31/12/2009 and until 31/12/2010 it regains its 2007 value (100€). So even if the stock has just regained its market value, the yearly Portfolio Return is -8,75%, +60%, +100% leading to a mean 30.41%  $[(-8,75\%, +60\%, +100\%)/ 3]$ .



2. Investors who withdraw capital or held it inactive for the first years of the financial crisis considered stock markets as investment opportunity. So, from the mid-end of 2009 they buying stocks, increasing greatly their market prices.
3. As I mentioned before, companies for which I had insufficient data available, estimated a negative Enterprise Value and found out that they became inactive or left the stock market were excluded from the sample. This companies were mainly problematic companies that in most cases had low or negative Price Returns, especially during the first time period. Since a great amount of “unhealthy – high risk investment choices” was excluded, is it not expected that in a crisis period these companies will become a pole of attraction for investors, increasing their price return?

As for measurement comparison now, EBITDA and EBITA fail to generate a specific trend at any time period. On the other hand, in the second time period (2011-2017), an increase in EV/EBIT ratio results in an increase on PRET.

Pricing Errors (PE) is the last important comparison factor upon the EV multiples. When an analyst studies a market, Pricing Errors = (Market Value of Equity – Enterprise Value)/ Market Value of Equity are always expected to some degree. In all portfolios PE is negative which mean that in most cases MVE < EV. The difference is also high, judging from PE prices, which can only mean that a) either the economic environment is unstable making the stock market unable to price the companies far below their actual value or b) followed methodology for the estimation of EV has the tendency to overstate the Enterprise Value. Considering the PE ratio I believe it is a combination of both.

Normally, a financial statement user expects that the higher the EV/ Earning Metric ratio is the greater the difference among Market and Enterprise Value will be, at least for short time periods (like this of 2008-2010). However, this trend only applies for portfolios 2 to 5. The reason behind this diversity is that negative earnings companies present high Pricing Errors and portfolio 1 is composed of companies with this exact characteristic. As for longer time periods (2011 – 2017), EBIT based portfolios maintain their previous trend, EBITDA based portfolios lose their ability to present any trend and EBITA based portfolios manage to improve their trend into this of an increasing rate of PE. Also, EBITA based portfolios maintain their 2008-2010 trend when the PE performance is examined through the whole decade (2008-2017).

Finally, in all three panels, the lowest price of MVE is located on portfolio 1, in most cases P/B price is above 2 and the average P/B ratio is over 2,20. The portfolio Beta price range is (0.80, 0.99) which make it quite stable. Naturally, portfolios composed of negative and low profit companies are meant to have low MVE. Furthermore, the P/B ratio declares that estimating a company using book and not market prices will in most cases lead to understate its value. The portfolio's Beta price range is relatively low considering that the sample is composed of thousands of companies, from 15 different countries, with major diversities on their stock market performances. As for comparison issues, T-statistics, MVE, P/B and Beta can provide some informativeness over the portfolios, according to what the user of the panel is searching, yet I can see no solid trend or diversity that can lead to further comparison statements.

**ΟΙΚΟΝΟΜΙΚΟ  
ΠΑΝΕΠΙΣΤΗΜΙΟ  
ΑΘΗΝΩΝ**



ATHENS UNIVERSITY  
OF ECONOMICS  
AND BUSINESS

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ΜΕΤΑΠΤΥΧΙΑΚΟ ΛΟΓΙΣΤΙΚΗΣ &  
ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ  
MSc IN ACCOUNTING & FINANCE



## 9. Conclusion

This thesis compares EBITDA, EBITA and EBIT abilities to generate useful information for analysts, academics, investor and other users of financial statement. First of all, it selects a time period (2008-2017) and explains the economic environment of that time. This is a necessity since it affects the market performances. Later, the analysis expands its horizons to the increasing significance of intangibles assets and amortization, the current trend of diversifying amortization from depreciation and compares the three income measurements based on selected data. And finally, the thesis selects an evaluation procedure/methodology and examines it and its results throughout the decade.

