

## **Eva Analysis of the Building Materials Sector in the Global Construction Industry**

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### **Abstract**

One of the major challenges facing the global construction industry is the lack of productivity. The data from Euromonitor shows that productivity of global construction industry has declined from \$17,516.1 USD per person in 2000 to \$14,744.5 USD per person in 2018. This has been one the reasons for the under-performance of the industry as a whole. The only sub-sector in the global construction industry generating positive economic value added (EVA) is the building materials sector. This research tries to understand and analyze the reasons for profitability of the building materials sector. Some common trends are followed by the industry viz. high correlation between net income and total equity and eventually return on equity (ROE). However, there is no correlation between total debt and ROE. This means that in spite of taking high debt the companies are not able to generate high returns for the shareholders. The research goes on to give specific insights about the excellent performance of the building materials sector which can be implemented by other companies as well.

**Key words:** EVA, net income, building materials, productivity, construction industry, construction finance

### **Introduction**

One of the major challenges facing the global construction industry is the lack of productivity. The data from Euromonitor shows that productivity of global construction industry has declined from 17,516.1 USD per person in 2000 to 14,744.5 USD per person in 2018. This has been one the reasons for the under-performance of the industry as a whole. As mentioned in the IFC's construction industry value chain report<sup>6</sup> the structure of construction industry is such that only large-scale players are generating positive value in the value chain. However, small fragmented specialty trades are not able to generate positive value. This is mostly because the small fragmented trades are unorganized in nature and there is no integration of supply chain which makes it challenging for these trades to create value. This is the main reason for lack of productivity in global construction industry.

As is further explained in the study, the average EVA of the global construction industry, with 13 sub-sectors, is negative. This means that, on a macro level global construction industry is not able to fulfill the demands of the providers of capital viz. debt providers and equity holders. This also means that, value generated by the sector is not able to pay back the cost of using capital. However, diving deep, realize that out of the 13 sub-sectors in the global construction industry, there is one sub-sector which is generating positive economic value added (EVA) and that is building materials sector.

Now, look at it in this context- there is a lack of productivity in the global construction industry with average EVA of the industry being negative. However, one sub-sector is generating positive EVA whose strategies may prove to be a potential solution for increasing the overall productivity. This can be done by understanding and analyzing the buildings material sector for its profitability. And by implementing these ideas in other sub-sectors.

### **Aim of the study**

This research tries to understand and analyze the reasons for profitability of the building materials sector. Some common trends are followed by the industry viz. high correlation between net income and total equity and eventually return on equity (ROE). However, there is no correlation between total debt and ROE. This means that in spite of taking high debt the companies are not able to generate high returns for the shareholders.

The project will try to analyze these insights from both financial perspective as well as business perspective. The project will be adding value to the financial research universe and also try to give valuable inputs to construction companies by elaborating the strategies followed by the most profitable companies in building material sector.

### **Review of literature**

A number of research papers have been explored and relevant findings have been incorporated in the literature review.

There has been a lot of research done on the construction sector. This research consists of studies on delayed construction projects and its impacts, types of materials used in building materials, achieving sustainability in construction sector, case studies of innovative projects that have been successful in one country and can be implemented elsewhere and other such studies. Many studies cater to the field of engineering and architectural aspect of construction sector. However, there is dearth of studies specifically aimed at understanding the profitability of building materials sector.

The significance of EVA as a parameter of success and financial performance has been largely accepted in the research field. Although there is scarcity of studies conducted in construction industry in context of EVA, it can still be found that one study which caters to the construction industry. This study elaborates the performance of EVA in these companies from 2010-2017 (Kruk S., Year: 2018). This study analyses construction companies listed on Warsaw stock exchange. However, this study covers entire construction industry whereas, the research study conducted by the authors aims to analyse building materials sector only. Since, the research literature relevant to EVA in construction industry is very limited, the authors have tried to incorporate the application of this concept in different industries. There is an interesting study conducted on the application of EVA in automotive sector (Malichova E, Durisova M, Tokarcikova E., Year: 2017). This study is trying to understand the significance of EVA as a performance evaluating tool. The authors of this study have devised a way to calculate EVA for companies engaged in automotive industry. However, this article falls short of giving us any concrete results about EVA analysis after you have calculated it for a

company. Another study talks about the applicability of EVA as a parameter to judge and improve the efficiency, competency and sustainability in the listed banks in china<sup>3</sup>(Zheng X., Year: 2014). The study assumes importance in context of research work because the author has gone on to discuss the factors which drive the performance of EVA. In spite of being an important study it suffers from drawbacks like very low sample size and nature of banking industry vis-à-vis construction industry, which tends to reduce its relevance to some extent. Then there is a very targeted study conducted in the pulp and paper industry<sup>4</sup>(Saputra W. E., Sukoco A., Suyono J., Elisabeth D. R., Year: 2018). The study has done comparative analysis of EVA and MVA of listed companies working in this sector. The study is mostly descriptive in nature and does not dwell deeper in the reasons for poor or good performance of the companies. The research study has taken only 4 companies for analysis which sort of casts a doubt on the reliability of the results. There is also a research report<sup>5</sup>(Barbosa F., Woetzel J., Mischke J., Ribeirinho M. J., Sridhar M., Parsons M, Bertram N., and Brown S, Year: 2007) discussing the structure of global construction industry. The report tells us that there is a lack of productivity in this industry mostly on account of fragmented specialty trades. However, the large-scale players are relatively well organised and are generating high value. Another research report discusses the global construction value chain<sup>6</sup> (Malik A. and Maheshwari A. Year: 2018) and discusses the role of each stakeholder in the value chain. The report also discusses new technologies and emerging trends in the field of construction. Then there are three research studies discussing actual execution of construction projects. One discussing the causes of cost and time overrun in a construction project<sup>7</sup> (Dolage, D.A.R. and Rathnamali, D.L.G., Year: 2013), second discussing the newer value chains in the field of construction projects<sup>8</sup> (Virtanen, J.P., Hyyppä, H., Stähle, P., Kalliokoski, S., Kähkönen, K.E., Ahlavo, M., Launonen, P., Kukko, A., Julin, A. and Achour, N., Year: 2016) and another study proposing a simulation model to foresee potential challenges in execution of construction projects<sup>9</sup> (Oloke, D., Olomolaiye, P. and Proverbs, D., Year: 2004). There is a research study elaborating the use of concept of supply chain management in the field of construction industry<sup>10</sup> (Hasim, S., Fauzi, M.A., Yusof, Z., Endut, I.R. & Ridzuan, A.R.M., Year: 2018). The study tries to apply this idea by integrating the processes in this industry.

The assessment of economic value added in construction companies in the years 2010-2017, This paper studies the economic value added or value creation by construction companies during the time period of 2010-2017. The entire research study is descriptive in nature where the results of the analysis are described and elaborated by the author. The author has undertaken a study of 40 construction companies listed on the Warsaw stock exchange grouped under the WIG-construction index. The results indicate that in 54% of the entities negative NOPAT (Net Operating Profit After Tax) was observed. The author has also found results pertaining to WACC (Weighted Average Cost of Capital) viz. the highest and lowest average WACC for the sector in 7 years. Also, lowest average debt was found to be in the year 2010. After that the debt levels have increased until 2015 and then decreased thereafter. The study also found the individual companies who have had lowest and highest levels of average debt levels. The observed companies have average debt levels of more than 45% of the sum of capitals. The paper has also analysed the changes in levels of capital during the said period. The study finds that out of the 299 cases where EVA was calculated in 128 cases

the EVA values were found to be negative. The author claims that there was value creation only in two periods viz. 2010 & 2015. In other years the NOPAT was not able to cover the average costs of capitals and hence the EVA was negative. The authors also found that some companies have been consistent in their value creation/destruction. Some companies consistently created value whereas some companies consistently created destruction of value. The author claims that negative EVA was the result of loss in operating margins. The study also talks about the external environment of these companies. The author has found that there was a correlation between decreasing EVA and increasing number of bankruptcies. The study also says that the performance of the companies in construction sector was also affected by the external climate of the economic situation in construction. The author has concluded that in 25% of the analysed periods the firms could generate economic profits. While in the rest of the periods average return rate was not sufficient to cover the required rate of returns of the investors. Hence, on an average there was no value-creation. The author also concludes that in 6 out of 8 periods the cost at which debt is availed is higher than the cost at which equity is availed by the firm. The author also states that EVA cannot replace net profit and that positive EVA does not reflect good management practice.

Models of application economic value added in automotive company, the research article proposes to use the metric of EVA for the Automotive industry and also proposes a method for calculation of the same. The essential objective of this research article is to recommend the use of EVA in the matters of performance evaluation. The author's aim is also to describe variants of calculating the indicator of EVA. The study is undertaken in a Slovakian automotive company engaged in manufacture of plastic products used in automotive industry, although the owner is a foreign company. The author aims to make the owners of enterprises realise the use of EVA for purposes more than financial performance. Following process is followed for calculating the EVA of this company viz. i. Determining the total capital, ii. Determining net profit after tax, iii. Determining the weighted average cost of capital and iv. Calculation of EVA. The EVA being a very complex indicator to calculate owing to the huge number of accounting adjustments required to be carried out, the entire research article devoted to figuring out the steps involved in calculation of the EVA indicator. At the end of the research article the author proposes the sequence of steps that can be used in calculating EVA for a Slovakian enterprise in automotive industry. This sequence includes two phases viz. preparatory phase and preparation phase. The first phase is about creating a context and basis of the calculation of the indicator whereas the second phase involves actual calculation of the indicator. The research article is about the calculation of EVA for automotive industry and there is no post-calculation analysis or evaluation of the EVA of the said industry. The research article does not talk about whether the EVA is good or bad, or whether the EVA is gradually increasing or decreasing or also there is no root cause analysis of the performance of the EVA. The research article in short is an analysis of how to calculate the EVA and not why the EVA looks the way it looks.

