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The relationship between liquidity and profitability in the
Food & Beverage industry
Evidence from Europe and United States

Rui Filipe Rocha Almeida

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Professor Leonor Ferreira

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Abstract

This Work Project clarifies the relationship between liquidity and profitability based on a sample in the Food & Beverage (F&B) industry, and comparing the largest European and United States companies. The research concludes that liquidity, proxied by current ratio or quick ratio, correlates with return on assets taken as the measure of profitability, and so does the cash conversion cycle and its components. Moreover, company size correlates with liquidity, and indirectly affects ROA. This research contributes and addresses to managers in the F&B industry and recommends how they should act in order to improve profitability in the industry.

Key words: Food & Beverage; Profitability; Liquidity; Cash Conversion Cycle; Return on Assets

1. Introduction

This research analyzes the relationship between liquidity and profitability in the Food & Beverage (F&B) industry, comparing European and United States (U.S.) companies. Every company faces the need for cash, and in particular, liquidity is a key variable in the F&B industry due to the importance of inventory management and because the practice of short-term discounts is usual, which affect the Cash Conversion Cycle (CCC). Figure 1 shows the average revenue, liquidity ratios (such as current ratio and quick ratio) and return on assets (ROA) between 2011 and 2014 in the F&B industry according to the initial sample of this research which contains the largest European and U.S. F&B companies.

Average Indicators (Initial Sample)	2011	2012	2013	2014	2014 vs 2011	2014 vs 2011 %
Revenue (€ millions)	9,346	10,542	10,573	10,429	1,083	11.6%
Current ratio	1.71	1.64	1.74	1.64	-0.07	-4.3%
Quick ratio	1.12	1.07	1.18	1.09	-0.02	-1.9%
Return on assets (ROA)	11.6%	12.2%	12.8%	11.5%	-0.1%	-0.6%

Figure 1 – Average revenue, liquidity ratios and return on assets in the largest European and U.S. F&B companies (2011-2014)

The average revenue in the F&B industry increased by 11.6% between 2011 and 2014, while liquidity ratios have decreased in the same period. Regarding CCC, there is an increase on average between 2011 and 2014¹. Concerning profitability, using ROA as a proxy, its evolution in this period shows the average ROA hits a peak in 2013 (12.8%) but in 2014 it returns to a level similar to 2011 (11.5%). Since the decrease in liquidity occurs when there is a decrease in profitability, there is an indication that there might be a relationship between the two variables. If liquidity is crucial to the F&B industry, it is worth testing if that relationship exists and if it is significant in this time period. Moreover, it is useful to test if company size influences the variables in the relationship between liquidity and profitability.

The relationship between liquidity and profitability has been studied before in the F&B industry, but there are contradictive conclusions between authors concerning this relationship, namely if it is positive (Lyroudi & Lazaridis, 2000) or negative (Bieniasz & Gołaś, 2011). A preliminary analysis of the evolution of liquidity and profitability indicators shows significant differences between companies from Europe and U.S. regarding their CCC and profitability, and these differences have been increasing over the last years (2011-2014). Thus this research extends the literature in the F&B industry by providing new evidence based in a sample of the largest European and U.S. F&B companies. The research contributes to the understanding of the relevance of financial statements, namely how they can be used to improve a company's financial situation. By signalling the variables that can improve operational decisions, this research specially addresses to managers in the F&B industry who need to deepen the understanding of the liquidity-performance relationship.

This Work Project proceeds as follows. Section 2 discusses two key concepts: liquidity and profitability. Section 3 describes the F&B industry and its context. Section 4 reviews prior literature

¹ See Appendix 1 with the complete information regarding the evolution of the average CCC and its components in the F&B industry between 2011 and 2014.

about liquidity and profitability, in general and specifically applied to the F&B industry. Section 5 outlines the methodology used, data sources, the variables and their proxies, describes the sample used, the criteria used to its selection, and the development of research questions. Section 6 presents the results obtained from the statistical analysis and the insights and answers to the research questions. Section 7 concludes, and gives suggestions for further research.

2. Key concepts

Liquidity and *profitability* are the key concepts in this research. Thus discussing them, what they mean, how to measure and how they adapt to the F&B industry is necessary before designing the research.

Liquidity refers to the amount of cash or cash equivalents that a company is able to obtain in order to be able to pay its current liabilities. Accordingly, it is crucial for a company to be able to collect payments from its customers. Otherwise, it would quickly default on its current debts. The management of liquidity is efficient when a company is able to control its current assets and liabilities, fulfil its current obligations and avoid excessive investment on assets at the same time (Eljelly, 2004). The liquidity of a company can be assessed through the analysis of its liquidity ratios, as well as its CCC².

Liquidity ratios are “traditional” measures based on static statement of financial position³ data (Jose et al., 1996). Against liquidity ratios, there is limited usefulness in assessing future liquidity and the fact that “traditional liquidity ratios” include operating assets and those assets are intrinsically tied in the operations of the company, so they do not provide an entirely useful approach (Finnerty, 1993).

² Appendix 2 describes the proxies used to assess liquidity: current ratio, quick ratio, working capital turnover ratio, inventory to net working capital ratio, and cash conversion cycle.

³ According to International Financial Reporting Standards (IFRS), the balance sheet is referred to as the statement of financial position.

