

# Economic-financial Analysis and Value Creation in Portuguese Manufacturing Industry

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**Abstract:** The Portuguese economy has gone through different phases in the recent years, with special emphasis on the period when the country needed aid from the International Monetary Fund and the European Union. During the same period, austerity measures were taken, impacting in the life of the Portuguese companies and society in general. Once this period of greater difficulty had been overcome, were experienced some years of recovery and expansion. Being the manufacturing industry one of most preponderant in the Portuguese economy, responsible for almost a quarter of the turnover and a fifth of the Portuguese companies' working force, due to its role it deserves an analysis to its more recent past. This study focuses on a value creation and economic-financial analysis in the Portuguese manufacturing industry, in specific in the manufacture of food products, clothing apparel and of fabricated metal products industries in the 2010-2018 timeframe. In sequence, a sample of 75 companies was defined for this study, subjected to mandatory Official Account Review in all years of the analysis period. The traditional economic-financial and value creation indicators were then applied to the sample and the average sectorial companies, which include EVA<sup>®</sup>, CFROI<sup>®</sup>, as well as three bankruptcy forecasting models. This analysis intends to measure the performance, in a sustainability point of view, of the three manufacturing industry sections under analysis.

Keywords: Manufacturing industry, Value creation, Economic-financial analysis

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## 1. Introduction

The manufacturing industry has a great importance for the economy of almost every country and in Portugal, according to Ministério da Economia (2020), it was responsible in 2018 for 24.30% of the global turnover and 18.10% of the Portuguese companies' total workforce, while in 2010 the same indicators corresponded to 21.60% and 18.50%, respectively. Despite the negative percentual evolution of the workforce, it increased in absolute value more than 40 thousand people, which can be explained by the even greater increase in the number of employees in other sectors of activity in Portugal.

Even though its relevance, the manufacturing industry is a sector with low investment in the recent decades, particularly technologically speaking, comparing to the existing capacity in other European countries. According to Banco de Portugal (2021), in 2018, 72.90% of the Portuguese manufacturing industry's

turnover came from low and medium-low technology activities.

Due to the Covid-19 pandemic, the European Union (EU) is now starting to distribute greater amounts of funds to its member-states, and according to the plan of application elaborated by Silva (2020), one of the large, planned investments in Portugal is called "*A reindustrialização do país – Uma indústria de futuro e competitiva*". According to Silva (2020), the country's reindustrialization involves the creation of a program capable of creating favourable economic conditions for emergency periods and consolidation of competitive companies on a global scale. The future of the manufacturing industry looks promising if this investment will be accomplished, however, before looking to the future it is important to understand the present and the recent past and that is the purpose of this study, which will focus on the economic and financial analysis and value creation of the Portuguese manufacturing industry. The aim

of this study is to answer the following questions:

**Q1:** What was the impact of the economic crisis, which implied the intervention of the International Monetary Fund (IMF) in Portugal in 2011, in terms of competitiveness, measured by the value creation, and level of debt in the Portuguese manufacturing industry?

**Q2:** Is there a difference in terms of the sustainability of the economic and financial indicators, namely liquidity and profitability, between the different sections of the Portuguese manufacturing industry, whether in periods of crisis or in cruising phase?

**Q3:** Considering the bankruptcy forecasting models, the Portuguese manufacturing industry was positioned in a more resilient economic and financial situation in 2018, compared to 2010?

## Methodology

In order to perform the analysis to the industry under study and answer the previous questions the following steps will be followed: 1) Review of the literature related to economic and financial analysis and value creation, as well as the Portuguese accounting system and its evolution; 2) Description of the Portuguese manufacturing industry and selection of its most representative sections according to the number of companies; 3) Definition of companies' sample belonging to the manufacture of food products, clothing apparel and of fabricated metal products industries, with financial data available and audited from 2010 to 2018; 4) Computing of the traditional value creation and economic-financial indicators of the selected companies and also the sectorial companies average for each analysed year; 5) Discussion of the results; 6) Answers to the starting questions and conclusions.