The application of economic value added on performance evaluation of listed banks in china, the research paper talks about applicability of EVA in public banks of China. The aim is to use this indicator for evaluation of performance to improve parameters of efficiency,

competency and sustainability. The research paper has banked upon the fact that EVA as a financial parameter has had a limited popularity within China. The author gives recommendations with respect to management of capital, asset quality improvements, and other relevant suggestions for the betterment of Chinese banking industry. The author has undertaken a research study of 12 public sector banks of China and analysed their financial reports for the period of 2006-2011. The author briefly talks about the relevance of MVA (Market Value Added). The author has brought in EVA in this context with a multi-pronged approach viz. introduction of EVA as a performance evaluator to the banking sector of China, tweak the EVA metric to suit as per the needs of the banking industry of China and Chinese economy and contributing factors of EVA in this scenario. The author says that as per the results of EVA analysis the banks perform on a large spectrum. Hence, the driving factors of EVA are required to be looked into. Following factors influence the outcome of EVA according to the author- economic cycle, price level, interest rates, exchange rate, macro policies, risk factors, size factors and access barrier factors. Also, as per the CAMEL approach (Capital adequacy, Asset quality, Management, Earnings, and Liquidity) these factors influence outcome of EVA viz. capital adequacy, asset quality, management, earnings and liquidity. The author suggests that to increase EVA promoters have to engage in effective capital management, control operations cost i.e. increase operating margin and introduce non-interest income. In conclusion, the author states the necessity of EVA in Chinese banking sector because it correctly reflects changes of bank value, in EVA risk and capital are matched very efficiently against each other and components of value management can be included in EVA outcome. However, this analysis is specific to banking industry which is inherently different as compared with global construction industry. Also, the number of samples in this analysis are very low i.e. 12 only.

Analysis of economic value added and market value added to measure financial performance in pulp and paper companies, the author of this research paper has undertaken the performance evaluation of the pulp and paper industry of Indonesia with a comparative analysis between EVA and MVA. The study was undertaken for the period of 2017 and 2018. The study has 4 companies under analysis all of which belong to the pulp and paper industry and listed on the Indonesia Stock Exchange. This is a case study-based research paper. The paper concluded that in 2017, 3 out of 4 companies were able to generate positive EVA. Whereas in 2018 only 2 out of 4 companies are creating economic value. The comparable analysis of the same companies for the same time period with a parameter of MVA is giving similar results. In 2017 and 2018, 1 and 2 companies are able to create positive value respectively. Most of the companies are showing instability in generating positive EVA. Also, the research paper is descriptive in nature and does not go deeper in the analysis of the reasons of generating positive or negative EVA. The research paper is also not involved in undertaking any time series analysis. The research paper refrains from undertaking trend analysis and also does not go into analysing the components of the said EVA indicator. There are only 4 companies which also creates a doubt over the sufficiency of the sampling. In this way the research paper is very limited in scope.

McKinsey's MGI-Reinventing-Construction-In-Brief; The McKinsey's report is one of the most comprehensive and updated report on the global construction industry. It discusses the reasons for low productivity of the global construction industry which include the structure of the industry i.e. large-scale players and fragmented specialized trades. The latter one drags down the productivity of the industry as a whole. The report goes on to suggest that action in seven key areas has the potential to boost the productivity by 50-60%. These areas regulatory mechanism, framework of contracts, construction designs, improvement in supply chain, improving on-site execution, innovation and technology and re-skilling workers. This report however, discusses steps to improve productivity of the construction industry and does not dwell deep into building materials sector per say.

IFC Construction-Industry-Value-Chain; The report defines construction value chain as follows, the value chain for any construction project is composed of specific variations within a fixed framework of distinct stages—design, production and conversion of raw materials into manufactured products, and construction itself. The report explains the role of each stakeholder in the value chain which includes raw material suppliers, manufactured products suppliers, contractors, engineers and architects, developers, financiers, regulators, owners and end users. The report also talks about the sustainability initiatives taken by various sectors in the global construction industry including the building materials sector. This includes innovative green cement and carbon negative manufacturing processes.

Causes of Time Overrun in Construction Phase of Building Projects by D.A.R. Dolage and D.L.G. Rathnamali. The research study revealed that 80% of the projects under study did not finish within the agreed contract period. The authors have come up with a list of 51 factors which cause time overrun in the construction projects. This paper discusses the very many factors that affect delays in construction projects completion. They have tried to come up with an exhaustive list of factors which lead to or may lead to time overruns. The paper goes on to discuss in detail about the entire supply chain of the execution of construction projects. Their results are based on a case study undertaken for the purpose of research. However, this paper limits itself to discussing only the causes of time overrun and does not discuss about the lack of productivity in construction industry. This paper also does not mention anything specific about the global building materials sector. This is the research gap that this research project will try to fill in.

New Value Chains to Construction (2016) Value chain investigations are used to contemplate the worth procedure creation of organizations. For the construction business, a few change operators are influencing the value chains in utilization. To address this improvement, this article audits what is viewed as the condition of workmanship in added substance fabricating techniques and 3D estimating innovation. Another value chain is proposed for development utilizing these advances which are then contrasted with the present worth chain in the development business. These developing innovations may fundamentally change the construction industry business and the manner by which purchasers secure development administrations. As needs be, problematic advances and digitalization will probably profoundly affect the plans of action and worth systems in construction.

Demonstrating construction performance through virtual simulation - a case study approach (2004) The construction business keeps on confronting the test of meeting up with execution targets, for example, time and cost dependent on customers' prerequisites. Hybrid concrete construction (for example the mix of precast and in-situ concrete and different materials) offers the construction business partners a wide scope of advantages. An approach of showing execution through the virtual reproduction of the key execution pointers of time and cost as a reason for embracing half breed development is thus exhibited. An average steel-outline development venture was utilized as a contextual investigation in which the remarkable parts of the plan, program/development technique and progress were caught nearby. Information gathered were utilized to re-enact the advancement progressively utilizing the model of the VR model computer generated simulation model. This paper discusses a new simulation model which may be able to foresee possible time and cost overruns in the project. However, this paper does not discuss the building materials sector in specific, it only tries to suggest a possible solution to the problem of time and cost overruns.

The material supply chain management in a construction project: A current scenario in the procurement process, supply chain (SC) is a new term that emphasizes interaction between marketing, logistics, and production. With the application of SC, comes the opportunity primarily related to the management of procurement of logistics material across corporate boundaries, such as between firm and its suppliers. This paper presents the existing research in the field of materials procurement of SC which includes SC concepts and traditional management versus supply chain management (SCM). The discussions on the evolution of SCM have also been included to show how SC is defined and practiced today, with the intention of highlighting new opportunities to improve the performance of materials SCM. This paper indicated that SCM has transferred from ultra-functional material chain insights to intervention and even between organizations. The SCM concept is now commonly used in businesses for corporate interests in the SC (from organizations that extract basic raw materials to end customers). The basic principles of SCM are integration. However, SCM is not well-known in the construction industry. This paper considers the potential of applying SCM to integrate the construction process in Malaysia and hence, addressing urgent issues including poor cost, practices and environmental performance associated with the traditional process.

There is a conspicuous lack of research on Economic Value Added (EVA) analysis of the companies working in the building materials sector. This gives ample scope to explore this topic in depth. And hence, EVA analysis of the building materials sector is the true contribution of this research project.

## **Materials and method**

The research is conducted as a follow-up to a research study conducted as a part of an internship project at Bekaert Industries Ltd. In this study an EVA analysis of the global construction industry was undertaken. The list of companies taken in this study is from the same internship project.

## **Brief about previous work**

A brief about the methodology used in the previous study is pertinent to be discussed here.

To understand the working of the global construction industry this research has followed the Value Chain approach. The project was divided into two parts. First part involved analyzing the value chain from the supply side. Whereas the second part involved analyzing the same value chain from the end user side.

The value chain of global construction industry includes multiple actors/elements and their interaction with each other- raw materials, manufactured products, materials & equipment suppliers, contractors, architects & engineers, developers, financiers, owners and end users<sup>6</sup>.

The analysis involved analyzing the supply side value chain which includes raw materials, manufactured products, materials & equipment suppliers, contractors, architects & engineers.

The global construction industry is comprised of the following 13 sectors -

- (1) Chemical (Specialty)
- (2) Construction Supplies
- (3) Building Materials
- (4) Planning/Designing
- (5) Real Estate (General/Diversified)
- (6) Real Estate (Operations/Services)
- (7) Real Estate (Development)
- (8) R.E.I.T (Real Estate Investment Trusts)
- (9) Home building
- (10) Plumbing & other services
- (11) Banks (Regional)
- (12) Insurance (Property/Casualty)

After a careful and diligent analysis of the global construction industry it turns out that building materials sector is the only sector in the industry which is generating positive economic value added (EVA). This prompts an in-depth research in understanding the reasons behind the excellent performance of the sector.

$$EVA = [\text{Operating Profit} \times (1 - \text{Tax rate}^{\#})] - [(\text{Shareholders Funds} + \text{Long term debt} + \text{Loans}) \times WACC^{\#}]$$



Further study will include specific analysis of the building material sector. The analysis will include top global companies in the sector. This list of companies is the outcome of the research undertaken during the internship project.

In all 93 companies have been taken for research analysis. The list can be found in Appendix- 1: the 93 companies under study.

The buildings material sector has shown positive EVA in the year 2017. This positive EVA could be the result of high profits which in-turn could be the result of high revenues. However, in order to understand the probable reasons for this outcome, the study goes on to see if there is any correlation between EVA and other multiples. Thus, the study conducts a correlation analysis to understand if EVA and any other multiples are positively/negatively correlated.

Considering 9 financial metrics (average of 5 years) viz.

- i. Net Income,
- ii. EVA
- iii. Average Total Invested Capital,
- iv. Net Debt,
- v. Total Equity,
- vi. Return on Equity,
- vii. Debt/EBITDA,
- viii. Total Debt and
- ix. Cash.

For the list of companies with their respective 9 financial metrics please refer appendix- 2: Companies and their 9 financial metrics.

### **Test of Normality**

Before conducting correlation tests, first there is a need to find out whether the data is normal or non-parametric i.e. non-normal. Thus, this study runs the data through the Anderson-Darling test which tests the data for normality. Following are results of the Anderson Darling test (done in Minitab) of all the nine variables .

The p-value of all the graphs is below 0.005 which signifies that none of the datasets follow normal distribution.