Based in these results I conclude that the 2008 (base year) ratio performance method of forming portfolios is superior compare to the mean performance throughout the decade method on informativeness, comparison among measurements and market analyzing. I must mention though that both methods present an increase in MVE over time and a tremendous difference in “portfolios behavior” between the two time periods (2008-2010, 2011-2017). In the first time period ratios present higher values and diversity while in the second time period they present trends and higher consistency. Furthermore, the mean decade performance in much closer to the second time period. This is not just because it is a longer time period and contain more observations, but also because the first time period performances are related to the extreme prices that the financial crisis generates. The limitation of these prices is greater when I examine the decade in its entirety due to ratio winsorization (98% on each Panel).

When it comes to companies’ distribution among portfolios, based on their EV/ Income Measurement performance, EBITDA surpass EBITA and EBITA surpass EBIT. The same goes with chance of achieving higher profitability. EBITDA generates the highest values in PE and PRET, but the lack of a trend that includes all 5 portfolios for both PE and PRET means that it also generates higher risks. In terms of predicting Portfolio

Returns EBIT preforms better than EBITA and in terms of predicting Pricing Errors EBITA dominates EBIT. In both cases, EBITDA has lower performance since it cannot generate any valid trend.

The importance of an output is relevant to the objectives of its user. For example, a user desires to invest in stock market during the early stages of a financial crisis or just update his portfolios according to the new economic reality, will probably select EBITDA measurement if he seeks for maximum profitability (from PE and PRET) and EBITA measurement if he wishes to achieve profitability by following market trends. . However, the fact that there is a change in EV/ EBITA and EV/EBIT portfolios hierarchy during the second time period is decreasing significantly the value of located trend. Considering that EBITDA performs better on earnings-based consistency, maintained the EV/EBITDA ratio trend during all three time periods and can lead to greater profitability I deem EBITDA to be the one that performs bests under extreme economic environments. EBITA performs better than EBIT, since it generates better trends and has a better earnings-based consistency. To sum up, EBITDA exceeds EBITA in terms of the informativeness value and EBITDA exceeds EBIT.

Of course, since the portfolios are formed during the financial crisis, which means that they are tested under extreme conditions, the measurements could perform differently in a longer sample period that begins in years of economic stability.<sup>23</sup> However, testing their performance of all three measurements under such conditions is something that in my knowledge has not be done before, and this is why this thesis examines this exact matter.

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<sup>23</sup> Still, most of these studies also present EBITDA superiority.

## 10. Appendix

### 10.a. Appendix 1

Contingent claims can be defined as “derives whose future payoff depends on the value of another underline asset” or more else “derives that are dependent on the realization of some uncertain future event and they include stock options, stock rights, stock warrants, conversion features of convertible bonds and convertible preferred stocks, and unvested restricted stock and restricted stock units.”

Since Operating Income affects their value<sup>24</sup> their fair and not their book value should be a part of Enterprise Value (EV). In order to develop a better understanding over the contingent claims, this appendix will present 2 different approaches over estimating their value and select the one most valid for this thesis.

Fundamentally, an analyst needs to collect information in order to proceed to an evaluation procedure. However, the average analyst can access limited information from his database. Given that fact, I consider EPS-related disclosures methods as valid options (two widely used databases: Datastream and Compustat provide sufficient data).

Before all EPS modules must be explained. Earnings Per Shares States how much earnings correspond to each common share outstanding and with the following formula:

$$\text{EPS} = \text{Net Income} / \text{Common Shares Outstanding}$$

---

<sup>24</sup> E.g. a company makes an unexpected business deal that suddenly increases its operating income. This can result to an increase of an options value.

EPS module functions perfectly but only under three conditions:

1. The company has only Common Shares Outstanding.
2. The number of shares faced no major changes throughout the year.
3. The company acquired no income or claims besides that of Outstanding Common Shares.

In a vast sample these conditions rarely hold<sup>25</sup>. As so, Basic EPS would be a more valid ratio:

**Basic EPS = Net Income Available to Common Shareholders/ Weighted Average Common Shares Outstanding**

Since:

1. A firm generates income all year but shares can be issued anytime<sup>26</sup>. As so, the Number of Weighted Average Common Shares Outstanding is a more practical denominator.
2. A part of net income might be unavailable to common shareholders due to the existence of non-controlling interests or outstanding preferred shares (with claims over the net income).