## 2. Literature Review

### Portuguese accounting system

The accounting standardization in Portugal started in 1974, after the 25<sup>th</sup> of April revolution. Only in 1977 was introduced the first accounting system, the *Plano Oficial de Contabilidade* (POC), which was in usage until 2009, even though it had experienced some changes over time. With this system

getting outdated and the growing need to meet the international accounting standards, Portugal introduced in 2010 a new accounting system based on the IASB standards, called *Sistema de Normalização Contabilística* (SNC). This is the current accounting system applied in Portugal and according to CSC (2021), on its 65<sup>th</sup> article is stated that all commercial companies must prepare annually a set of documents that must include the management report and financial statements, delivered with the opinion of the supervisory body, if it exists, and the Official Accounting Review when the company is obliged to do so.

### Auditing and accounting review

According to Breia, Mata and Pereira (2014) auditing, which includes the Official Accounting Review, consists on the preparation of reports with financial information of the companies which, although not being an undoubted guarantee of the absence of fraud or distortions, provides greater credibility and reliability to the information provided to the stakeholders. It is stated in the Directive 2014/56/EU that *"the statutory audit results in the expression of an opinion that the financial statements give a true and fair view of the audited entities in accordance with the relevant financial reporting framework"*.

The obligation of auditing depends on the legal model of the company and its size. According to CSC (2021), are required to statutory audit all joint stock and private limited companies that do not have a supervisory board and that exceed for two consecutive years at least two of the following conditions:

- 1) Total Assets: 1 500 000 €;
- 2) Turnover: 3 000 000 €;
- 3) Average number of workers: 50.

All public stocked companies are also subject to this obligation. By contrast, small and most medium-sized companies are not always subject to the same mandatory auditing, a practice that is not consensual for many specialists.

### Financial Information Analysis

Brealey, Myers and Allen (2011) state that the analysis of financial information is essential for planning the company's future, both in short and long term. Fabozzi (2013) describes financial analysis as the selection,

evaluation and interpretation of financial and other pertinent information to assist the assessment of a company's operating performance and financial condition. It is through financial analysis that most business problems are diagnosed, and like any problem, the sooner its recognition, the better the survival chances. Breia (2013) states that only three to four years after the existence of a problem this is identified and there is an attempt to solve or mitigate it, usually due to the following factors:

- Attempt not to blame managers;
- Unadjusted remuneration and awarding bonuses without considering sustainability;
- Excessive focus on global results;
- Impairments, financial participations and risks with an inadequate expression.

### Ratio Analysis

In economic-financial ratio analysis, the univariate one is traditionally the most applied method for studying the companies' position, being very useful on decision making, observation and forecasting of the company's performance. It is a simple, quantitative and relatively straightforward method to apply through financial statements and that is why it is used in almost all business analyses. There are ratios which have associated abstract reference values, based on the obtained results allow us to draw conclusions about them. Others, however, require a better analysis and critical sense.

The classification of the analysis as univariate derives from the analysis of the company's situation through a single independent variable. According to Peres (2014), the variables are analysed individually without any attempt to find an integrated relationship between two or more of them that explains the company's situation. The first author to present the relevance of this technique was Beaver (1966), whose application consisted on analysing ratios individually in order to classify the companies as healthy or not. The ratios may evaluate various aspects of company performance such as liquidity, capital structure, efficiency, profitability, among others. However, it should be noted that although these are highly relevant indicators in the analysis, their isolated assessment shouldn't serve as a basis for decision-making, as business performance

is a multifaceted event and no indicator alone will succeed on capturing fully its effects. Neves (1989) states that any financial analysis technique helps to ask the right questions but not to give the answers. The inclusion of multiple indicators in the analysis will provide a more global perception of the company's situation.

### Liquidity

The analysis of a company's liquidity, in a simplified approach, consists in evaluating the ability to pay its obligations in the short term. Some examples are the current and quick ratios.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Despite the inventory being considered a current asset, companies can experience some difficulty transforming it into cash, so the quick ratio excludes from the analysis that possible outcome.

$$\text{Quick Ratio} = \frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$$

These ratios are intended to be greater than 1, which means the considered current assets are enough to cover the liabilities in short term.