As the normality test results show that the data is non-parametric hence, the study will go for Spearman's Correlation test to check if there is any correlation between EVA and 8 other multiples.

For finding Spearman's correlation first rank the data in the ascending order of values. The ranked data can be referred in the appendix-3: Companies sorted as per their ranking in the category.

## Results

After ranking all the numbers run the Spearman's Correlation test. The results are as follows-

**Table 1. Spearman's correlation for all the 93 companies**

	Avg NI	WACC EVA	Avg Tot Inv Cap	Net Debt (€)	Total Equity (€)	ROE	Debt/ EBITD A	Total Debt (€)	Cash etc (€)
Avg NI	1.000								
WACC EVA	0.016	1.000							
Avg Tot Inv Cap	0.408	0.093	1.000						
Net Debt (€)	0.127	0.202	0.301	1.000					
Total Equity (€)	0.647	-0.088	0.767	0.074	1.000				
ROE	0.693	-0.041	0.085	-0.264	0.233	1.000			
Debt/EBITDA	0.398	0.126	0.141	0.524	-0.054	-0.468	1.000		
Total Debt (€)	0.228	0.189	0.797	0.633	0.586	-0.093	0.483	1.000	
Cash etc (€)	0.488	-0.002	0.778	0.063	0.801	0.176	-0.007	0.652	1.000

Above table shows the Spearman's correlation factor. Any positive value shows a positive correlation and a negative value shows a negative correlation. Also, any value above 0.5 shows there is a significant correlation between the two variables and hence, has been highlighted in red colour.

Following observations can be drawn from the result.

- (1) There is no significant correlation between EVA and any of these variables. This means that positive EVA does not depend on a single financial variable.
- (2) Net Income has a significant correlation with Total Equity. This probably means that companies with higher net income are able to succeed because they are financed by high equity and low debt.

(3) Net Income also has a significant correlation with Return on Equity (ROE). Higher NI will naturally result in high ROE for the respective years.

(4) There is high correlation between Average Total Invested Capital and Total Equity and Total Debt. The correlation is slightly higher with Total Debt by about 0.02 points. However, considering factor of error this difference could be ignored. This essentially means that both the forms of financing are popular amongst companies with high capital base.

(5) There is high correlation between Average Total Invested Capital and Cash. This means companies with high capital base are also keeping high idle cash which is required for the sustaining operations of these companies.

(6) Net Debt is total debt after deducting interest payments. Net Debt has high correlation with Debt/EBITDA and Total debt for natural reasons.

(7) With increase in Total equity there is an increase in Total debt and Cash. This means companies with high equity also have high debt and high cash. However, this does not mean that these are successful companies because a company may have high debt and high equity and still be unsustainable and loss making.

(8) There is also significant correlation between Total debt and Cash. Total debt consists of short term and long-term debt both. So, the high correlation may signify two things; either short term debt is kept in cash or long-term debt is kept in the form of cash. The possibility of latter is remote and it is also lack financial logic. Thus, it is possible that companies are taking high short-term debt to increase their cash in hand which is a requirement of a construction business.

Now, going further deep in the analysis take up following path i.e. segregate the list of companies into two groups viz. companies with positive net income and companies with negative net income.

Following is the Spearman's correlation coefficient for the companies with negative net income-

**Table 2. Spearman's Correlation coefficient for loss-making companies**

	<i>Avg NI</i>	<i>WACC EVA</i>	<i>Avg Tot Inv Cap</i>	<i>Net Debt (€)</i>	<i>Total Equity (€)</i>	<i>ROE</i>	<i>Debt/ EBITDA</i>	<i>Total Debt (€)</i>	<i>Cash etc</i>
Avg NI	1.000								
WACC EVA	0.337	1.000							
Avg Tot Inv Cap	0.726	-0.013	1.000						

Net Debt (€)	- 0.658	0.068	0.755	1.000					
Total Equity (€)	- 0.210	-0.503	0.543	0.166	1.000				
ROE	0.103	0.024	0.019	0.039	-0.136	1.000			
Debt/EBITDA	- 0.218	-0.126	0.255	0.430	0.046	- 0.195	1.000		
Total Debt (€)	- 0.789	0.140	0.877	0.877	0.314	0.148	0.310	1.000	
Cash etc (€)	- 0.596	-0.055	0.770	0.551	0.493	0.286	0.219	0.727	1.000

As can be seen in the Spearman's correlation chart-

(1) There is a significant negative correlation (-0.789) between NI and Total Debt. And there is no correlation between NI and Total Equity. This means that decrease in net income is correlated with increase in debt. However, this situation could be the outcome of inadequate servicing of debt and hence the resultant negative net income.

(2) Here again even the loss-making companies are keeping high amount of cash on their balance sheet even when they need to pay their debts. This is most probably because of the nature of business itself which requires high quantum of liquid cash.

Now take a look at the Spearman's correlation coefficient of the profit-making companies-

**Table 3. Spearman's Correlation coefficient for profit-making companies**

	Avg NI	WACC EVA	Avg Tot Inv Cap	Net Debt (€)	Total Equity (€)	ROE	Debt/ EBITDA	Total Debt (€)	Cash etc(€)
Avg NI	1.000								
WACC EVA	0.132	1.000							
Avg Tot Inv Cap	0.743	0.110	1.000						
Net Debt (€)	0.128	0.193	0.172	1.000					
Total Equity (€)	0.812	0.048	0.879	0.112	1.000				
ROE	0.350	-0.016	-0.033	-0.180	-0.014	1.000			
Debt/EBITDA	0.011	0.117	0.271	0.509	0.222	-	1.000		

						0.187			
Total Debt (€)	0.614	0.176	0.774	0.534	0.736	-	0.125	0.608	1.000
Cash etc (€)	0.681	0.035	0.755	-0.057	0.833	-	0.059	0.178	0.661

As is observed in the above Spearman's correlation coefficient chart-

- (1). There is a high positive correlation between NI and Total Equity and to some extent Total Debt too. This means that companies with high NI also have high equity and equity financing could be one of the reasons for their success.
- (2). Like the loss-making companies, profit-making companies are also keeping high cash with them and this is most likely because of the nature of business itself.

There is a case in point where companies are keeping cash as high as 31994% of debt but not paying the debt. Please refer appendix-4 for the table of cash as a percentage of total debt.

## Discussion

The results are descriptive in nature. They explain the nature of relationship between the 9 financial metrics. These results are based on the historical performance of the 93 companies in the year 2017. Hence, the results are a mirror of the performance of these companies in this year only. Some results give unique insights into the financial efficacy of these construction companies. It is desirable to compare these results with those of previous studies.

## Comparative study of the results

This research study conspicuously differentiates itself from other similar studies.

- (1). Unlike the work of Kruk S. (Year: 2018)<sup>1</sup> which focusses on analysing the entire construction industry, this work has focussed specifically on the most profitable sector in construction industry i.e. building materials sector. Also, Kruk S. (Year: 2018)<sup>1</sup> has primarily analysed net operating profit after taxes (NOPAT), invested capital and weighted average cost of capital (WACC). Whereas, our study has focussed on analysing 9 financial metrics.
- (2). The results of the study conducted on EVA in automotive sector by Malichova E. et.al. (Year: 2017)<sup>2</sup> are focussed not on analysing EVA but on the procedure to calculate EVA. Unlike the results by the authors which give insights on 9 different financial parameters, this study focusses on calculation of total capital, WACC and NOPAT.
- (3). The results of study on application of EVA in Chinese listed banks by Zheng X., (Year: 2014)<sup>3</sup> majorly talks about the impact of macro-environment on changes in EVA. For example, they have discussed impact of changing economic cycle, price level, interest rates,

exchange rates etc on EVA. In contrast, study by the authors has mainly focussed on changes in micro and company specific metrics and their correlation with EVA.

(4). Then there are results of the study conducted by Saputra W. E., Sukoco A., Suyono J., Elisabeth D. R. (Year: 2018)<sup>4</sup>. The results of this study focus on two kinds of companies viz. one, which are generating positive EVA and two, which are generating negative EVA. There is also some causal analysis conducted to a certain extent. Also, this study has undertaken 2 years of data for 4 companies, whereas, the study by authors has taken one year of data for 93 companies. There are possible variation in results owing to this difference as well.

### **Conclusion and implications**

The results of the analysis throw ample light upon the finances of the companies in buildings material sector. The findings of the data analysis can be summarized in the following manner.

The key findings of research study are-

- (1). EVA does not have any direct correlation with the 9 financial factors considered in the study.
- (2). Equity financing is the preferred mode of financing for the profitable companies (positive net income).
- (3). Loss-making companies have high amount of debt and less quantum of equity.
- (4). Even companies who are in high losses do keep high cash with them, most likely because the construction business demands that. This cash is as high as their total debt on balance sheet.
- (5). Companies with high capital base have high amount of equity and debt both. However, companies with high net income prefer equity financing than debt financing.

It is to be noted here that since EVA does not have any direct correlation with any of the above-mentioned financial factors, Net Income has been considered as a factor for comparison.

Also, since EVA directly does not depend on any one of these factors it is probably the case that positive EVA generation requires a complex financial engineering. This may involve keeping high equity financing, high cash and efficient business operations, which in itself is a different discussion. A disclaimer would be appropriate here, this study found that EVA does not have any direct correlation with the 8 factors undertaken in the study. However, there could be other financial metrics which might have significant positive or negative correlation with EVA.

### **Addition to literature**

The global construction industry is suffering from the disease of lack of productivity. This has meant a steep decline in productivity of global construction industry from \$17,516.1 USD

per person in 2000 to \$14,744.5 USD per person in 2018. This has meant that the EVA of global construction industry is negative. However, there is one sector which is generating positive EVA in this industry i.e. building materials sector.

As is witnessed during the extensive literature review, there is a visible dearth of research being conducted in the area of EVA in construction. The existing research mainly focusses on technological aspects of construction industry viz. new technologies, use of innovative materials etc. Also, it can be seen that there are some studies being conducted to understand the nature of finances in construction industry as can be seen in the work of Kruk S. (Year: 2018)1.