On the other hand, CCC, introduced by Hager (1976), measures the time between cash spending and receipts, and provides a dynamic approach to liquidity management. The CCC tends to be “longer for older firms and companies with greater cash flows” (Baños-Caballero et al., 2010). Because it takes into account income statement data instead of using balance sheet information exclusively, CCC approach brings a “time dimension” (Jose et al., 1996) to the analysis. Therefore, a CCC analysis can and should be used to complement liquidity ratios analysis. According to Richards and Laughlin (1980), there is a positive relationship between liquidity ratios and the CCC, which fosters a good liquidity management. Ultimately, this type of analysis can be very useful to a manager. For instance, by reducing cash amounts invested in current assets a company obtains funds that can fuel its growth and reduce its financing costs (Filbeck & Krueger, 2005), which are crucial ways of enhancing profitability.

Profitability is the ability of a company to generate revenues that surpass its expenses in a given period of time. Depending on the industry where the company operates, profitability differs, and these differences can be assessed through the use of profitability ratios such as ROA⁴:

$$ROA = \frac{EBIT}{Total\ Assets} \quad [1]$$

ROA gives insight on how efficiently a company uses its assets to generate profits in the operations⁵. Furthermore, ROA can be decomposed into three meaningful ratios⁶, which are known as operational risk, gross sales margin, and asset turnover⁷.

⁴ Return on Equity (ROE) is also a measure of profitability. This Work Project does not consider ROE because it is influenced by the financing decision of a company, which is out of the scope of the research.

⁵ The numerator could also be the Net Income instead of EBIT. By using the EBIT in the numerator, the ratio only takes into consideration revenue and operational expenses, so it excludes all effects related to interest, extraordinary losses and gains, and dividends earned in the period, which are out of the scope of this study.

⁶ This process is called the DuPont method. It was developed in the 1920s by DuPont Corporation and it allows the isolation of the variables which may affect profitability.

⁷ See Appendix 3 with the explanation about operational risk, gross sales margin and asset turnover.

$$ROA = \frac{EBIT}{Gross\ Margin} \times \frac{Gross\ Margin}{Sales} \times \frac{Sales}{Total\ Assets} \quad [2]$$

$$ROA = Operational\ Risk \times Gross\ Sales\ Margin \times Asset\ Turnover \quad [3]$$

Each industry presents its own pattern in what concerns the liquidity-profitability relationship, and each company's financial situation is unique. Thus, a description of the F&B industry is useful to provide a context to the analysis.

3. The Food & Beverage industry

The F&B industry is composed by all companies which produce and sell goods used to human consumption (besides pharmaceuticals), either in solid or liquid form. Examples of well known companies in this industry are Nestlé (European firm), The Coca Cola Company (U.S. firm), or Starbucks (U.S. firm). These companies sell fresh or packaged food, as well as several types of beverages. F&B players can be categorised in three groups: farmers (that gather or produce raw materials), processors (who transform raw goods bought from farmers into finished products), and distributors (who distribute those products to the final consumers). This Work Project focuses on processors and distributors which are the ones closest to the final consumer and most of the major F&B companies operate in those two steps of the value chain. Some companies operate only in one of these groups. For instance, Nestlé is a processor while Starbucks is a processor and a distributor to the final consumer. Figure 2 summarises a SWOT⁸ analysis of the F&B industry.

⁸ SWOT: Strengths, Weaknesses, Opportunities, and Threats.

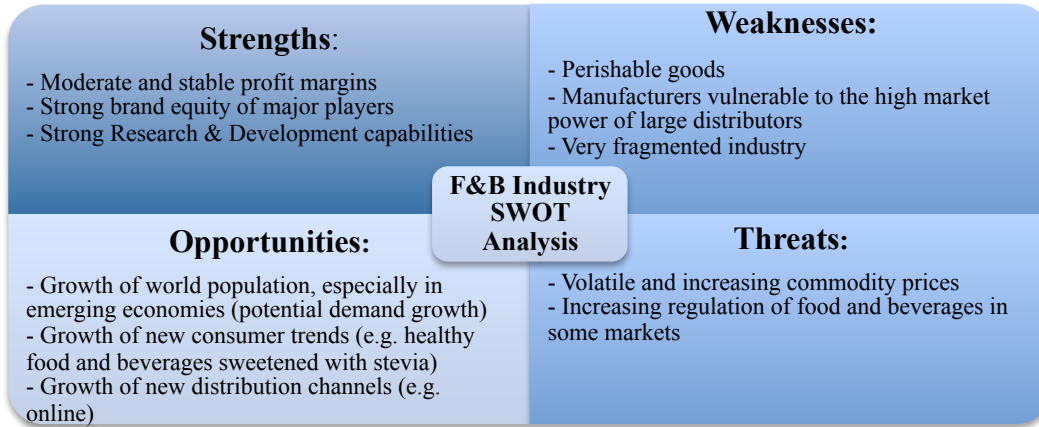


Figure 2 – SWOT analysis of the F&B industry

Inventories in the F&B industry are perishable, a characteristic which means they are not good for consumption after a short time. Thus, accurate demand planning is imperative in this industry in order to have optimal levels of inventory. In a survey conducted in 2014, executives in the F&B industry noticed inventory financing the “third highest” financial issue that they face (NCMM, 2014)⁹. An optimal inventory management allows companies to reduce the risk of having obsolete inventory, and that is crucial because this risk affects liquidity, and more specifically CCC through DIO.