Similar to current ratio, the Net Working Capital (NWC) also compares the current assets and liabilities but through their difference:

$$NWC = \text{Current Assets} - \text{Current Liabilities}$$

On the other hand, the Working Capital Requirements (WCR) should be used if is intended to analyse the operating assets and liabilities.

$WCR = \text{Operating Assets} - \text{Operating Liabilities}$   
The difference between NWC and WCR defines the liquidity situation of a company. The lower is WCR, the more auto sufficient is the company's operating cycle and better its liquidity situation.

### Capital Structure

Capital structure ratios, in turn, evaluate the company's ability to comply its obligations in the medium and long term. Fabozzi (2013) recalls that financing through debt obliges the company to pay interest rates as well as return what was loaned to it. In turn, equity financing does not require payments since the distribution of dividends is a management decision. Fabozzi (2013) states that the way by which the company finances itself, namely the relationship between its liabilities and equity, defines the

financial risk to which the company is subject. Through the equity ratio that relation can be analysed:

$$\text{Equity ratio} = \frac{\text{Equity}}{\text{Assets}}$$

In order to evaluate the distribution of the debt considering its time distance obligation to be returned, can be analysed the following ratio:

$$\text{Debt Structure} = \frac{\text{Long term liabilities}}{\text{Liabilities}}$$

Both these ratios do not have a reference threshold consensually defined, even though some authors as Fernandes et. (2018) state that equity ratio should be greater than '0.33'.

### Efficiency

The efficiency ratios, as the name suggests, are dedicated to evaluate the use of the resources and the efficiency of their management in the company's activity. In this group of ratios, we can distinguish two types: turnover ratios and average periods. According to Brealey, Meyers and Allen (2011) turnover ratios evaluate how efficient the company is using its resources and the company will be more efficient as higher is the value of the ratio. However, these are highly sensitive to the sector and may differ reasonably depending on the company's activity.

$$\text{Asset turnover} = \frac{\text{Sales}}{\text{Assets}}$$

Average Collection Period (ACP) and Average Payment Period (APP) are measured in days and represent, on average, the time it takes the company to receive from its customers and pay to its suppliers, respectively. Average Inventory Period (AIP) represents the average duration that products remain in storage. The aggregate analysis of these three durations can be done through the Exploration Life Cycle Duration (ELCD):

$$\text{ELCD} = \text{AIP} + \text{ACP} - \text{APP}$$

Banco de Portugal (2019) refers that this indicator aims to express the duration of the operating cycle of companies, starting from the acquisition and transformation of inventories until the selling of goods or services.

### Profitability

Profitability ratios aim to assess the degree of efficiency with which the company's

resources are applied, and for Breia, Mata and Pereira (2014) they intend to assess the sustainability of the long-term equilibrium. Profitability can be analysed using various means, such as Assets, Equity, or a specific investment. For example, Samonas (2015) refers that Return On Equity (ROE) determines the rate of return on capital invested by shareholders in the company and allows them to assess whether its return compensates for the risk of holding that capital.

$$\text{Return On Equity} = \frac{\text{Net Income}}{\text{Assets}}$$

### Risk

Risk ratios intend to evaluate the vulnerability and sensitivity that a change in turnover may introduce to the company's financial balance. One example of risk ratios is the Degree of Combined Leverage (DCL):

$$\text{DCL} = \frac{\text{Contribution Margin}}{\text{Earnings before taxes}}$$

This ratio evaluates the vulnerability of the business to a variation in sales, which is higher the greater the weight of fixed operating and financial costs are, so, this indicator combines both operational and financial risk.

### Bankruptcy Forecasting Models

Bankruptcy Forecasting Models are included in multivariate analysis since they use a combined set of indicators to assess the companies' situation. The first investigator to develop these models was Altman through the Z-Score, in 1968. This model suffered some modifications over the years, with the following being the last version published (Altman, 2002):

$$Z = 3,25 + 6,56 X_1 + 3,26 X_2 + 6,72 X_3 + 1,05 X_4$$

$$\text{With } x_1 = \frac{\text{Working Capital}}{\text{Assets}}; \quad x_2 = \frac{\text{Retained Earnings}}{\text{Assets}};$$

$$x_3 = \frac{\text{EBIT}}{\text{Assets}} \text{ and } x_4 = \frac{\text{Equity}}{\text{Liabilities}}.$$

Many other models were elaborated by other authors. For the Portuguese companies, a model was developed by Neves and Silva (1998) with the support of state entities. Also, a study developed by Peres and Antão (2019) revealed within a set of 21 bankruptcy forecasting models that the one created by Monelos, Sánchez and López (2013) is the most effective when applied to Portuguese manufacturing industry companies.