However, there are very few to no studies being conducted to understand the nature of the most profitable sector in global construction industry. The study by authors has tried to fill this gap and find out the reasons behind such a spectacular performance of this industry. And this, the authors believe, is the true contribution of this work to the research literature in this field.

### **Future scope**

Equity financing has been found out to be the most preferred mode of financing in the companies generating positive net income. This finding could be studied in-depth further. This is because equity has a high cost of capital because of high risk and debt has a lower cost of capital, still, these companies are preferring equity financing over debt financing.

Loss making companies have high debt and low equity. This needs to be put in context of study. This study has used Spearman's correlation coefficient as a test of finding strength between net income, debt and equity of the companies. Now, the Spearman's correlation coefficient or for that matter any correlation coefficient is a lagging indicator, which means that it only explains relationship between the datapoints and does not explain causality. This means that loss making companies having high debt could be the outcome of inefficient management of debt or unproductive business operations.

As explained in Table No. 4, companies with high debt are keeping free cash even when they have to repay debt. Some companies are keeping cash as high as 31994% of total debt. This can be understood up to some extent where the companies are able to reap benefits of the lowering the taxable income by the virtue of interest expenses. However, even where the debt levels are reaching unsustainable levels the companies have not paid off their debts with the free cash available with them. As mentioned earlier in the findings, some of this is most likely because of the nature of business of construction industry which requires high liquidity. However, not repaying debts while keeping high cash is a risky strategy which may lead to companies taking over unsurmountable amount of debts which may then lead to bankruptcy.

### **Acknowledgements**

The authorsof this study would like to express their sincerest gratitude to Symbiosis Institute of International Business (SIIB) and Symbiosis International University (SIU), Pune, India for supporting us throughout this endeavour. A special thank you to SIIB for providing the

Bloomberg terminal which proved to be an integral part of this research study for data collection and research. The authors would like to thank Mr. Mahesh Gokhale, Project manager at Bekaert Industries Pvt Ltd., Pune who initiated the foundation of this research study at his organisation as part of an internship project. This research study was built on the results obtained in the same.

The authors would also like to express their sincere gratitude towards their friends and family who have been pillars of support and strength during the course of study.

### **Declaration of interest**

The authors acknowledge and declare that there are no financial conflicts of interest to disclose. Also, no financial interest or benefit has arisen from the direct application of this research.

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### **Word count**

The word count of this article is 6197 (excluding References).

### **Appendix**

1. The 93 companies under study

#	Name of the company	EVA of 2017 ( in Euros)
1	VIGLACERA DAPCAU SHEET GLASS	300177555456
2	DAI NIPPON TORYO CO LTD	13650142208
3	DULUXGROUP LTD	11819419648
4	NITCO LTD	6758048768
5	BINANI INDUSTRIES LTD	1509372416
6	SKSHU PAINT CO LTD-A	1087054336
7	BOROSIL GLASS WORKS LTD	844558400
8	EMILCERAMICA SPA	657173056
9	MAZOR GROUP LTD	621051584
10	NIHON YAMAMURA GLASS CO LTD	383256064
11	SIMPLEX INFRASTRUCTURES LTD	383179200
12	RAYSUT CEMENT CO	344255328
13	CONSTELLIUM SE	226115664
14	ROYAL CUSHION VINYL PRODUCTS	131105480

15	SAMHWA PAINTS INDUSTRIAL CO	127048960
16	SUNWAY BHD	101779968
17	CONSTRUCTION CORP NO 1 JSC	100025136
18	CROMOLOGY SERVICES SASU	87570880
19	DYNASTY CERAMIC PUB CO LTD	85142216
20	ORGE ENERJI ELEKTRIK TAAHHUT	81742136
21	TOTETSU KOGYO CO LTD	76813904
22	SOLAR A/S-B SHS	76730272
23	SCI JSC	70668864
24	ENERGOPROJEKT OPREMA AD	56949324
25	WIJAYA KARYA PERSERO TBK PT	23456174
26	VIETNAM CONSTRUCTION & IMPOR	22382072
27	PBG SA	13609596
28	VETROPACK HOLDING AG-BR	4194666
29	MT HOEJGAARD A/S	2471126
30	UTL INDUSTRIES LTD	2344020
31	MAPEI SPA	1628309
32	AMBIENTHESIS SPA	1095321
33	WEG SA	0
34	DA CIN CONSTRUCTION CO LTD	-632262
35	ARAB ELECTRICAL INDUSTRIES	-669274
36	MAGROS METAL DD SARAJEVO	-5772279
37	NATOCO CO LTD	-6020145
38	ROYAL CERAMIC INDUSTRY PCL	-6442890
39	ABK GROUP INDUSTRIE CERAMICH	-8077549
40	DEPA PLC	-10697059

41	POST AND TELECOMMUNICATION	-12646718
42	TONGYANG INC	-18584662
43	TENOX CORP	-21772620
44	R.P.P. INFRA PROJECTS LTD	-25793858
45	VIDRALA SA	-31897106
46	SOLTECH ENERGY SWEDEN AB	-32666986
47	EMPIRE INDUSTRIES LTD	-33662052
48	AEGION CORP	-40517496
49	MATHIOS S.A.	-44988408
50	SOMANY CERAMICS LTD	-45149072
51	METAWATER CO LTD	-47253856
52	MOSTOSTAL ZABRZE SA	-49207820
53	NOROO HOLDINGS CO LTD	-78509184
54	CHEMBOND CHEMICALS LTD	-87767344
55	BEKAERT NV	-97480280
56	MARUTI INFRASTRUCTURE LTD	-101865968
57	EPWIN GROUP PLC	-106547816
58	PHU PHONG CORP	-116380888
59	ARWANA CITRAMULIA TBK PT	-122483488
60	ZHEJIANG HISUN PHARMACEUTI-A	-164331008
61	AINAVO HOLDINGS CO LTD	-174656512
62	RAMKY INFRASTRUCTURE LTD	-195379792
63	DEVELOPMENT INVESTMENT CONST	-200943600
64	STANDARD AD LESKOVAC	-257407632
65	AVIC SANXIN CO LTD-A	-296070656

66	DENIZLI CAM SANAYI VE	-346814400
67	NESCO LTD	-350699648
68	FP MCCANN LTD	-377902304
69	BADGER DAYLIGHTING LTD	-392828480
70	ASIAN GRANITO INDIA LTD	-472036160
71	CASALGRANDE PADANA SPA	-503647744
72	MULIA INDUSTRINDO TBK PT	-575015616
73	TPI POLENE PUBLIC CO LTD	-974228288
74	SUPERLON HOLDINGS BHD	-1085941120
75	NITTOH CORP	-1216824192
76	CHINA STATE CONSTRUCTION DEV	-1405240448
77	BLUESCOPE STEEL LTD	-1808723584
78	DEMCO PCL	-1997599360
79	CHINA HAISUM ENGINEERING -A	-3001586944
80	BERGER PAINTS INDIA LTD	-4031951872
81	UAC OF NIGERIA PLC	-7418500096
82	TARKETT	-7448733696
83	TAIKISHA LTD	-8265143296
84	UNI WALL APS HOLDINGS BERHAD	-8537241088
85	PINTARAS JAYA BHD	-17960361984
86	SHALIMAR PAINTS LTD	-21655379968
87	DIC NO.4 JSC	-30584250368
88	QUANEX BUILDING PRODUCTS	-37473509376
89	ORASCOM CONSTRUCTION PLC	-37758902272
90	TOPBUILD CORP	-81814577152
91	MULTI-USAGE HOLDINGS BHD	-113456234496

92	SANKO METAL INDUSTRIAL CO	-2241530167296
93	SAN-EL MUHENDISLIK ELEKTRIK	-4318193254400

## 2. Companies and their 9 financial metrics

Name	Avg NI (€)	WACC EVA (€)	Avg Tot Inv Cap (€)	Net Debt (€)	Total Equity (€)	RO E	Deb t/ EBI TD A	Total Debt (€)	Cash etc (€)
BLUESCOPE STEEL LTD	4.68 E+08	- 180872 3584	422896 5103	- 402721 93.2	355668 0369	10. 33	1.1 5	63266 6258.4	43077 6569.7
WEG SA	3.09 E+08	- 0	280761 4971	543592 78.51	165774 6877	19. 18	2.9 0	11239 21794	81302 4067.4
TONGYANG INC	1.65 E+08	- 185846 62	701971 902	- 122699 242.5	605949 877.6	24. 55	1.4 8	33275 707.88	58096 991.39
SUNWAY BHD	1.45 E+08	101779 968	326626 2223	132305 0537	168778 3384	9.8 6	8.5 7	14372 74577	43146 1588.5
BEKAERT NV	9309 4500	- 974802 80	1509.0 02856	118039 7000	155581 0816	7.2 9	3.5 8	14722 27200	43461 4201.6
DULUXGROUP LTD	8764 0847	118194 19648	508635 690.5	242001 841.7	241701 432.4	37. 10	1.7 7	26761 2374.4	28066 992.34
TOPBUILD CORP	8542 9291	- 818145 77152	132721 3257	561076 667.8	863390 310.9	11. 31	1.5 9	23959 5637.8	73771 477.2
VIDRALA SA	8353 3333	- 318971 06	911735 850.7	411094 000	498813 804.8	15. 89	1.9 4	35473 7392	16184 400
WIJAYA KARYA PERSERO TBK PT	7307 9421	234561 74	131719 7352	- 232967 55.78	703019 691.4	13. 78	2.9 3	45563 0396.2	50136 9250.1
TOTETSU KOGYO CO LTD	6299 3168	768139 04	555020 631.2	- 135514 435	494512 609	13. 30	0.0 3	20701 66.474	13389 9087.9
TARKETT	5383 3333	- 744873 3696	147078 3317	753600 000	817060 006.4	6.9 1	2.9 7	64157 9987.2	10130 0000
TAIKISHA LTD	5106 4776	- 826514 3296	918237 024.5	- 313488 029.9	761389 452.1	6.7 7	0.6 6	57451 742.37	33418 2019.6
BERGER PAINTS INDIA LTD	5058 7694	- 403195	307263 577.7	469097 4.506	215852 858	24. 47	0.7 9	62662 271.99	19827 586.65