However, stock options or convertible bonds may result to dilutions that the above ratio cannot recognize. To deal with this potential dilution a new ratio can be selected:

<sup>25</sup> E.g. issuing common and outstanding shares, new shares issuances

<sup>26</sup> E.G. A company has 20.000 common shares outstanding. On 30/06/20X0 the company issues 1.000 common shares outstanding. These shares will generate earnings for 6 months instead of 12.



**Diluted EPS = Adjusted Net Income Available to Common Shareholders / Adjusted Weighted Average Common Shares Outstanding**

As one can see Diluted EPS has the same formula with Basic EPS, but it includes some adjustments in both numerator and denominator. The required adjustments are:

- a) Increase the number of shares by the same number that a potential conversion of all convertible securities will issue and the income according to the related preferred dividends or interests (excluding taxation).
- b) Increase the shares number equally to the number of shares that an exercise and vesting of all equity contracts and unvested restricted stock will issue and decrease the number of shares equally to the number of shares that investors can obtain after exercise or vesting if they can be bought according to their average market price.

Companies with potential dilution on EPS have the obligation to report Diluted EPS. When investor and analysts must always have in mind that it is not always an objective measurement. Maturity and changes in stock prices are factors that affect the value of options but Diluted EPS does not place this time factor under consideration. On the contrary, Diluted EPS immediately adjust convertibles according to the time factor but ignores the changes in stock factors. These two vulnerabilities result estimating errors over the dilution. In most cases, the ratio is overstated in the case of a price change that exceed the markets expectations and is understated when the price falls below them since the time that companies issue convertibles. Now that I presented some necessary facts over EPS modules, I can present the two approaches regarding the value estimation of **Contingent Claims ( CC )**.

Both approaches are trying to measure the Dilution Factor (DF) that common shareholders face.

The first approach focuses on the value of equity and therefore measures the Dilution Factor (DF) by dividing the Weighted Average Diluted Shares with the Weighted Average Common Shares.

$$\mathbf{DF = Weighted\ Average\ Diluted\ Shares / Weighted\ Average\ Common\ Shares.}$$

The second approach focuses on shares earnings and therefore measures the Dilution Factor (DF) by dividing Basic EPS ratio with Diluted EPS (but only when Diluted EPS > 0).

$$\mathbf{DF = Basic\ EPS / Diluted\ EPS.}$$

After measuring the Dilution Factor (DF), both approaches multiply the Market Value of Equity (MVE) with a Ratio that equals the Dilution Factor minus 1.

$$\mathbf{RATIO = DF - 1}$$

$$\mathbf{CC = MVE * RATIO}$$

While both approaches are valid the first approach is deemed to be more accurate since:

1. Considering the Enterprise Value (EV) module as a whole, an equity estimation approach over the value of Contingent Claims will create a more stable module and make the variable a little more comparable with the rest of the variables.
2. There is not a limitation factor (Diluted EPS > 0).



## 10.b. Appendix 2

In this chapter I present tables and diagrams related to currency rate, beta, amortization, depreciation and Intangibles. The symbol \* after an industry or a year means that a 98% winsorization has occurred.

**Table 1: 31/12 Exchange Rate (Currency / Euro)**

CURRENCY	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AUSTRALIAN DOLLAR	0,5968	0,4932	0,6247	0,7613	0,7860	0,7867	0,6484	0,6744	0,6713	0,6851	0,6516
CANADIAN DOLLAR	0,6921	0,5883	0,6610	0,7506	0,7567	0,7612	0,6816	0,7111	0,6616	0,7048	0,6649
HONG KONG DOLLAR	0,0871	0,0927	0,0895	0,0963	0,0995	0,0978	0,0935	0,1062	0,1185	0,1223	0,1067
DANNISH KRONE	0,1341	0,1342	0,1344	0,1342	0,1345	0,1340	0,1341	0,1343	0,1340	0,1345	0,1343
NOWERGIAN KRONE	0,1257	0,1026	0,1205	0,1282	0,1290	0,1361	0,1196	0,1106	0,1041	0,1101	0,1016
USA DOLLAR	0,6793	0,7185	0,6942	0,7484	0,7729	0,7579	0,7251	0,8237	0,9185	0,9487	0,8338
UN POUND	1,3636	1,0499	1,1260	1,1618	1,1972	1,2253	1,1995	1,2839	1,3625	1,1680	1,1271
SWEDISH KRONE	0,1059	0,0920	0,0975	0,1115	0,1122	0,1165	0,1129	0,1065	0,1088	0,1047	0,1016
POLISH ZLOTY	0,2783	0,2408	0,2436	0,2346	0,2243	0,2455	0,2407	0,2340	0,2345	0,2267	0,2394
SOUTH AFRICAN RAND	0,0997	0,0765	0,0938	0,1128	0,0954	0,0895	0,0687	0,0712	0,0590	0,0692	0,0675
SWISS FRANC	0,6043	0,6734	0,6740	0,7997	0,8226	0,8284	0,8146	0,8317	0,9229	0,9312	0,8546
MALLESYAN RIGIT	0,2054	0,2081	0,2027	0,2442	0,2436	0,2478	0,2211	0,2354	0,2130	0,2115	0,2060