## Value Creation

Value is a vast concept and can be applied to many areas and in different contexts. In a monetary approach we can simply define it as how important a good or service is, that is, how much valued and willing we are to pay for it. Neves (2011) states that this concept gained special emphasis from the 1980s onwards, when examples of management focused on creating shareholder value began to emerge with the author pointing to Fruhan and Rappaport as the main drivers of this change. In different bibliographic sources, different definitions for value creation can be found. However, there is a consensus among most authors that value is created when the return generated by a company or a given investment is greater than the costs incurred. Currently, the most used indicators of value creation are the Economic Value Added (EVA<sup>®</sup>), the Cash Flow Return On Investment (CFROI<sup>®</sup>) and the Market Value Added (MVA).

### EVA<sup>®</sup>

This indicator is probably the most used and popular metric for assessing a company's value creation. The fundamental principle of EVA<sup>®</sup> is the existence of value creation when the profit resulting from the company's operations after taxes is greater than the cost of the Invested Capital, which includes financial liabilities and equity.

$$EVA^{\circledast} = NOPAT - WACC \times IC$$

With NOPAT=Net Operational Profit After Taxes; WACC=Weighted Average Cost of Capital and IC=Invested Capital.

EVA<sup>®</sup> is obtained in the form of absolute value, which makes it impossible to compare companies with substantially different values of Invested Capital. In order to overcome this limitation, the EVA<sup>®</sup> spread can be analysed:

$$EVA^{\circledast} \text{ spread} = ROC - WACC$$

In this calculation it is compared the WACC with the Return On Capital with value being created when  $EVA^{\circledast} \text{ spread} > 0$ .

### CFROI<sup>®</sup>

This one is also a method that, despite being less used for some years, has once again gained prominence as a measure of value creation. This value creation metric

compares the cash flows generated with the gross investment, being, in the analysis of companies, equivalent to the Invested Capital in it and which enables the generation of these same cash flows. The CFROI<sup>®</sup> is obtained as a percentage, however, refers Erasmus (2008) that by itself it is not possible to measure the creation or destruction of value. Although it is calculated as an internal rate of return, it cannot be interpreted in the same way. Martins, Paulo and Silva (2011) refer that it should be compared with the average cost of capital (WACC) in order to ascertain the creation of value, existing when  $CFROI^{\circledast} > WACC$ .

$$-IC + \sum_{i=1}^n \frac{CF_i}{(1+k)^i} + \frac{ERV}{(1+k)^n} = 0$$

With IC=Invested Capital; CF<sub>i</sub>=Inflation-adjusted gross Cash Flows; ERV=Expected Residual Value of non-depreciating assets; n=investment duration; k=solution of CFROI<sup>®</sup>.

## 3. Case study

### Economic contextualization

Before carrying out any analysis, it is important to contextualize the Portuguese manufacturing industry as well as the external environment that surrounds it. With the subprime crisis starting in 2008 in the United States of America, Mohti et al. (2019) refers that it quickly spread to other countries reaching worldwide in the following years, with several financial institutions declaring large losses and some even bankruptcy. In the European Union (EU), this crisis also had a great impact. According to data provided by Eurostat (2020), in 2008 the Gross Domestic Product (GDP) of the EU showed signs of concern with a slowdown in its growth. However, the worst would come in 2009 with a recession due to the drop in GDP, estimated on (-) 4.3% comparing to the previous year. In 2012 was again experienced a decrease of 0.7% of the GDP. With an economic crisis spreading across the world, Portugal was no exception. According to data from Pordata (2020), this had repercussions in terms of GDP with a negative variation rate from 2009 to 2013, except for 2010, an increase in unemployment rate and a decrease in

families' consumption. With a high and growing external debt, with budget deficit and deteriorating financing conditions, Portugal was forced to resort to the IMF in May 2011. This recovery plan was applied between 2011 and 2014 and worth around 78000 million euros, offset by a decrease in expenses, an increase in taxes and a privatization policy.