		1872							
VETROPACK HOLDING AG-BR	4516 6062	419466 5.5	650262 360.2	621055 89.52	569626 358.8	7.8 0	0.4 8	52770 992.6	88530 051.22
BADGER DAYLIGHTING LTD	3613 0185	392828 480	303235 817.4	346181 84.22	196165 823	18. 99	0.9 1	71328 078.45	27231 161.44
METAWATER CO LTD	3313 9756	472538 56	488569 883.7	119522 088.3	349531 297	10. 48	1.8 8	11612 2751	14268 1081.9
DYNASTY CERAMIC PUB CO LTD	3026 1657	851422 16	144261 390.1	615567 97.88	905563 25.37	39. 19	0.8 5	42698 710.89	37423 52.479
DAI NIPPON TORYO CO LTD	2895 0029	136501 42208	363296 521.4	431232 0.903	251627 495.5	13. 22	1.5 3	82237 371.06	26293 318.45
RAYSUT CEMENT CO	2772 7757	344255 328	421543 118.1	405273 07.66	341868 995.3	10. 43	1.5 2	72016 502.99	27586 093.89
CHINA HAISUM ENGINEERING -A	2601 1451	300158 6944	188219 034.8	200401 970.9	156479 843.7	18. 30	0.0 4	10872 85.088	16048 7442.1
MAPEI SPA	2504 6800	162830 8.5	101518 8416	524098 424	542733 817.6	5.2 8	13. 06	39229 5993.6	65509 296
VIETNAM CONSTRUCTION & IMPOR	2262 9318	223820 72	499298 800.9	239674 34.98	296103 773.1	9.6 5	4.4 0	17672 9815.9	63611 169.36
SKSHU PAINT CO LTD-A	2123 7073	108705 4336	183132 020.1	581919 25.85	117074 224.5	19. 80	1.3 2	40603 378.09	19344 221.93
NESCO LTD	1893 4012	350699 648	105706 337.8	418496 8.895	942537 92.88	21. 72	0.0 0		80364 1.6372
PBG SA	1852 4326	136095 96	184085 219.4	973649 81.01	366694 62.99	5.1 6	0.6 9	20525 0683.6	39940 556.24
NOROO HOLDINGS CO LTD	1628 0736	785091 84	613593 765.7	343898 13.43	409948 440	8.1 9	4.7 9	16319 4831.4	84223 103.73
QUANEX BUILDING PRODUCTS	1590 2935	374735 09376	503450 017.3	160581 107.4	345620 439.5	4.3 7	1.7 9	13784 1380.8	36195 851.58
FP MCCANN LTD	1568 7715	377902 304	813969 33.17	247296 9.482	718491 26.84	23. 84	6.8 5	10352 138.53	11278 626.64
EPWIN GROUP PLC	1467 9616	106547 816	136861 990.2	276022 35.42	100290 463.7	18. 27	1.0 4	32241 132.03	12629 230.84
DA CIN	1408	-	269191	-	147505	10.	8.4	11676	80428

CONSTRUCTION CO LTD	1662	632262.4375	507.4	56970670.92	182.8	36	4	0985.8	155.32
SANKO METAL INDUSTRIAL CO	13903938	2.24153E+12	131441047	51997257.46	105995211.5	13.56	0.42	8423729.448	38526898.08
SIMPLEX INFRASTRUCTURES LTD	12995060	383179200	688543780.1	416568563.5	201813178.9	6.39	5.26	450806770.1	6366817.479
CHINA STATE CONSTRUCTION DEV	11737962	1405240448	168823940.7	37118166.71	110290029.2	9.26	6.81	58735460.25	38185347.54
SAMHWA PAINTS INDUSTRIAL CO	9769985	127048960	338926960.2	80286820.03	223533148.9	5.56	3.91	92677784.17	25974757.33
ABK GROUP INDUSTRIE CERAMICH	9216342	8077549	52666064	8152747	33198916	24.53	1.59	18812407.8	5742767.4
ARWANA CITRAMULIA TBK PT	9000848	122483488	71374078.71	5953993.688	63141171.23	15.32	0.41	6906535.314	3803154.662
AINAVO HOLDINGS CO LTD	8959275	174656512	142730471	70112252.49	132992240.1	7.07	0.26	3811914.651	66191700.67
EMILCERAMICA SPA	8144167	657173056	140538918.7	78398203	105917399.2	16.51	1.24	33522800.2	41135442.8
SOMANY CERAMICS LTD	7973372	45149072	115069103.7	51720275.78	59677231.93	17.37	2.00	40920545.69	2653496.641
SOLAR A/S-B SHS	7672093	76730272	308150362.5	61743603.69	227485100.4	2.76	1.60	68444129.9	38430141.35
BOROSIL GLASS WORKS LTD	7590297	844558400	112170272.2	695392.9404	100392767.8	8.82	0.70	5184427.793	962380.4534
PINTARAS JAYA BHD	7151786	17960361984	75732923.3	38871528.01	73242241.54	11.07	0.00	0	2033534.694
NIHON YAMAMURA GLASS CO LTD	7016165	383256064	681314230.8	142893902.2	449066270.5	1.82	7.18	216099671.8	90841954.57
CASALGRANDE PADANA SPA	6905614	503647744	187410589.3	4093954	176928748.8	4.69	0.63	8930849.2	33640305.2
NATOCO CO LTD	6484687	6020144.5	132596760.4	64520817.03	127289911.9	5.00	0.10	1312446.53	49248043.31
ORGE ENERJI ELEKTRIK TAAHHUT	6390953	81742136	21060376.98	220719.5358	15884532.01	37.29	0.36	1783171.256	4942739.739

TENOX CORP	6017 906	- 217726 20	863920 26.07	- 599559 75.55	797501 69.06	8.5 8	0.1 8	25303 90.76	54221 810.01
DEVELOPMENT INVESTMENT CONST	6008 658	- 200943 600	176541 035.8	332126 94.61	109313 495.6	4.2 7	26. 26	62274 396.87	12696 119.93
ORASCOM CONSTRUCTION PLC	5715 748	- 377589 02272	790332 636.3	- 237513 09.81	436653 646.3	18. 21	5.7 3	36422 9732.4	40534 0665.1
CHEMBOND CHEMICALS LTD	5256 267	- 877673 44	291059 37.66	- 421411 2.329	250529 62.32	32. 24	0.7 4	23078 71.16	16530 80.92
UAC OF NIGERIA PLC	5201 885	- 741850 0096	350444 623.2	- 146605 31.54	251946 803.6	4.1 3	2.4 8	90467 659.63	42534 099.43
EMPIRE INDUSTRIES LTD	4901 614	- 336620 52	431494 16.62	236093 70.01	215298 68.22	25. 03	2.0 4	17220 030.06	76207 07.113
MULIA INDUSTRINDO TBK PT	4007 604	- 575015 616	287962 861.1	783259 93.46	101418 357.6	2.0 6	4.4 2	19216 1917.3	48975 44.912
ASIAN GRANITO INDIA LTD	3790 155	- 472036 160	925413 53.85	385193 15.59	490894 74.11	8.3 7	2.9 8	36860 426.91	21154 85.026
CONSTRUCTION CORP NO 1 JSC	2968 661	100025 136	248851 493.9	875299 95.81	734562 79.1	4.0 3	6.4 5	17911 1102.4	47757 049.08
SUPERLON HOLDINGS BHD	2853 254	- 108594 1120	241556 04.2	- 172136 8.835	201310 76.12	15. 65	0.3 6	14819 38.663	50617 40.563
R.P.P. INFRA PROJECTS LTD	2405 477	- 257938 58	391578 32.02	876385 6.236	253338 89.33	9.6 0	2.0 4	11608 764.22	45952 44.286
NITTOH CORP	1919 996	- 121682 4192	243769 24.2	- 360278 3.207	212902 67.5	9.6 9	0.5 3	15561 75.934	82802 52.26
ENERGOPROJEKT OPREMA AD	1144 419	569493 24	221531 41.88	- 153095 3.828	104909 06.17	12. 24	16. 45	75854 59.801	32162 47.411
SCI JSC	8942 31.3	706688 64	389723 88.95	251744 19.28	191457 36.83	6.7 1	18. 48	15176 384.7	20624 29.351
MULTI-USAGE HOLDINGS BHD	6880 19.6	- 1.1345 6E+11	129223 33.28	- 123308 6.399	129336 58.62	19. 15	0.0 0	8430.9 28535	26974 16.625
UNI WALL APS HOLDINGS BERHAD	6120 88	- 853724 1088	165548 4.148	361281 .8072	128955 3.554	59. 60	6.8 5	34659 7.1777	45167. 81652



MAZOR GROUP LTD	5709 52.2	621051 584	183788 16.39	749036 .9571	174827 78.58	5.2 4	0.9 9	17307 96.489	47713 12.521
DIC NO.4 JSC	3132 44	305842 50368	648449 6.164	98389. 67311	372243 4.903	7.4 5	3.7 6	20581 91.486	39948 1.6073
MAGROS METAL DD SARAJEVO	2208 85.7	577227 8.5	406461 0.541	101435 .9519	395753 9.253	5.7 5	0.5 5	10707 1.2885	5635.3 30975
DEMCO PCL	9264 7.01	199759 9360	116918 087.3	536240 4.541	813796 18.93	0.5 3	9.0 1	43020 892.54	14110 898.84
MARUTI INFRASTRUCTURE LTD	6777 8.67	101865 968	224460 9.753	462926 .8073	203428 1.464	2.1 6	0.0 0	0	30983. 1918
UTL INDUSTRIES LTD	4380 2.02	234402 0.25	322870 .8831	5887.8 22208	57358. 65863	5.1 6	0.0 6	21879 5.6748	42893. 0317
STANDARD AD LESKOVAC	1317 3.75	257407 632	488140 .542	13144. 36601	451743 .9612	2.9 0	1.4 4	36396. 58075	23252. 21559
SAN-EL MUHENDISLIK ELEKTRIK	5592 3.1	4.3181 9E+12	699693 6.006	886773 .9851	574847 6.042	1.2 8	9.0 8	12399 39.66	12430 95.022
ROYAL CERAMIC INDUSTRY PCL	7629 0.7	644288 9.5	187936 13.09	302071 4.404	137777 07.08	9.7 6	6.6 8	49287 13.084	34955 1.0468
DENIZLI CAM SANAYI VE	3800 34	346814 400	131374 77.95	30916. 19955	133233 11.89	2.2 9	0.9 2	68708 7.2328	58027. 93134
POST AND TELECOMMUNICATI ON	4714 52	126467 18	173525 30.4	442958 .0377	815488 2.438	2.8 9	6.8 5	68372 06.893	12193 38.23
VIGLACERA DAPCAU SHEET GLASS	6108 29	3.0017 8E+11	489814 4.975	275727 4.771	586856 .7572	5.1 6	6.3 7	26736 32.193	47680 3.0039
MATHIOS S.A.	6997 48	449884 08	174895 67.67	735614 2	744612 7.6	8.8 3	13. 21	89432 61.4	12461 06.8
TPI POLENE PUBLIC CO LTD	7028 58	974228 288	245101 4292	112985 2792	131180 9369	0.2 2	8.8 0	98087 4228.3	69318 468
ARAB ELECTRICAL INDUSTRIES	8971 70	669274	662101 7.493	486501 .9663	529212 5.349	17. 62	9.5 0	18584 72.272	10516. 41251
PHU PHONG CORP	9482	116380	517453 9.207	456496 1.715	660519 .4314	90.	6.8 5	43879 38.967	44101. 50601