Source: <https://synallagma-euro.gr>



**Table 2: Amortization (Part 1)**

INDUSTRY	AMORTIZATION/ EBITDA			AMORTIZATION/D&A		
	MEAN	MEDIAN	STD	MEAN	MEDIAN	STD
Aerospace and Defence	0,2715	0,1472	0,0828	0,4487	0,4594	0,0139
Alternative Energy *	-0,0721	0,0000	0,0545	0,2694	0,1745	0,0167
Automobiles and Parts	0,1056	0,0671	0,0214	0,2495	0,2041	0,0098
Beverages	0,0315	0,0186	0,0092	0,1047	0,0777	0,0059
Chemicals*	0,0050	0,0185	0,0306	0,1710	0,0979	0,0081
Construction and Materials	0,0580	0,0271	0,0101	0,1529	0,0773	0,0054
Electricity	0,0197	0,0279	0,0334	0,1502	0,1029	0,0100
Electronic and Electrical Equipment	0,1377	0,0658	0,0032	0,3877	0,3523	0,0085
Fixed Line Telecommunications	0,1970	0,1819	0,0323	0,3752	0,3272	0,0187
Food and Drug Retailers	0,0391	0,0404	0,0236	0,1721	0,1372	0,0123
Food Producers	0,0242	0,0214	0,0225	0,1463	0,0614	0,0067
Forestry and Paper	-0,0242	0,0122	0,0331	0,0532	0,0317	0,0056
Gas, Water and Multiutilities	0,0760	0,0340	0,0131	0,1865	0,0978	0,0127
General Industrials	0,0559	0,0243	0,0075	0,1176	0,0649	0,0064
General Retailers	0,0159	0,0273	0,0302	0,2344	0,1403	0,0090
Health Care Equipment and Services*	0,1517	0,0549	0,0368	0,3587	0,3139	0,0120
Household Goods and Home Construction*	0,0837	0,0289	0,0305	0,1672	0,1223	0,0064
Industrial Engineering	0,0990	0,0520	0,0189	0,2522	0,2066	0,0053
Industrial Metals and Mining	0,0636	0,0121	0,0491	0,1128	0,0455	0,0100
Industrial Transportation*	0,0930	0,0331	0,0204	0,2030	0,0921	0,0125
Leisure Goods	0,0772	0,0512	0,0893	0,4339	0,3152	0,0204



**Table 2: Amortization (Part 2)**

INDUSTRY	AMORTIZATION/ EBITDA			AMORTIZATION/D&A		
	MEAN	MEDIAN	STD	MEAN	MEDIAN	STD
Media	0,2096	0,0933	0,0747	0,5358	0,5664	0,0088
Mobile Telecommunications*	0,0680	0,1134	0,0406	0,4208	0,3391	0,0243
Oil and Gas Producers	-0,1430	0,0000	0,0939	0,1935	0,0524	0,0144
Oil Equipment and Services*	0,0652	0,0139	0,0323	0,2103	0,1142	0,0155
Personal Goods	0,1184	0,0287	0,0627	0,1992	0,1704	0,0076
Pharmaceuticals and Biotechnology	0,0103	0,0000	0,0582	0,4558	0,5152	0,0094
Software and Computer Services	0,1718	0,1162	0,0620	0,5762	0,5831	0,0257
Support Services	0,0965	0,0565	0,0315	0,3504	0,2861	0,0069
Technology Hardware and Equipment	0,1152	0,0839	0,1075	0,4650	0,4542	0,0104
Tobacco	0,0635	0,0194	0,0153	0,3115	0,2510	0,0454
Travel and Leisure	0,0233	0,0323	0,0006	0,2957	0,1252	0,0099
<b>TOTAL</b>	<b>0,0767</b>	<b>0,0380</b>	<b>0,0185</b>	<b>0,3291</b>	<b>0,2156</b>	<b>0,0096</b>