### Manufacturing Industry

When approaching manufacturing industry, according to INE (2021), we are referring to entities that transform raw materials into finished products or products to be used by other industries. The manufacturing industry can be divided into 24 sections and in Portugal has around 68 000 companies. From all its sections, the manufacture of food products, wearing apparel and fabricated metal products, except machinery and equipment industries are the ones with most companies. Together, these three sections are responsible for about 44,00% of the total number of companies in Portuguese manufacturing industry.

### Sample

Given the impossibility of carrying out an in-depth analysis of the 24 sections with the required rigor in this study, this one was focused on the three most representative sections of the industry under analysis. Using the Bureau van Dijk's Sabi database, a sample of Portuguese companies was selected, with financial reports available and subject to statutory audit for the period 2010 to 2018 and belonging to manufacture of food products, wearing apparel and fabricated metal products, except machinery and equipment industries. After applying some conditions to reduce the number of companies and eliminate outliers it was obtained a sample of 75 companies, with the following distribution:

NACE Code	Section	No. of firms
NACE 10	Manufacture of food products	23
NACE 14	Manufacture of wearing apparel	25
NACE 25	Manufacture of fabricated metal products, except machinery and equipment	27
	Total	75

The average sectorial companies for each of the three sections under analysis were also analysed from the sector tables data of Banco de Portugal.

## 4. Results

### Liquidity

Companies in the three sections registered satisfactory current ratio levels, with the results close to or above '1'. Analysing the quick ratio, reductions of 20.0% to 40.0% were observed comparing to the current ratio results. Analysing the quick ratio, it is observed a very similar evolution to the one registered in current ratio for all sections. Both average sectorial and sample companies have a quick ratio above '0.7', even so, by comparing it with the current ratio, a decrease can be observed, which is due to the weight of inventories in short-term assets. A relative comparison between the sections reveals a greater decline in the wearing apparel industry (NACE 14), which may be related to the effect of greater seasonality that it faces, and consequently forced to maintain higher levels of inventories.

### Capital Structure

The analysis of the capital structure allows us to conclude that globally the average companies in the three sections meet the required theoretical level of equity, where only NACE 14 did not meet these values in 2011 and 2012. There is also registered a growing trend of the equity ratio on the three sections. The analysis of liabilities showed that in all these sections there is a predominance of short-term liabilities, however, it can be observed that NACE 25 tends to have the highest values of long-term liabilities, with an average of more than 20.00% of its sample companies having a majority of this type of debt. However, there is no evident evolution pattern regarding the debt structure (short or long term) in any of the three sections.

### Efficiency

The Exploration Life Cycle Duration was clearly lower in NACE 10, due to its low ACP and AIP, revealing a decreasing evolution.

NACE 14 and 25 demonstrate a sectorial superiority comparing to NACE 10, although with a tendency of approaching. However, the sample results do not demonstrate a clear superiority of any of these last two sections (NACE 14 and 25). It is also evident that the high ELCD values of NACE 14 result from a high AIP, while those of NACE 25 result from a high ACP.

### **Profitability**

The Return On Assets of the three sections was globally positive throughout the period considering the operating results, never exceeding 10.00%. Considering the net income, in some years there was a negative return from 2010 to 2014 in NACE 14 and 25. NACE 10, on the other hand, always registered a positive return, both in its sample and sector.

The analysis of the ROE showed some extreme results regarding the samples. However, it is concluded that they were caused by a small number of companies that produce a great impact given the small size of their equity. A deeper analysis on the samples revealed that, in the three sections, more than 70.00% of the companies within the samples registered positive ROE every year.

### **Risk**

An overall analysis of the sections under study reveals that the period from 2010 to 2014 was of increased risk for the three sections. From 2015 to 2018 the values decreased and stabilized. The results revealed that the greatest impact on DCL comes from the operating structure expenses. In addition, the analysis revealed that NACE 10 was the one with lowest and most stable level of risk during all the analysed period.