	08	888				02			
ROYAL CUSHION VINYL PRODUCTS	- 1272 319	- 131105 480	- 168521 55.02	- 421654 45.91	- 586445 96.92	- 5.1 6	- 6.8 5	- 41449 341.02	- 66991. 84585
SOLTECH ENERGY SWEDEN AB	- 1711 234	- 326669 86	- 374714 36.02	- 271655 03.66	- 991144 0.329	- 134 .68	- 18. 35	- 15604 075.68	- 27102 01.783
MOSTOSTAL ZABRZE SA	- 1758 649	- 492078 20	- 637403 81.46	- 390349 5.938	- 513710 30.73	- 6.1 9	- 0.8 4	- 89959 42.832	- 67114 96.709
SHALIMAR PAINTS LTD	- 3076 877	- 216553 79968	- 372858 74.66	- 693040 3.827	- 141125 74.72	- 9.4 6	- 9.1 6	- 19276 512.27	- 11774 15.008
AMBIENTHESIS SPA	- 3761 167	- 109532 1.25	- 547508 33.33	- 201200 0	- 483706 00	- 8.7 9	- 6.9 7	- 77536 00	- 15702 00
AVIC SANXIN CO LTD-A	- 3807 795	- 296070 656	- 619391 179.2	- 193028 444.4	- 170661 553	- 4.2 1	- 14. 39	- 48388 0226.3	- 85345 406.1
NITCO LTD	- 6140 475	- 675804 8768	- 132177 017.3	- 905410 78.73	- 130011 7.126	- 116 .59	- 86. 85	- 13098 4714.8	- 43501 33.374
AEGION CORP	- 1.1E+ 07	- 405174 96	- 806930 834.4	- 199043 835.1	- 491456 239.3	- 2.8 3	- 61. 22	- 30984 8130.4	- 12416 6340.2
DEPA PLC	- 1.1E+ 07	- 106970 59	- 378511 873	- 709228 95.7	- 305693 281.6	- 2.2 9	- 1.8 4	- 45885 178.36	- 10486 2518.9
ZHEJIANG HISUN PHARMACEUTI-A	- 1.6E+ 07	- 164331 008	- 233227 9537	- 118043 6757	- 106009 5501	- 0.6 9	- 10. 09	- 12602 67893	- 29942 7456.1
RAMKY INFRASTRUCTURE LTD	- 2E+0 7	- 195379 792	- 481551 272.2	- 287822 794.8	- 996615 83.94	- 15. 89	- 154 .97	- 43715 3537.7	- 13820 381.46
CONSTELLIUM SE	- 2.7E+ 07	- 226115 664	- 160833 3333	- 198700 0000	- 316000 000	- 5.1 6	- 5.0 5	- 20462 00013	- 44860 0000
MT HOEJGAARD A/S	- 3.2E+ 07	- 247112 6	- 117991 297.3	- 495823 90.64	- 109016 969.7	- 24. 06	- 1.1 8	- 38721 507.15	- 30806 619.49
CROMOLOGY SERVICES SASU	- 3.9E+ 07	- 875708 80	- 258664 7876	- 742802 928.5	- 205326 56	- 227 .94	- 6.8 5	- 99025 7953.2	- 37443 2
BINANI INDUSTRIES LTD	- 4.6E+ 07	- 150937 2416	- 711498 986	- 810652 802.9	- 132156 729.1	- 5.1 6	- 22. 45	- 82225 7189.9	- 13296 981.04

3. Companies sorted as per their ranking in the category

Name	Avg NI	WACC EVA	Avg Total Inv Cap	Net Debt	Total Equity	ROE	Debt/EBITDA	Total Debt	Cash etc
BLUESCOPE STEEL LTD	93	17	93	14	93	60	30	84	88
WEG SA	92	61	91	67	91	81	50	89	93
TONGYANG INC	91	52	77	4	83	87	35	43	68
SUNWAY BHD	90	78	92	92	92	59	76	91	89
BEKAERT NV	89	39	2	90	90	48	54	92	90
DULUXGROUP LTD	88	91	70	80	67	90	41	75	55
TOPBUILD CORP	87	4	85	85	87	65	38	74	73
VIDRALA SA	86	49	81	82	80	73	45	77	48
WIJAYA KARYA PERSERO TBK PT	85	69	84	17	84	70	51	82	92
TOTETSU KOGYO CO LTD	84	73	71	3	79	68	5	19	82
TARKETT	83	12	86	87	86	46	52	85	79
TAIKISHA LTD	82	11	82	1	85	45	19	54	86
BERGER PAINTS INDIA LTD	81	14	59	47	64	85	23	57	50
VETROPACK HOLDING AG-BR	80	66	74	10	82	50	15	53	77
BADGER DAYLIGHTING LTD	79	25	58	60	62	79	26	59	53
METAWATER CO LTD	78	43	67	5	74	63	44	64	83
DYNASTY CERAMIC PUB CO LTD	77	75	48	69	44	92	25	50	29
DAI NIPPON TORYO CO LTD	76	92	63	20	68	67	37	61	52
RAYSUT CEMENT CO	75	82	65	63	72	62	36	60	54
CHINA HAISUM ENGINEERING -A	74	15	54	2	59	78	6	10	84
MAPEI SPA	73	63	83	84	81	40	83	79	70
VIETNAM CONSTRUCTION & IMPOR	72	68	68	54	70	57	57	69	69
SKSHU PAINT CO LTD-A	71	88	51	68	55	82	33	47	49
NESCO LTD	70	27	37	22	45	83	2	2	14
PBG SA	69	67	52	75	4	35.5	20	72	62
NOROO HOLDINGS CO LTD	68	41	72	59	75	51	59	68	75
QUANEX BUILDING PRODUCTS	67	6	69	77	73	30	42	67	58
FP MCCANN LTD	66	26	34	43	39	84	69.5	35	42

EPWIN GROUP PLC	65	37	45	57	47	77	29	42	43
DA CIN CONSTRUCTION CO LTD	64	60	56	12	58	61	75	65	74
SANKO METAL INDUSTRIAL CO	63	2	42	13	51	69	14	31	61
SIMPLEX INFRASTRUCTURES LTD	62	83	76	83	63	43	61	81	38
CHINA STATE CONSTRUCTION DEV	61	18	49	61	54	55	66	55	59
SAMHWA PAINTS INDUSTRIAL CO	60	79	61	72	65	41	56	63	51
ABK GROUP INDUSTRIE CERAMICH	59	55	29	51	33	86	39	40	37
ARWANA CITRAMULIA TBK PT	58	35	32	19	38	71	13	28	30
AINAVO HOLDINGS CO LTD	57	33	47	8	57	47	10	23	71
EMILCERAMICA SPA	56	86	46	6	50	74	32	44	63
SOMANY CERAMICS LTD	55	44	39	66	37	75	46	48	25
SOLAR A/S-B SHS	54	72	60	70	66	25	40	58	60
BOROSIL GLASS WORKS LTD	53	87	38	31	48	54	21	26	15
PINTARAS JAYA BHD	52	9	33	15	40	64	2	2	22
NIHON YAMAMURA GLASS CO LTD	51	84	75	76	77	22	74	73	78
CASALGRANDE PADANA SPA	50	23	53	23	61	31	18	32	57
NATOCO CO LTD	49	57	44	9	56	32	8	12	66
ORGE ENERJI ELEKTRIK TAAHHUT	48	74	19	32	24	91	12	16	35
TENOX CORP	47	51	35	11	42	53	9	21	67
DEVELOPMENT INVESTMENT CONST	46	31	50	58	53	29	90	56	44
ORASCOM CONSTRUCTION PLC	45	5	79	16	76	76	62	78	87
CHEMBOND CHEMICALS LTD	44	40	23	21	31	89	22	20	21
UAC OF NIGERIA PLC	43	13	62	18	69	28	49	62	64
EMPIRE INDUSTRIES LTD	42	47	28	53	30	88	48	39	40
MULIA INDUSTRINDO TBK PT	41	22	57	71	49	23	58	71	34
ASIAN GRANITO INDIA LTD	40	24	36	62	35	52	53	45	24
CONSTRUCTION CORP NO 1 JSC	39	77	55	73	41	27	64	70	65
SUPERLON HOLDINGS	38	20	21	26	27	72	11	13	36