Regarding customers, the relationship between processors and distributors, either retailers or wholesalers, is quite challenging. Many short-term activities and discounts are paid mostly by the processors in order to enhance the sales to the final consumers at retail or wholesale stores. Retailers and wholesalers force to cut prices regularly. In many major economies, they are highly concentrated and differences can be observed between U.S. and Europe. In the U.S. market, the major retailers Walmart, Kroger and Costco had approximately 45% total market share in 2014¹⁰, and in Europe’s largest economy – Germany – the three major grocery players Edeka, REWE Group and Lidl had a

⁹ In a survey by Plante Moran and The National Center for the Middle Market (NCMM). Source: GE Capital. “How Food & Beverage Companies are Addressing Their Top Financing Challenges”. 2014

¹⁰ Source: Statista (<http://www.statista.com/statistics/240481/food-market-share-of-the-leading-food-retailers-of-north-america/>). Accessed on November 12th 2015.

combined market share of 60.2% in 2013¹¹, thus having an even higher bargaining power compared to U.S. major retailers in the negotiations of these promotional activities. These practices are related with liquidity and the CCC in F&B companies through working capital turnover, as well as inventory to net working capital, and they require distributors to efficiently manage their current assets in order to be able to finance those trade activities which are very important to the sustainability of their business.

4. Literature Review

To the best of our knowledge, the literature that is relevant for this research can be divided in two streams. Firstly, the importance of liquidity and CCC is discussed, including evidence regarding the relationship between the two concepts. Secondly, the relationship between liquidity and profitability is discussed, focusing on a few contradictions between authors.

In industries other than F&B, Bhunia and Khan (2011) studied the trade-off between liquidity and profitability in Indian steel companies and concluded that “liquidity position has no impact on profitability”. On the other hand, they concluded that working capital management has some degree of correlation to higher profitability. Baños-Caballero et al. found that there is an “optimal working capital level that balances costs and benefits and maximizes (...) profitability” (Baños-Caballero et al., 2012: 519). However, specifically in F&B firms, Konuk and Zeren found that they “do not have optimal working capital cycle” (Konuk & Zeren, 2014: 161). Filbeck and Krueger (2005) analyzed working capital management results across 32 industries, including F&B. They provide a detailed analysis of how working capital performance evolved from 1997 to 2001 and observed that there is some degree of stability of working capital measures (days sales outstanding, days inventory outstanding, days payable outstanding) in each industry over time, which indicates that it would be

¹¹ Source: Planet Retail

valuable to study liquidity and working capital management in the F&B industry and how those concepts are related to the operational income of companies operating in that sector. Pattitoni et al. described liquidity management as one of the “key factors for enhancing profitability” in European countries (Pattitoni et al., 2014: 773).

Specifically in the F&B industry in Greece, Lyroudi and Lazaridis analyzed liquidity ratios and the CCC exclusively in the food industry, and found that the CCC is “positively related to the return on assets and the net profit margin” (Lyroudi & Lazaridis, 2000: 1). Moreover, they concluded that “there is no difference between the liquidity ratios of large and small firms” (Lyroudi & Lazaridis, 2000: 1). Nobanee (2009) stated that traditionally CCC and profitability are negatively correlated, but on the other hand, if the cash conversion cycle is too short, it could also harm the company’s profits. Shin and Soenen found that “a strong negative association exists between the firm's net trade cycle¹² and its profitability” (Shin & Soenen, 1998: 43). More recently, Bieniasz and Gołaś analyzed working capital management efficiency in the food industry in Poland and some countries of the Eurozone between 2005 and 2009. They observed that in “both large-sized enterprises and the small- and middle-sized ones, the profitability was negatively correlated with the cycles of inventory, accounts receivables and current liabilities” (Bieniasz & Gołaś, 2011: 80).

The literature about the relationship between liquidity and profitability is abundant. However, specifically in the F&B industry only a few authors have studied this relationship and to the best of our knowledge none of them compared U.S. and Europe. Moreover, the existing literature is controversial regarding the relationship between liquidity and profitability. Lyroudi and Lazaridis (2011) found a positive relationship between the CCC and the ROA, while Shin and Soenen (1998), Nobanee (2009) and Bieniasz and Gołaś (2011) found a negative relationship between CCC and profitability. This is a claim for further research, in view of clarifying the relationship

¹² *Net trade cycle* is an alternative name (used by the authors) that refers to the concept of *cash conversion cycle*.

between liquidity and profitability, and in order to extend the existing literature and help improving the decisions of managers in the F&B sector.

5. Methodology and Sample

The purpose of this Work Project is to clarify the relationship between liquidity and profitability based on a sample of the largest companies in the F&B industry, and comparing European and U.S. companies.

5.1. Research Questions

As mentioned, there is controversy about the relationship between liquidity and ROA, namely whether these variables are positively or negatively correlated. In the short-term, a reason for this relationship can be that good cash management allows the company to be less dependent on external financing. Consequently, in the long-term, it has better conditions to grow in a sustainable manner and with a consistently good performance. These variables have not been studied in the F&B industry individually, and furthermore, by comparing U.S. and European companies, better insights can be drawn in this topic. These reasons are a claim to study the liquidity-profitability relationship in the F&B industry. Thus, the following research question is set:

RQ 1: *Is liquidity related to ROA in the F&B industry?*

RQ 1.1: *Does the relationship between liquidity and ROA in European and U.S. companies differ?*

Four proxies are used to measure liquidity in this research, namely current ratio, quick ratio, working capital turnover ratio, and inventory to net working capital ratio. Ratios are used to avoid differences related to company size or different currencies that may affect comparability.

However, liquidity ratios have limitations. The CCC provides a more dynamic view of a company's liquidity. Therefore, it is worthwhile to study how CCC affects performance in the F&B industry, thus extending the literature by validating if a positive or negative relationship exists between the two

variables. To the best of our knowledge, this topic has not been researched before in the F&B sector, so RQ 2 also extends the literature.