### **Prediction of business failure**

The classification of companies' financial health is attributed according to the predominant result in the three models. A company classified as bankrupt by two models and not bankrupt by the other is considered bankrupt for this purpose, and vice versa. If all models agree that result is the one considered. The conclusions from

the models for the average sectorial companies were that NACE 10 is in a healthy financial situation for all years of the period under analysis; NACE 14, although in 2010 it is considered bankrupt, since 2011 it has been classified as non-bankrupt; finally, NACE 25 is classified in three years as bankrupt, specifically in 2011, 2017 and 2018. Regarding the performance of the average sample companies, it is observed that annually more than 70,00% are classified as healthy. NACE 10 was the one with the highest percentage of healthy companies, reaching 91.30% in 2018. The lowest number occurred in 2012 in NACE 25, with 70.37%. Even so, for just two years in each section the percentage of non-bankrupt companies was below 80.00%. In addition, was not possible to identify a clear trend of evolution as the results are somewhat irregular.

### **Value creation**

EVA<sup>®</sup> demonstrates value creation in all years of the analysis, except 2012, 2013 and 2017, years in which some sections registered value destruction. The maximum EVA<sup>®</sup> value was verified in 2014 for all sections. CFROI<sup>®</sup> registered a constant value creation for NACE 10 as well as for the samples of NACE 14 and NACE 25. Sectorial average companies of the latter two, however, showed some years of value destruction: NACE 14 from 2010 to 2012 and NACE 25 from 2011 to 2014. It was also observed that the years in which lowest number of companies registered value creation was 2012 according to CFROI<sup>®</sup> and 2013 according to EVA<sup>®</sup>.

## **5. Conclusions**

### **Question 1**

On the analysis of value creation indicators, EVA<sup>®</sup> and CFROI<sup>®</sup>, was registered that in the defined period of crisis (2010-2014), all sections experienced a great decrease. The EVA<sup>®</sup> analysis revealed an abrupt decline in 2012 and 2013 in all sections, with none of them creating value in the last of these years. The CFROI<sup>®</sup> Spread analysis also evidenced a decrease in some of these years, with some sections even registering value destruction in their sectorial and/or sample average companies. Analysing the following years, however, it is concluded that

both EVA<sup>®</sup> and CFROI<sup>®</sup> Spread also presented periods of great increase and decrease, and since these are outside the economic crisis period, their causes cannot be associated with it. Additionally, there are even several observations from the different sections, after 2014, where the observed decreases in these indicators overcame those verified in the crisis period. It is therefore concluded that the value creation in the three sections under analysis is quite irregular, both in crisis situations and in cruise phase. Although the decrease of value creation indicators between 2010 and 2014 is obvious, it is also true that occurred large decreases in the subsequent period, which allows us to infer that the impact of the economic crisis, although existent, was not clearly superior to what happens in a non-crisis period.

Regarding the capital structure was observed through equity ratio that the manufacture of food products (NACE 10) experienced a decrease in this indicator from 2010 to 2012, increasing the weight of debt. Since then, the trend has been for growth in this indicator, and consequently increasing the weight of equity. NACE 14 and 25 did not registered significant changes on their capital structure, so is concluded through this criterion that the impact of the economic crisis had higher repercussions at NACE 10. In terms of debt structure, there was some variation in the temporal decomposition of liabilities at the manufacture of fabricated metal products (NACE 25) between 2010 and 2014, with NACE 10 and 14 also demonstrating slight fluctuations, even though with lower extent. The remaining years were characterized by more stable evolutionary trends.

### **Question 2**

The liquidity of the sections under analysis allowed detecting a dissimilarity between the two periods. Overall, liquidity situation problems were registered across the three sections, essentially in NACE 10 and 14, where during practically the entire period most companies belonging to their samples had Working Capital Requirements greater than Net Working Capital. However, the years of these two sections when more companies had problems occurred during the crisis period, with the number of companies with enough Net Working Capital

to cover Working Capital Requirements being clearly higher in the cruise phase period. Although NACE 25 sample presents a reasonably stable number of companies with positive liquidity situation in the two periods, its sectorial average company showed a significant decrease in the liquidity situation in the crisis period, in specific from 2011 to 2013. It is concluded that liquidity, in specific the liquidity situation, tends to be more negative in crisis period in the three sections.