BHD									
R.P.P. INFRA PROJECTS LTD	37	50	27	52	32	56	47	36	32
NITTOH CORP	36	19	22	24	29	58	16	14	41
ENERGOPROJEKT OPREMA AD	35	70	20	27	19	66	86	29	28
SCI JSC	34	71	26	55	26	44	88	37	23
MULTI-USAGE HOLDINGS BHD	33	3	13	28	20	80	4	4	26
UNI WALL APS HOLDINGS BERHAD	32	10	5	38	9	93	69.5	8	7
MAZOR GROUP LTD	31	85	17	30	25	39	28	15	33
DIC NO.4 JSC	30	7	10	33	12	49	55	18	12
MAGROS METAL DD SARAJEVO	29	58	7	37	13	42	17	6	1
DEMCO PCL	28	16	40	48	43	20	78	51	47
MARUTI INFRASTRUCTURE LTD	27	38	6	40	11	24	2	2	4
UTL INDUSTRIES LTD	26	64	3	35	5	35.5	7	7	5
STANDARD AD LESKOVAC	25	30	4	36	6	26	34	5	3
SAN-EL MUHENDISLIK ELEKTRIK	24	1	12	29	15	18	79	11	18
ROYAL CERAMIC INDUSTRY PCL	23	56	18	44	22	8	65	25	10
DENIZLI CAM SANAYI VE	22	28	14	34	21	17	27	9	8
POST AND TELECOMMUNICATION	21	53	15	39	17	14	69.5	27	17
VIGLACERA DAPCAU SHEET GLASS	20	93	8	25	7	35.5	63	22	13
MATHIOS S.A.	19	45	16	50	16	10	84	33	19
TPI POLENE PUBLIC CO LTD	18	21	89	89	89	21	77	87	72
ARAB ELECTRICAL INDUSTRIES	17	59	11	41	14	6	81	17	2
PHU PHONG CORP	16	36	9	46	8	4	69.5	24	6
ROYAL CUSHION VINYL PRODUCTS	15	80	1	64	3	35.5	69.5	49	9
SOLTECH ENERGY SWEDEN AB	14	48	25	56	18	2	87	38	27
MOSTOSTAL ZABRZE SA	13	42	31	45	36	12	24	34	39
SHALIMAR PAINTS LTD	12	8	24	49	23	9	80	41	16
AMBIENTHESIS SPA	11	62	30	42	34	11	73	30	20
AVIC SANXIN CO LTD-A	10	29	73	78	60	13	85	83	76
NITCO LTD	9	90	43	74	10	3	92	66	31
AEGION CORP	8	46	80	79	78	15	91	76	81

DEPA PLC	7	54	64	7	71	16	43	52	80
ZHEJIANG HISUN PHARMACEUTI-A	6	34	88	91	88	19	82	90	85
RAMKY INFRASTRUCTURE LTD	5	32	66	81	46	7	93	80	46
CONSTELLIUM SE	4	81	87	93	1	35. 5	60	93	91
MT HOEJGAARD A/S	3	65	41	65	52	5	31	46	56
CROMOLOGY SERVICES SASU	2	76	90	86	28	1	69.5	88	11
BINANI INDUSTRIES LTD	1	89	78	88	2	35. 5	89	86	45

4. Cash as a percentage of total debt

MULTI-USAGE HOLDINGS BHD	8430.929	2697417	31994%
CHINA HAI SUM ENGINEERING -A	1087285	1.6E+08	14760%
TOTETSU KOGYO CO LTD	2070166	1.34E+08	6468%
NATOCO CO LTD	1312447	49248043	3752%
TENOX CORP	2530391	54221810	2143%
AINAVO HOLDINGS CO LTD	3811915	66191701	1736%
TAIKISHA LTD	57451742	3.34E+08	582%
NITTOH CORP	1556176	8280252	532%
SANKO METAL INDUSTRIAL CO	8423729	38526898	457%
CASALGRANDE PADANA SPA	8930849	33640305	377%
SUPERLON HOLDINGS BHD	1481939	5061741	342%
ORGE ENERJI ELEKTRIK TAAHHUT	1783171	4942740	277%
MAZOR GROUP LTD	1730796	4771313	276%

DEPA PLC	45885178	1.05E+08	229%
TONGYANG INC	33275708	58096991	175%
VETROPACK HOLDING AG-BR	52770993	88530051	168%
METAWATER CO LTD	1.16E+08	1.43E+08	123%
EMILCERAMICA SPA	33522800	41135443	123%
ORASCOM CONSTRUCTION PLC	3.64E+08	4.05E+08	111%
WIJAYA KARYA PERSERO TBK PT	4.56E+08	5.01E+08	110%
FP MCCANN LTD	10352139	11278627	109%
SAN-EL MUHENDISLIK ELEKTRIK	1239940	1243095	100%
MT HOEJGAARD A/S	38721507	30806619	80%
MOSTOSTAL ZABRZE SA	8995943	6711497	75%
WEG SA	1.12E+09	8.13E+08	72%
CHEMBOND CHEMICALS LTD	2307871	1653081	72%
DA CIN CONSTRUCTION CO LTD	1.17E+08	80428155	69%
BLUESCOPE STEEL LTD	6.33E+08	4.31E+08	68%
CHINA STATE CONSTRUCTION DEV	58735460	38185348	65%
STANDARD AD LESKOVAC	36396.58	23252.22	64%
SOLAR A/S-B SHS	68444130	38430141	56%
ARWANA CITRAMULIA TBK PT	6906535	3803155	55%
NOROO HOLDINGS CO LTD	1.63E+08	84223104	52%
SKSHU PAINT CO LTD-A	40603378	19344222	48%

UAC OF NIGERIA PLC	90467660	42534099	47%
EMPIRE INDUSTRIES LTD	17220030	7620707	44%
ENERGOPROJEKT OPREMA AD	7585460	3216247	42%
NIHON YAMAMURA GLASS CO LTD	2.16E+08	90841955	42%
AEGION CORP	3.1E+08	1.24E+08	40%
R.P.P. INFRA PROJECTS LTD	11608764	4595244	40%
EPWIN GROUP PLC	32241132	12629231	39%
RAYSUT CEMENT CO	72016503	27586094	38%
BADGER DAYLIGHTING LTD	71328078	27231161	38%
VIETNAM CONSTRUCTION & IMPOR	1.77E+08	63611169	36%
DEMCO PCL	43020893	14110899	33%
DAI NIPPON TORYO CO LTD	82237371	26293318	32%
BERGER PAINTS INDIA LTD	62662272	19827587	32%
TOPBUILD CORP	2.4E+08	73771477	31%
ABK GROUP INDUSTRIE CERAMICH	18812408	5742767	31%
SUNWAY BHD	1.44E+09	4.31E+08	30%
BEKAERT NV	1.47E+09	4.35E+08	30%
SAMHWA PAINTS INDUSTRIAL CO	92677784	25974757	28%
CONSTRUCTION CORP NO 1 JSC	1.79E+08	47757049	27%
QUANEX BUILDING PRODUCTS	1.38E+08	36195852	26%
ZHEJIANG HISUN PHARMACEUTI-A	1.26E+09	2.99E+08	24%



CONSTELLIUM SE	2.05E+09	4.49E+08	22%
DEVELOPMENT INVESTMENT CONST	62274397	12696120	20%
AMBIENTHESIS SPA	7753600	1570200	20%
UTL INDUSTRIES LTD	218795.7	42893.03	20%
PBG SA	2.05E+08	39940556	19%
DIC NO.4 JSC	2058191	399481.6	19%
BOROSIL GLASS WORKS LTD	5184428	962380.5	19%
POST AND TELECOMMUNICATION	6837207	1219338	18%
VIGLACERA DAPCAU SHEET GLASS	2673632	476803	18%
AVIC SANXIN CO LTD-A	4.84E+08	85345406	18%
SOLTECH ENERGY SWEDEN AB	15604076	2710202	17%
MAPEI SPA	3.92E+08	65509296	17%
TARKETT	6.42E+08	1.01E+08	16%
MATHIOS S.A.	8943261	1246107	14%
SCI JSC	15176385	2062429	14%
UNI WALL APS HOLDINGS BERHAD	346597.2	45167.82	13%
DULUXGROUP LTD	2.68E+08	28066992	10%
DYNASTY CERAMIC PUB CO LTD	42698711	3742352	9%
DENIZLI CAM SANAYI VE	687087.2	58027.93	8%
ROYAL CERAMIC INDUSTRY PCL	4928713	349551	7%
TPI POLENE PUBLIC CO LTD	9.81E+08	69318468	7%

SOMANY CERAMICS LTD	40920546	2653497	6%
SHALIMAR PAINTS LTD	19276512	1177415	6%
ASIAN GRANITO INDIA LTD	36860427	2115485	6%
MAGROS METAL DD SARAJEVO	107071.3	5635.331	5%
VIDRALA SA	3.55E+08	16184400	5%
NITCO LTD	1.31E+08	4350133	3%
RAMKY INFRASTRUCTURE LTD	4.37E+08	13820381	3%
MULIA INDUSTRINDO TBK PT	1.92E+08	4897545	3%
BINANI INDUSTRIES LTD	8.22E+08	13296981	2%
SIMPLEX INFRASTRUCTURES LTD	4.51E+08	6366817	1%
PHU PHONG CORP	4387939	44101.51	1%
ARAB ELECTRICAL INDUSTRIES	1858472	10516.41	1%
ROYAL CUSHION VINYL PRODUCTS	41449341	66991.85	0%
CROMOLOGY SERVICES SASU	9.9E+08	374432	0%

5. Table of tables and their description

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2	Result of Anderson Darling test of EVA
3	Result of Anderson Darling test of Average Total Invested Capital
4	Result of Anderson Darling test of Net Debt
5	Result of Anderson Darling test of Total Equity
6	Result of Anderson Darling test of ROE
7	Result of Anderson Darling test of Debt/EBITDA
8	Result of Anderson Darling test of Total Debt
9	Result of Anderson Darling test of Cash

Figure 1.