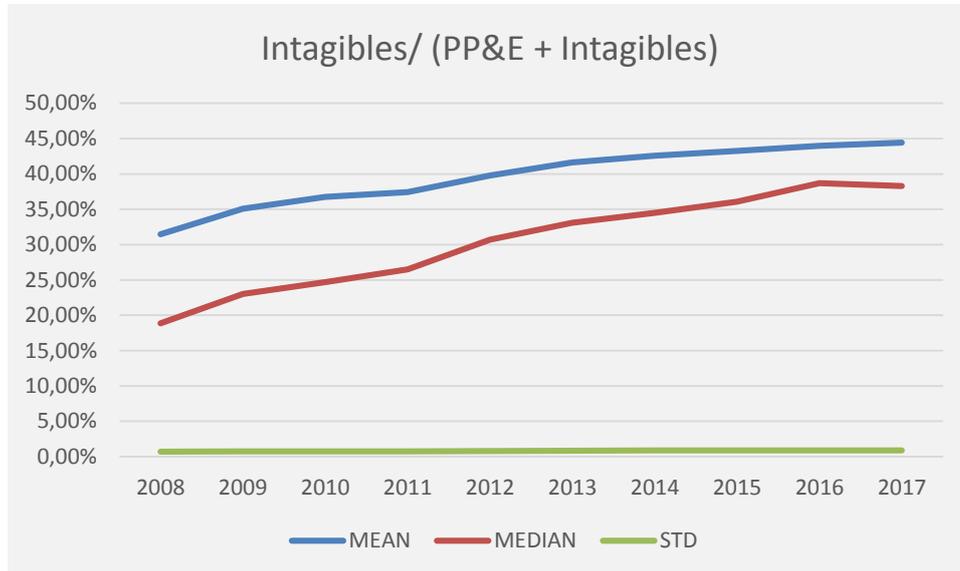


**Table 3: Beta**

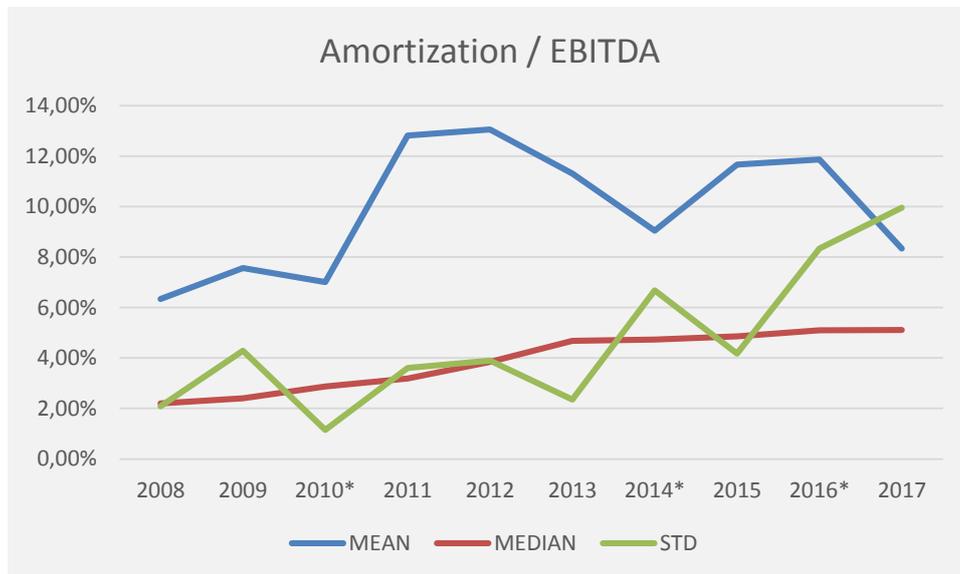
INDUSTRY	BETA		INDUSTRY	BETA	
	MEAN	MEDIAN		MEAN	MEDIAN
Aerospace and Defense	0,95	1,05	Household Goods and Home Construction	0,69	0,82
Alternative Energy	0,86	0,75	Industrial Engineering	0,99	0,88
Automobiles and Parts	1,29	1,10	Industrial Metals and Mining	1,09	0,98
Beverages	0,34	0,27	Industrial Transportation	0,71	0,51
Chemicals	0,80	0,72	Leisure Goods	0,62	0,62
Construction and Materials	0,86	0,88	Media	0,93	0,78
Electricity	0,67	0,65	Mobile Telecommunications	0,85	0,48
Electronic and Electrical Equipment	0,98	0,90	Oil and Gas Producers	0,62	0,73
Fixed Line Telecommunications	0,69	0,40	Oil Equipment and Services	0,92	0,93
Food and Drug Retailers	0,48	0,46	Personal Goods	0,64	0,79
Food Producers	0,61	0,57	Pharmaceuticals and Biotechnology	0,95	0,85
Forestry and Paper	1,16	1,19	Software and Computer Services	0,76	0,70
Gas, Water and Multiutilities	0,75	0,58	Support Services	0,70	0,77
General Industrials	0,76	0,71	Technology Hardware and Equipment	0,93	0,94
General Retailers	0,83	0,79	Tobacco	0,89	0,88
Health Care Equipment and Services	0,77	0,92	Travel and Leisure	0,69	0,62
<b>TOTAL</b>	<b>0,80</b>	<b>0,77</b>			