RQ 2: *Is the CCC related to ROA in the F&B industry?*

RQ 2.1: *Is DIO related to ROA in the F&B industry?*

RQ 2.2: *Is DSO related to ROA in the F&B industry?*

RQ 2.3: *Is DPO related to ROA in the F&B industry?*

RQ 2.4: *Does the relationship between CCC, or its components, and ROA in European and U.S. companies differ?*

Regarding the CCC, three proxies are used: DIO, DSO, and DPO. Concerning the ROA, it is decomposed into three ratios: Operational risk (OR), Gross sales margin (GSM), and Asset turnover (AT). Company size is proxied by annual revenues¹³.

Major players¹⁴ in an industry are often seen as the “makers” of the market, which means that the market follows the tendencies created by their individual actions. In this sense, it is worth of notice to know how company size is related to liquidity and profitability in the F&B industry. Lyroudi and Lazaridis (2000) found no significant correlation between firm size and liquidity indicators in the food industry in Greece. On the other hand, Bhutta and Hasan found that firm size has a “significant relationship with profitability of firms in food sector” (Bhutta & Hasan, 2013: 23). However, little research was done about this relationship in the F&B industry. Therefore, this research extends the literature and finds if there is a relationship between firm size and profitability.

RQ 3: *Is company size related to liquidity in the F&B industry?*

RQ 3.1: *Does the relationship between company size and liquidity in European and U.S. companies differ?*

RQ 4: *Is company size related to ROA in the F&B industry?*

RQ 4.1: *Does the relationship between company size and the ROA in European and U.S. companies differ?*

¹³ Other usual proxies for size are total assets and number of employees. However, since profitability is measured for the period by ROA, it is more adequate to consider revenue as representative of company size because it is also obtained from the income statement.

¹⁴ Size is proxied by total revenues, since the analysis focuses on income statement data (EBIT), and thus major players are those with highest revenues in the industry. Section 3 refers to major players in the F&B industry.

The variables necessary to answer the research questions are: liquidity, CCC, ROA, and company size.

5.2. Sample and Data

The initial sample is composed by 81 companies from all continents which operate in the F&B industry and it represents a large share of the worldwide F&B sector¹⁵. The size of the sector was estimated in approximately €5.3 trillion in 2008¹⁶, and there is a total sum of approximately €845 billion of annual revenue in 2014 in this sample, which represents a 16% share. Moreover, companies in the sample differ regarding size. In 2014 the annual revenue of these companies ranges between €1.1 billion and €75.6 billion, with an average of €10.4 billion. Data for the research was retrieved from the Bloomberg database¹⁷. It contains consolidated financial data from reports of 81 companies for the periods between 2011 and 2014, this being the most recent period with published financial data. This research does not include periods before 2011 to avoid influences of the worldwide financial crisis that affected European and U.S. economies and influences at a different level the financial data of companies in these two geographies. Furthermore, by studying such a recent period there is a higher degree of applicability of the key insights in the near future, provided that this research addresses to managers in the F&B industry by recommending how they should act to improve profitability.

The initial sample contains companies from every continent, and even though it facilitates the understanding of the average figures and evolutions in the F&B industry, it contains many companies which are not comparable. Thus, some companies were excluded. Companies that operate in regions that do not adopt US GAAP or IAS/IFRS but domestic accounting standards which may justify differences in financial reporting¹⁸ were excluded. The second criterion is the relative importance of each geography in the whole F&B industry, justified that companies from African, Asian, and non-US

¹⁵ See Appendix 4 with the full list of companies in the initial sample and respective countries of origin.

¹⁶ Source: IMAP Food and Beverage Industry Global Report 2010, p. 4. The market size was converted from USD to Euros using the existing exchange rate on 10th November 2015, 22:07 (EUR/USD = 0.93342).

¹⁷ Consolidated data was partially compared to the one available in the companies' websites (the statement of financial position, the income statement, and the statement of cash flows) for validity purposes.

¹⁸ For instance, IFRS regulation is applied in many European countries, but not in the United States.

American countries were also excluded in order to have a sample composed only by companies from the U.S. and Europe, which are two of the most important geographies in the world in terms of size and presence of multinational F&B companies.

The final sample is composed by 29 companies from the U.S. and 12 from Europe¹⁹. U.S. companies in the final sample represent €356.5 billion of total revenue in 2014, which corresponds to approximately 42% of the total revenue in 2014 (€845 billion) of the 81 companies in the initial sample. In 2007, the U.S. represented €933 billion in the total F&B industry revenue in 2008²⁰, so the final sample covers a significant percentage (38% of the total €933 billion in 2008) of the U.S. industry. In Europe the market was worth €1.3 trillion in 2007²¹ and the final sample contains European companies with total revenue of €199.3 billion (approximately 15% of the total European F&B industry).

Data analysis consists of univariate analysis with descriptive statistics of the main variables in the research such as maximum, minimum, median, standard deviation, and average. Afterwards, a bivariate analysis answers to the research questions and provides evidence about the relationship between liquidity, CCC and profitability in F&B industry in U.S. and European companies. Bivariate analysis consists of correlation and linear regressions with a confidence level of 95%, in the following model²²:

$$Y_t = a + b X_t \quad [4]$$

In this model, Y_t is the dependent variable while X_t represents the explanatory variable. The coefficient b shows how much the explanatory variable impacts the Y_t , and if that impact is positive or negative. The intercept value a shows how much Y_t is affected by exogenous variables. Using this model, if the relationships found are significant, conclusions can be drawn about which variables are positively or negatively related.