Through the profitability ratios, and specifically analysing the Return On Assets, it is concluded that the profitability was lower in the crisis period. The minimum values recorded in each of the three sections, either in sector or in samples, occurred during crisis period. By opposition, the years in which maximum profitability was achieved refer to the cruise phase period. Additionally, all years in which negative returns were recorded (operating, financial and net) were all from 2010 to 2014. In conclusion, there is a discrepancy in the sustainability of profitability in periods of crisis and cruise phase.

### **Question 3**

The analysis of the three bankruptcy prediction models agreed that the manufacture of food products (NACE 10) was more resilient in 2018, with a higher score when compared to 2010, both in sector and sample, and therefore more far from bankruptcy. The analysis of the number of companies in the sample classified as non-bankrupt demonstrates the same trend, with 2018 registering a greater number of healthy companies. The manufacture of wearing apparel (NACE 14) also presents higher scores in 2018 for the three models, except for the model by Neves e Silva (1998) over the average sample company, which registers a decrease compared to 2010. Nevertheless, it is concluded that while in 2010 two of the three models classified NACE 14 sector as bankrupt, in 2018 all classified it as healthy. Finally, in the manufacture of fabricated metal products (NACE 25), despite the number of companies in the sample classified as bankrupt being the same in 2010 and 2018, it is registered that while in 2010 the sector was classified as healthy by most models, in



2018 was classified as bankrupt by two models and consequently less resilient.

### **General conclusions**

The study of the three sections concluded that, despite belonging to the same industry, these are relatively heterogeneous among themselves regarding the results over various indicators. In addition, their activities are also very distinct, so it is difficult to draw general conclusions about this whole industry.

Regarding the bankruptcy prediction analysis, the results vary depending on the model used. From the obtained results, it is concluded for this case study that the Altman (2002) model is more positive in its scores, classifying the average sectorial companies in the three sections as not bankrupt in all years of the analysis. Focusing on the samples, in all sections more than 95% of the companies were classified as not bankrupt from 2010 to 2018. This model also has an interesting peculiarity as it is assigned a rating to companies based on its score. Focusing on the average sectorial companies, we conclude that NACE 10 and 14 were in 2010 classified as "Speculative Investment", being in 2018 classified as "High Quality". In turn, NACE 25 got its sector average company classified as "Speculative Investment" in 2010, ending 2018 as "Low Medium Quality". NACE 10 and 14 samples also had positive evolutions in their rating. NACE 25 sample showed a decrease on one level (A→A-), nevertheless, classified as "Medium High Quality" in 2010 and 2018.

Finally, regarding the creation of value, in specific the EVA<sup>®</sup> and CFROI<sup>®</sup> indicators, some inconsistencies were found in the results extracted from each of the methods, namely regarding the years in which value were destroyed. The CFROI<sup>®</sup> analysis concludes the year in which most companies in the sample destroyed value was in 2012, while through EVA<sup>®</sup> it was concluded that was in 2013. However, these minimums are both located in the crisis period, confirming the impact that it had at the level of value creation.

### **Future lines of investigation**

Reached the end of this study, it is acknowledged that a longer timeframe horizon, including more previous years,

would be certainly beneficial and bring a greater source of information about this industry and the three sections. Even so, it is recognized that the difference between accounting standards is an obstacle to the comparison, so it should be considered.

As the world economy is once again going through a difficult period as result of the Covid-19 pandemic, it would be interesting to analyse the years following 2018 and establish a source of comparison between the economic crisis caused by that pandemic and the previous crisis that implied the intervention of the IMF in Portugal in 2011, verifying at the same time the conclusions drawn from question 3 regarding the resilience of this industry when a new crisis approaches.

It is also important to remember that although the set of three analysed sections include about 44.00% of the companies in the Portuguese manufacturing industry, there is still a vast number of sections that have not been analysed and its analysis would complement the study of the Portuguese manufacturing industry.

Finally, economic-financial analysis and value creation encompasses a wide range of indicators, many of which were not addressed in this study. The analysis of different metrics and models would provide a wider analysis, allowing to draw more effective conclusions.

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