**Diagram 1: Intangibles assets as a percentage of total PP&E and Intangibles**

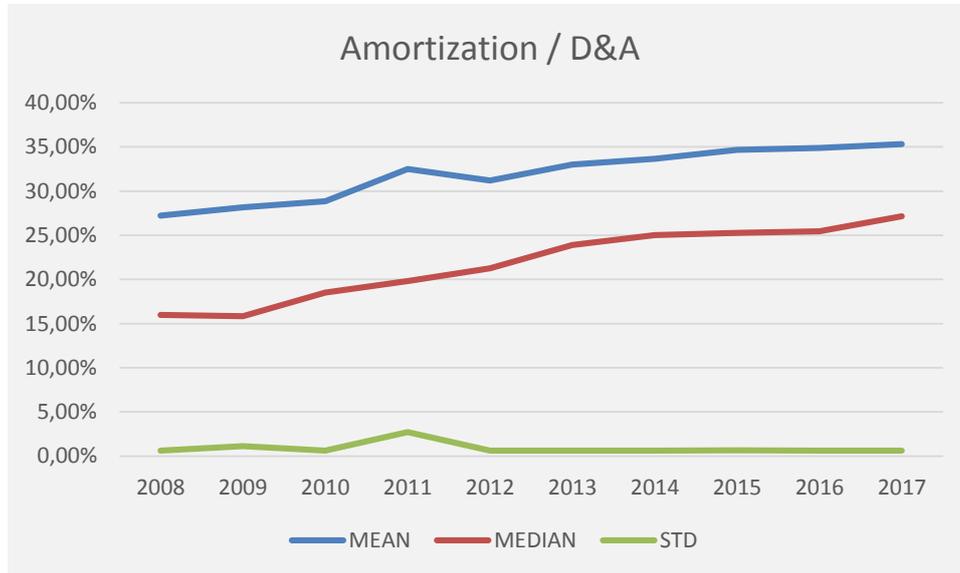


**Diagram 2: Amortization as a percentage of EBITDA**





**Diagram 3: Amortization as a percentage of Depreciation and Amortization (D&A)**



### 10.c. Appendix 3

This Appendix contains 4 panels that present the performance EBITDA, EBITA and EBIT during the decade.