¹⁹ See Appendix 5 with the summarized list of reasons for exclusion and the list of companies in the final sample.

²⁰ Source: IMAP Food and Beverage Industry Global Report 2010, p. 4. The market size was converted from USD to Euros using the existing exchange rate on 10th November 2015, 22:07 (EUR/USD = 0.93342).

²¹ Source: IMAP Food and Beverage Industry Global Report 2010, p. 4. The market size was converted from USD to Euros using the existing exchange rate on 10th November 2015, 22:07 (EUR/USD = 0.93342).

²² The internal validity of the results is considered.

6. Data Analysis and Results

6.1. Univariate Analysis

The four-year average of every variable was calculated for each of the 41 companies²³ in the final sample²⁴ and significant differences were found between European and U.S. firms. The revenue presents a higher average in European firms (approximately €16 billion, the double of U.S. firms). Regarding liquidity ratios, the largest difference is in the working capital turnover ratio, which is -10.1 for European firms, and 16.2 for U.S. firms. European firms present a negative average due to the negative working capital that occurs in the largest firms of the sample, giving an indication that the largest European firms present more current liabilities than current assets. This is in line with cash conversion cycle of these companies, as shown in Figure 3.

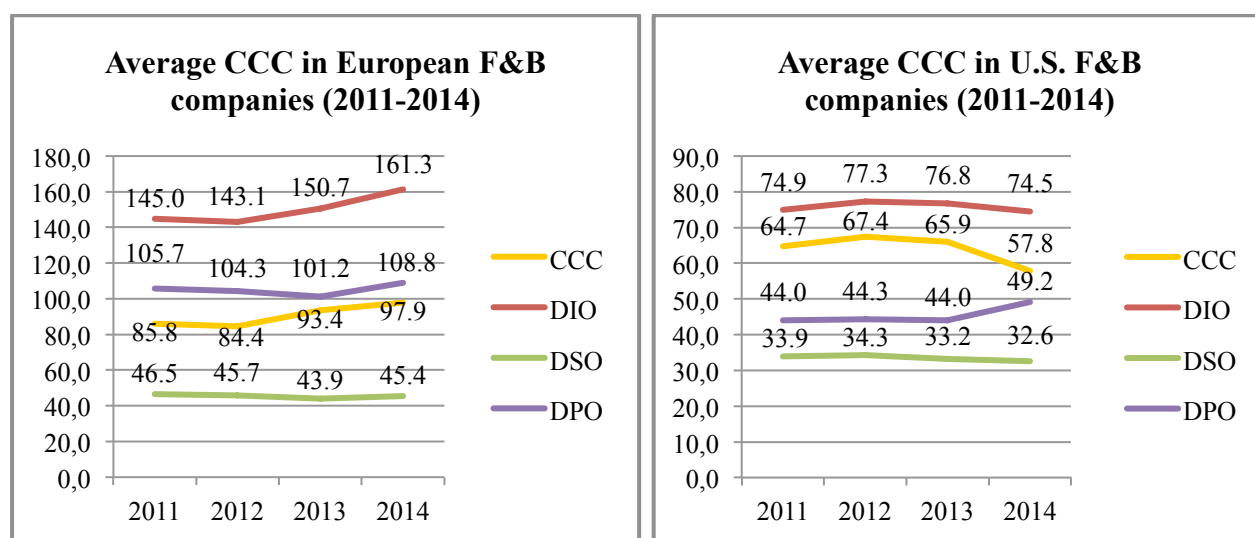


Figure 3 – Average cash conversion cycle (in days) of European and U.S. firms in the final sample (2011-2014)

The average DPO of European F&B companies (105 days) is much higher than in the U.S. (45 days). This situation may occur due to the high bargaining power of the biggest firms in Europe, which allows them to have more favorable payment periods.

²³ 29 from the United States and 12 companies from Europe.

²⁴ Appendix 6 and 7 show the descriptive statistics of the European and U.S. companies of the final sample for revenue, liquidity ratios, CCC and ROA between 2011 and 2014.

Concerning the dependent variable in this study – ROA – Figure 4 shows its evolution between 2011 and 2014 in the companies of the final sample: the average of European firms is 8.4% and in the U.S. firms it is 13.7%.

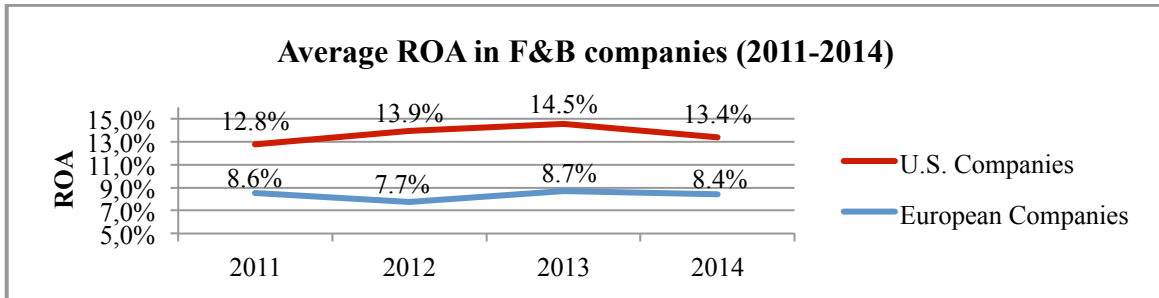


Figure 4 – Evolution of the ROA between 2011 and 2014 in F&B companies

F&B in the U.S. F&B market has higher levels of operational profitability than the average (calculated in the initial sample, see Figure 1) of the F&B industry in the world. The purpose of this Work Project is to clarify which variables have an impact on these different ROA in U.S. and Europe. Following the financial crisis that started in 2008 and affected many industries worldwide, the F&B industry began recovering in 2009²⁵. More specifically, ROA in the present sample reaches a peak in 2013. However, in 2014 ROA started decreasing again, reaching 13.4% in U.S. firms and 8.4% in European firms. This variation can be explained by the variations of ROA components, shown in Appendix 8.