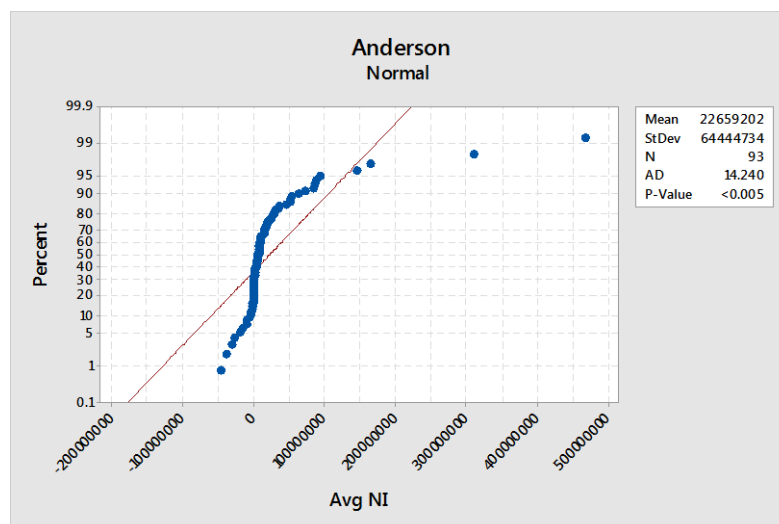


Figure 2.

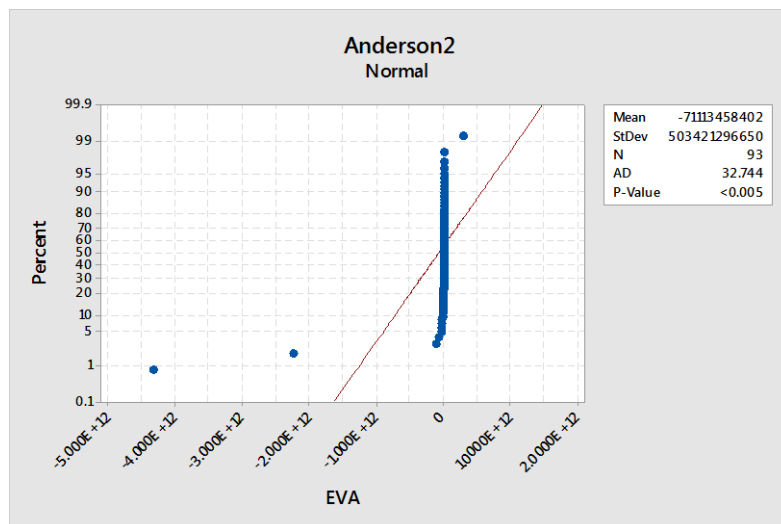


Figure 3.

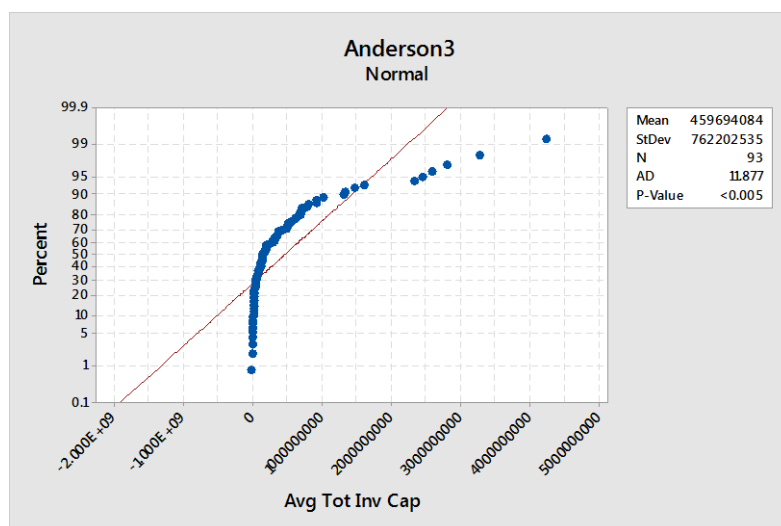


Figure 4.

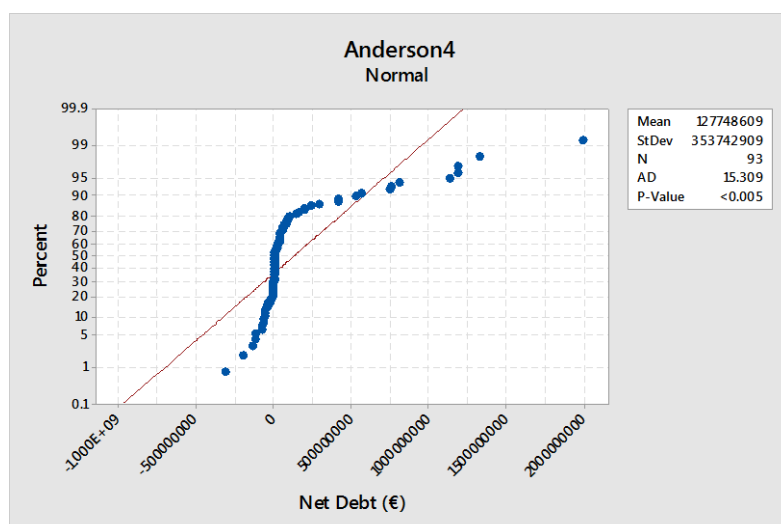


Figure 5.

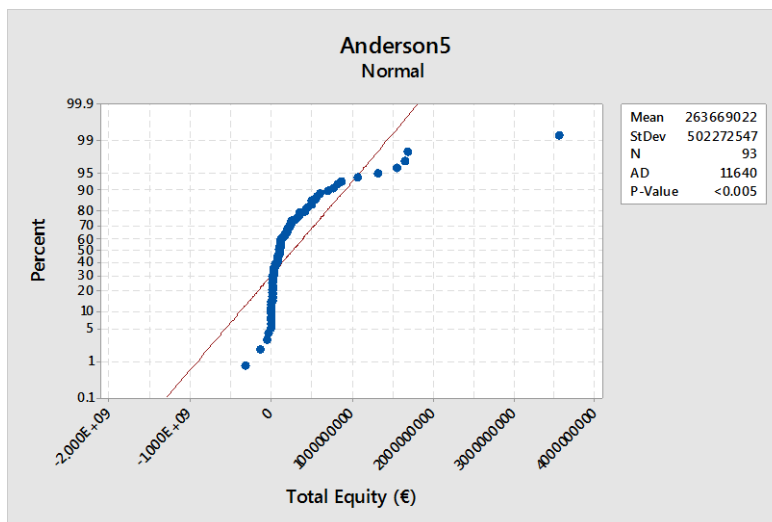


Figure 6.

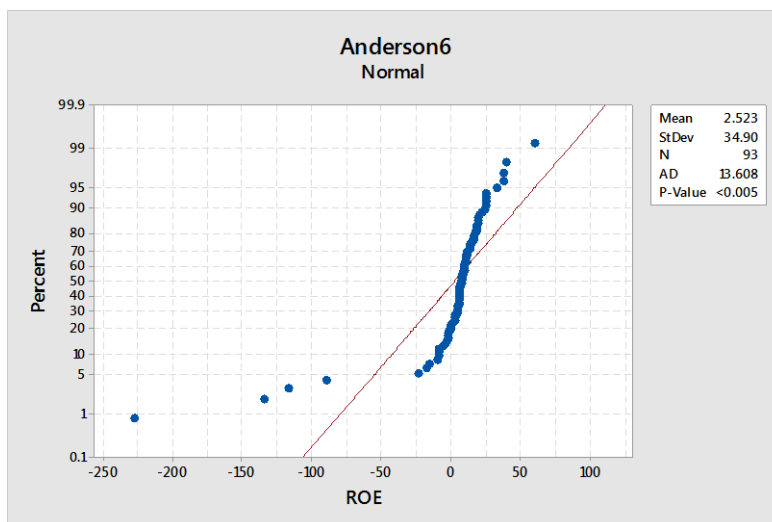


Figure 7.

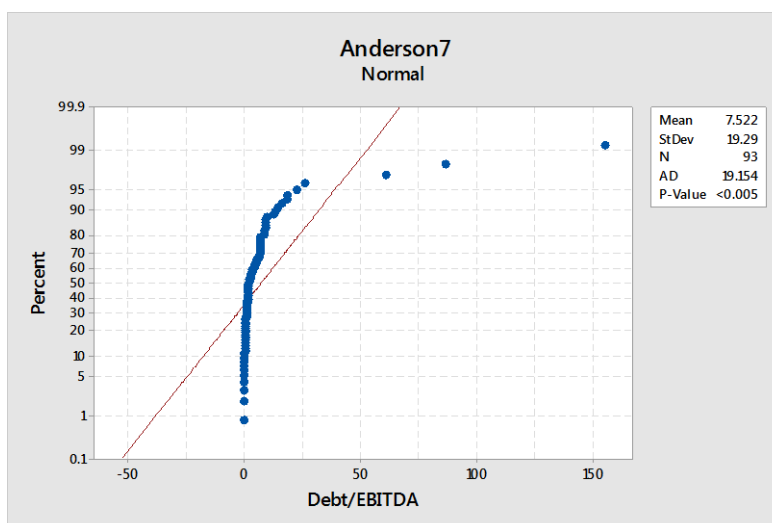


Figure 8.

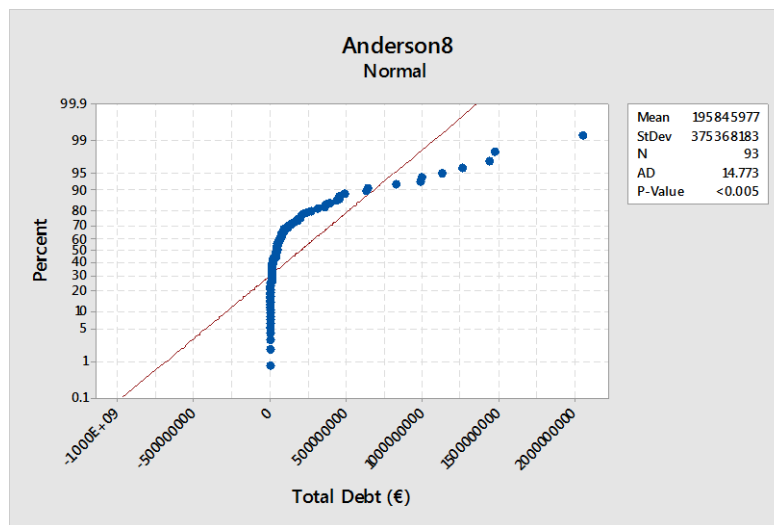


Figure 9.