**Panel A: EV/EBITDA**

METHOD 1																		
PORTFOLIOS	EV /EBITDA 2008-2011						EV /EBITDA 2011-2017						EV /EBITDA 2008-2017					
	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B
1	-8,03	0,5375	-0,5194	6,09	359752	2,3194	-1,19	0,0581	-0,3313	6,89	628051	2,2272	-3,02	0,1609	-0,3856	8,09	546748	2,2659
2	3,47	0,8596	-0,4833	13,78	4463347	2,0869	4,74	0,1099	-0,4564	15,54	5727592	2,6033	4,29	0,2269	-0,4651	18,73	5345613	2,4628
3	4,90	0,9967	-0,6130	25,24	3292075	2,3467	6,01	0,1081	-0,5401	24,93	4402157	2,4644	5,56	0,2265	-0,5773	29,37	4068027	2,4599
4	5,02	0,9635	-0,6410	22,22	4851829	1,9095	7,03	0,1122	-0,4891	24,39	6649304	2,3615	6,45	0,2550	-0,5365	30,77	6107374	2,2296
5	10,73	1,8381	-0,8796	16,74	2865681	2,3062	8,46	0,1113	-0,8939	11,57	5517786	2,5058	9,10	0,2004	-0,8743	12,69	4716217	2,4324
METHOD 2																		
PORTFOLIOS	EV /EBITDA 2008-2011						EV /EBITDA 2011-2017						EV /EBITDA 2008-2017					
	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B
1	-16,37	0,7840	-0,6043	13,94	450883	2,2499	-9,66	0,1541	-0,6493	10,41	388314	2,1312	-10,60	0,1356	-0,6362	15,69	407259	2,1662
2	2,69	0,9599	-0,6814	13,26	4047574	2,3224	3,36	0,1187	-0,5216	15,34	5624435	2,6662	3,14	0,2273	-0,5707	18,45	5147140	2,5579
3	4,90	0,9724	-0,7126	18,56	3880687	2,2012	5,71	0,1275	-0,5526	30,68	5078962	2,4297	5,46	0,2703	-0,5979	30,80	4717988	2,3423
4	6,86	0,6047	-0,5966	13,81	4744958	2,1038	7,86	0,1047	-0,4112	13,68	6708923	2,5220	7,56	0,1937	-0,4753	17,26	6117534	2,4000
5	12,36	1,8539	-0,5603	7,95	2704714	2,1138	16,84	0,1293	-0,5277	19,33	5121353	2,3650	15,25	0,2595	-0,5175	18,95	4391348	2,2882



**Panel B: EV/EBITA**

METHOD 1																		
PORTFOLIOS	EV /EBITA 2008-2011						EV /EBITA 2011-2017						EV /EBITA 2008-2017					
	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B
1	-5,51	0,6026	-0,7786	1,76	237078	2,2289	0,32	0,0689	-0,3455	2,57	440917	2,2398	-1,17	0,1603	-0,6203	3,08	379043	2,2304
2	3,93	0,8391	-0,3471	10,64	4344071	2,2668	5,68	0,1145	-0,3861	11,23	5478061	2,6941	5,30	0,2110	-0,3769	14,55	5136350	2,5631
3	5,92	0,8637	-0,5568	24,74	3650030	2,4185	7,35	0,0996	-0,4359	25,72	5042347	2,5177	6,94	0,2025	-0,4777	25,21	4622332	2,5276
4	8,58	1,1813	-0,6666	18,16	5492650	1,9333	9,22	0,1059	-0,5602	10,50	7745725	2,2819	9,05	0,2663	-0,5929	13,09	7065869	2,1783
5	15,09	0,8273	-0,8394	17,17	2108074	2,2243	9,21	0,1101	-0,7654	19,63	4203303	2,4627	10,88	0,2317	-0,7731	21,49	3571354	2,3826
METHOD 2																		
PORTFOLIOS	EV /EBITA 2008-2011						EV /EBITA 2011-2017						EV /EBITA 2008-2017					
	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B
1	-20,13	1,1174	-0,6956	11,93	1873038	2,1600	-9,95	0,0070	-0,7992	20,53	1983137	2,1800	-11,64	0,1723	-0,7431	18,76	1949719	2,1666
2	2,83	1,2336	-0,6914	7,36	2692212	2,4805	3,68	0,0974	-0,5346	12,63	3028682	2,3255	3,41	0,1920	-0,5854	14,36	2926876	2,3844
3	5,63	0,5935	-0,5930	10,96	4594294	2,0967	7,14	0,1349	-0,4664	13,24	6443163	2,8584	6,63	0,2168	-0,5045	16,36	5887124	2,6013
4	8,80	0,7558	-0,5361	6,99	4325063	1,7691	10,00	0,1330	-0,4141	8,00	7125625	2,2026	9,62	0,2520	-0,4519	10,17	6283132	2,0802
5	28,86	1,1862	-0,7231	10,94	2353696	2,4238	20,51	0,1247	-0,5178	16,45	4321098	2,6245	23,99	0,2378	-0,5627	17,79	3726472	2,5618