In U.S. firms, AT decreases between 2012 (122%) and 2014 (104%). This is a symptom that, on average, F&B companies in the sample are less and less efficient in using their assets, from €1.22 generated for each €1 of Total Assets in 2012, to a level of €1.04 generated for each €1 of Total Assets in 2014. The decrease in AT is compensated by the slight increase of OR and GSM in the same period. On the other hand, European firms have earned more per unit of sales than U.S. based companies in the F&B industry, as there is a higher average GSM than in U.S. firms (45.8% *versus*

²⁵ Source: Dow Jones US F&B Index

37% in U.S. firms). However, the AT is much lower when compared to U.S. firms (69.7% *versus* an average of 115.6% in U.S. firms).

These figures show that there is a clear difference between managers' decisions and their line of focus in European and U.S. firms. While European managers focus more on performance in terms of the GSM and have a higher CCC (and especially DIO), U.S. managers are more concerned with the efficiency in the use of assets, and having a fast CCC. Figures 5 and 6 present the differences between the average CCC, DIO, DSO and DPO of U.S. and European companies.

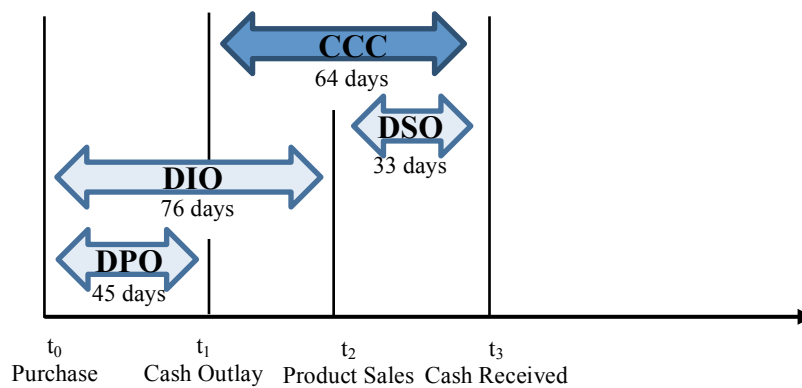


Figure 5 – Average cash conversion cycle in U.S. companies in 2011-2014 (Adapted from Lind et al., 2012)

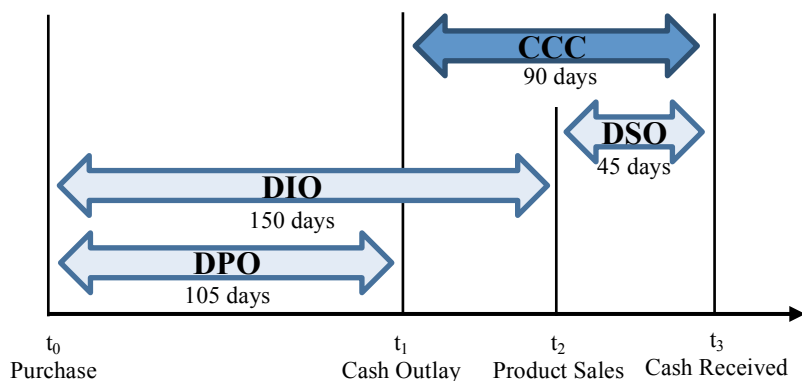


Figure 6 – Average cash conversion cycle in European companies in 2011-2014 (Adapted from Lind et al., 2012)

6.2. Relationship between liquidity and ROA (RQ 1)

In U.S. companies there is a positive and significant correlation of 0.46 between the current ratio and ROA (p-value 0.01). Approximately 21% of the variability of ROA is explained by current ratio. More specifically, there is a positive and significant correlation of 0.40 between current ratio, that is liquidity, and OR ratio (p-value 0.03), but there is no correlation with the other two components of ROA (GSM and AT). Therefore, current ratio is significantly related with ROA, thus in the U.S. the ROA is higher in companies that have higher current ratios. That relationship is shown in the following linear model:

$$ROA_{U.S.} = 0.054 + 0.047 CR_{U.S.} \quad [5]$$

The intercept value (0.054) is moderate and it indicates that a significant part of ROA is being explained by other variables. The coefficient of 0.047 confirms that the relationship is positive, and the effect of liquidity (current ratio) on profitability (ROA) is relatively strong. Although Khan and Bhunia (2011) found no relationship between liquidity and profitability in the steel industry in India, this test shows that current ratio is significantly related to profitability in the F&B industry. Regarding European companies no significant correlation exists between current ratio and ROA or its components. Thus, current ratio contributes to ROA in U.S. companies, but this relationship does not exist in European companies in the F&B industry.

Using quick ratio as proxy for liquidity, there is a positive and significant correlation of 0.66 between the liquidity and profitability (ROA) in U.S. companies (p-value 0.0001). Variations in ROA are explained in 43% by variations of quick ratio. Therefore, in the U.S. ROA is higher in companies with higher quick ratios, so quick ratio is significantly related to ROA. No significant correlations exist between quick ratio and OR, GSM or AT individually. The relationship between quick ratio and ROA is shown in the following linear model:

$$ROA_{U.S.} = 0.028 + 0.099 QR_{U.S.} \quad [6]$$

In European companies, no significant correlation exists between quick ratio and ROA or its components. Thus, liquidity (quick ratio) contributes to profitability (ROA) in U.S. companies, but this relationship does not exist in European companies in the F&B industry. The results obtained for Europe when using current and quick ratios as proxies for liquidity are contrary to the conclusions of Pattitoni et al. who described liquidity management as one of the “key factors for enhancing profitability” in European countries (Pattitoni et al., 2014: 773). However, their sample contained 17 industries besides F&B. By studying the F&B industry individually no relationship is found.

When using the working capital turnover ratio as a proxy for liquidity no significant correlation is found between liquidity and ROA in U.S. and European companies. Also, there is no significant correlation between inventory to net working capital ratio and ROA. Thus those ratios do not impact profitability (ROA).

6.3. Relationship between CCC and ROA (RQ 2)

In U.S. companies no significant correlation exists between DIO and ROA, but there is a positive and significant correlation of 0.39 between DIO and GSM (p-value 0.0378). Therefore, DIO is significantly related to ROA through GSM (RQ 2.1), thus in the U.S. ROA is higher in companies with higher CCC (because of a higher DIO) due to a higher GSM. That relationship is shown in the following linear model:

$$GSM_{U.S.} = 28.253 + 0.115 DIO_{U.S.} \quad [7]$$

The intercept value (28.253) is high, therefore exogenous variables are influencing the GSM significantly in this model. However, the coefficient of 0.115 shows that there is a considerable positive effect of DIO on the GSM of U.S. companies. Therefore, U.S. companies with a longer DIO tend to have higher GSM, which in turn causes a higher ROA. In European companies no significant correlation exists between DIO and ROA or its components (OR, GSM, AT). Thus, DIO contributes

to ROA through GSM in U.S. companies but this relationship does not exist in European companies in the F&B industry (RQ 2.1/2.4). These results confirm the conclusions of Lyroudi and Lazaridis who analyzed Greek companies of the food industry and stated that the CCC is “positively related to the return on assets and the net profit margin” (Lyroudi & Lazaridis, 2000: 1). The difference between the results of U.S. and Europe can be related to different levels of risk aversion. Since European managers tend to be more risk averse²⁶, they would rather focus on GSM than OR to improve ROA. One of the possible determinants of that higher GSM is the higher DIO of European firms.

Regarding the relationship between DSO and ROA, in U.S. companies no significant correlation exists between the two variables, but there is a negative and significant correlation of -0.64 between DSO and AT (p-value 0.0002), shown in the following model:

$$AT_{U.S.} = 2.068 - 0.027 DSO_{U.S.} \quad [8]$$

The negative coefficient indicates that companies with higher DSO have a lower AT, thus a lower ROA. According to the average CCC of U.S. companies presented in the univariate analysis, the DSO is the CCC component with the lowest weight but it is in fact the only one that is correlated with ROA in U.S. companies. In European companies, there is also no direct significant correlation between DSO and ROA, but there is a positive and significant correlation between DSO and GSM of 0.63 (p-value 0.028) and a negative correlation between DSO and AT of -0.59 (p-value 0.041). These relationships are shown by the following linear models:

$$GSM_{EU} = 15.561 + 0.666 DSO_{EU} \quad [9]$$

$$AT_{EU} = 1.369 - 0.015 DSO_{EU} \quad [10]$$

²⁶ “Europe’s risk-averse culture risks condemning it forever to second place behind the U.S.”. Link: <http://europesworld.org/2014/02/24/europes-risk-averse-culture-risks-condemning-it-forever-to-second-place-behind-the-u-s/>. Accessed on December 14th 2015.

Thus, DSO contributes to ROA through AT in U.S. companies and through GSM and AT in European companies in the F&B industry (RQ 2.2/2.4). Muscettola reached a similar conclusion, which was that “managers can create value by raising the number of days for accounts receivables” (Muscettola, 2014: 32).

Concerning the relationship between DPO and ROA, in U.S. companies no significant correlation exists between the two variables, but there is a positive and significant correlation between DPO and GSM of 0.49 (p-value 0.007) and a negative correlation between DPO and AT of -0.51 (p-value 0.005). These relationships are shown by the following linear models:

$$GSM_{U.S.} = 20.245 + 0.369 DPO_{U.S.} \quad [11]$$

$$AT_{U.S.} = 1.744 - 0.013 DPO_{U.S.} \quad [12]$$

In European companies, no significant correlation exists between DPO and ROA, but there are significant correlations between DPO and each of the three ROA components: 0.66 between DPO and OR (p-value 0.02); 0.75 between DPO and GSM (p-value 0.0053); -0.77 between DPO and AT (p-value 0.0036). These relationships are shown by the following linear models:

$$OR_{EU} = 0.186 + 0.001 DPO_{EU} \quad [13]$$

$$GSM_{EU} = 28.421 + 0.165 DPO_{EU} \quad [14]$$

$$AT_{EU} = 1.116 - 0.004 DPO_{EU} \quad [15]$$

Thus, DPO contributes to profitability through GSM and AT in U.S. companies and through OR, GSM and AT in European companies in the F&B industry (RQ 2.3/2.4). Differences between U.S. and European firms can be explained by the evolution of the economic situation in the two geographies. Companies tend to increase DPO in times of crisis, and while in 2014 the U.S. economy has recovered significantly from the economic downturn of 2008-2011, European economies continued to have recessions and excessive debt.