Panel C: EV/EBIT

METHOD 1																		
PORTFOLIOS	EV /EBIT 2008-2011						EV /EBIT 2011-2017						EV /EBIT 2008-2017					
	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B
1	-6,91	0,5817	-0,8873	1,62	442948	2,1452	3,07	0,0787	-0,6491	5,06	989736	1,4017	0,34	0,1659	-0,7151	5,43	823393	2,1606
2	4,61	0,8537	-0,2839	10,07	4104314	2,1750	5,47	0,1004	-0,2849	10,40	5300792	2,7712	5,17	0,2084	-0,2849	13,70	4941053	2,5954
3	5,28	1,0173	-0,6057	24,09	3609547	2,5149	8,45	0,1036	-0,5620	21,38	4823226	2,4669	7,41	0,2252	-0,5735	23,63	4457147	2,5250
4	9,06	1,4142	-0,6467	14,76	5642815	1,8934	10,01	0,1111	-0,5999	9,48	8070513	2,2791	9,65	0,2506	-0,6066	13,29	7337966	2,1634
5	17,95	0,8945	-0,7639	15,44	2031516	2,5263	9,86	0,1047	-0,6184	12,63	3723402	2,5121	12,23	0,2243	-0,6487	21,34	3213028	2,4405
METHOD 2																		
PORTFOLIOS	EV /EBIT 2008-2011						EV /EBIT 2011-2017						EV /EBIT 2008-2017					
	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B	RATIO	PRET	PE	TSTAT	MVE	P/B
1	-18,98	1,0257	-0,5744	10,39	1182248	2,3008	-13,73	0,0205	-0,6331	5,43	1289259	2,2631	-15,16	0,1997	-0,5775	10,40	1256714	2,2703
2	2,12	0,9440	-0,7633	7,36	2449105	1,9871	3,73	0,0931	-0,7059	11,39	2949572	2,3118	3,2348	0,1892	-0,7101	13,44	2798575	2,2537
3	5,82	0,8527	-0,6217	6,94	4278691	2,5570	7,98	0,1288	-0,4192	8,89	6067950	2,8859	7,2932	0,2364	-0,4802	11,12	5529615	2,7801
4	9,41	0,8904	-0,5876	6,98	5468997	1,7548	11,45	0,1271	-0,4572	7,07	8511947	2,1919	10,81	0,248	-0,4999	9,34	7597420	2,0280
5	30,91	0,6504	-0,6681	8,65	2457314	2,4840	25,64	0,1322	-0,507	9,12	4071513	2,5402	27,34	0,2296	-0,5582	10,06	3582952	2,5422

**Panel D: Mean Beta (2008-2017)**

Portfolios	Method 1			Method 2		
	EV/EBIT	EV/EBITDA	EV/EBITA	EV/EBIT	EV/EBITDA	EV/EBITA
1	0,90	0,88	0,88	0,93	0,98	0,89
2	0,88	0,86	0,86	0,86	0,84	0,92
3	0,87	0,86	0,86	0,84	0,85	0,90
4	0,86	0,85	0,86	0,88	0,81	0,81
5	0,83	0,89	0,88	0,85	0,86	0,82

**RATIO:** is the Enterprise Value divided with each earning metric (according to the panel), **PRET:** is the mean Portfolio Return if we assume that the investor buys a Portfolio at the start of every year then sales it at year end  $(MVE_{2011} - MVE_{2010}) / MVE_{2011}$ , **PE :** is the mean ratio that express the difference between the Market and the Estimated value of a Company  $(MVE - EV) / MVE$ . **MVE:** is the mean Market Value of Equity of each portfolio, **P/B:** Market Price of Shares Outstanding / Book Value of Shares Outstanding. All the above prices are measured according to year end values. An 98% winsorization has been performed on ratios before mean calculation.

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