6.4. Relationship between company size and liquidity or profitability (RQ 3/RQ 4)

In U.S. companies, there is a negative and significant correlation of -0.51 between company size and the current ratio (p-value 0.005). This relationship is given by the model:

$$CR_{U.S.} = 2.643 - 0.362 Revenue_{U.S.} \quad [16]$$

According to [16], larger U.S. companies tend to have lower current ratios. In European firms this negative correlation is -0.83 (p-value 0.001) which is stronger than in U.S. firms, and the relationship is shown by the following linear model:

$$CR_{EU} = 3.067 - 0.614 Revenue_{EU} \quad [17]$$

The intercept of [17] (3.067) is higher than [16] (2.643), meaning that there is a higher effect of exogenous variables on the current ratio of European firms. However, the size of the coefficient of [17] compared to [16] shows that company size (revenue) correlates more negatively with current ratio in European companies than in U.S. companies. Thus, company size negatively influences liquidity (current ratio) in U.S. companies and that relationship is even stronger in European companies in the F&B industry. This result could be related to higher fixed costs in larger companies, which leads to economies of scale. By distributing fixed costs among more units of production and sale, inventories become less costly per unit thus reducing the current assets and in turn, the current ratio. Furthermore, the difference between U.S. and European firms can be explained by differences in accounting choice concerning the inventory costing system. In the U.S. (using US GAAP) managers can choose between FIFO²⁷, LIFO²⁸ or weighted average costing, while the IFRS does not allow the use of LIFO (PWC, 2015)²⁹.

²⁷ FIFO stands for First In First Out.

²⁸ LIFO stands for Last In First Out.

²⁹ Source: PWC. "IFRS and US GAAP: similarities and differences – 2015". September 2015.

Regarding the relationship between company size and the quick ratio, in U.S. there is a negative and significant correlation of -0.44 (p-value 0.0175) between the two variables. This relationship is shown by the following linear model:

$$QR_{U.S.} = 1.612 - 0.213 Revenue_{U.S.} \quad [18]$$

In European companies, that correlation is -0.63 (p-value 0.0268), and the respective linear model is:

$$QR_{EU} = 1.636 - 0.292 Revenue_{EU} \quad [19]$$

Thus, company size has a negative impact on liquidity (proxied by quick ratio) in U.S. companies and an even stronger impact in European companies in the F&B industry.

No significant correlations exist between company size and working capital turnover ratio or between company size and inventory to net working capital ratio in U.S. or European companies. Thus, company size has no impact on the working capital turnover ratio nor the inventory to net working capital ratio in U.S. and European firms in the F&B industry. Since Lyroudi and Lazaridis concluded that “there is no difference between the liquidity ratios of large and small firms” (Lyroudi & Lazaridis, 2000: 1), these results contradict their conclusion in terms of the current and quick ratios, and they confirm their conclusion when we use the proxies working capital turnover and inventory to net working capital ratios.

Regarding the relationship between company size and profitability, since the current ratio is correlated with ROA in U.S. firms, company size could also have a relationship with ROA through the effect of the current ratio. However, no significant correlations were found between company size directly with ROA in U.S. or European companies. Thus, company size has no impact on profitability in U.S. and European companies in the F&B industry (RQ 4/4.1). This result is contrary to the conclusion of Hirsch et al. who stated “firm size seems to be an important driver of food processor performance in the EU” (Hirsch et al., 2014: 718).

7. Conclusions

This Work Project aimed at clarifying how liquidity impacts profitability in the F&B industry, in two different geographies: U.S. and Europe. For the period between 2011 and 2014, by comparing these two geographies, several insights can be drawn which extend the existing literature in the F&B industry. The results of this study show that liquidity is related to ROA in U.S. firms, and no correlation exists in Europe. Regarding the relationship between CCC and ROA, in both geographies nearly all the components of CCC (DIO, DSO, DPO) are related with at least one of the three components of ROA (OR, GSM, AT) but not with ROA directly. Only in Europe DIO is not linked with profitability. Concerning the relationship between company size and liquidity, the conclusion is that company size is linked with liquidity, proxied by current and quick ratio, in U.S. and European firms. Lastly, no correlation exists between company size and ROA.

This research extends the existing literature by clarifying the understanding that liquidity, proxied by current and quick ratio (controlled by managers), has an impact in the operational profit in the F&B industry. This result shows that the answer to the controversy regarding this relationship is that liquidity impacts profitability in the F&B industry. Ultimately, this Work Project is addressed to managers of the F&B industry since it provides insight about where they should act to improve profitability (ROA).

Nevertheless, this research has limitations. Firstly, there are differences in financial reporting regulation between European (IFRS) and U.S. companies (US GAAP). In the U.S. the interest gained from financial applications is included above the EBIT in the income statement, thus the EBIT is calculated differently which impacts the ROA. Secondly, in the U.S. managers can choose between LIFO and FIFO as inventory costing system while in Europe (IFRS) LIFO is not allowed. This creates differences between the EBIT in Europe and in the U.S. depending on the evolution of prices.

Thirdly, this research considers a short period (four years) which could impact the results. Lastly, even though using ROA as a proxy for profitability is useful in order to isolate the operational part of the profitability of the firms, the denominator of the ROA (Total Assets) can still contain financial assets, such as financial investments or other instruments. Therefore, ROA could still be influenced by financial effects. The degree of that effect depends on the financial profile of each company and is a possible path for further research. Other topics worth studying in this context would be considering other geographies (for instance, African or Asian countries), different periods, or using other proxies to assess liquidity or profitability.

8. References

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