An empirical study over the industry differences in the profitability of the Azorean enterprises

Dissertação de Mestrado

André Macedo Oliveira Pacheco

Mestrado em
Ciências Económicas e Empresariais

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Orientadores
Prof. Doutor João Carlos Aguiar Teixeira
Prof. Doutor Tiago Mota Dutra

Dissertação submetida como requisito parcial para obtenção do grau de Mestre em Ciências Económicas e Empresariais, com especialização em Finanças e Contabilidade.

ABSTRACT

This dissertation seeks to analyze what factors, firm specific and macroeconomic, explain the profitability of Azorean enterprises. Furthermore, it examines what factors are more impactful for each industry and if the profitability differs across industries.

A model of firms' profitability is developed based on a sample of 516 individual firms and 4160 observations, from 1984 to 2019. The firm specific explanatory variables for this model are leverage, size, growth opportunities, risk, asset turnover and market share. The macroeconomic variables are Gross Domestic Product (GDP) and the inflation rate. Additionally, regressions are estimated for the different industries contained in the sample. Moreover, the model incorporates a dummy variable associated with each industry to establish if the average profitability differs across industries.

When considering the full sample, the estimated regression results implies that there is a negative effect of leverage and size on profitability. On the contrary, the results suggest that growth opportunities, risk, asset turnover and market share have a positive influence on profitability. As for the macroeconomic variables, the inflation rate has a negative effect, whereas GDP has a positive effect on profitability.

The results suggest that some industries' profitability is differently impacted by the explanatory variables incorporated in the model. However, the results did not have statistical significance for all the industries. Moreover, the results indicate that the average profitability is distinct across different industries.

Keywords: Azorean enterprises, Industries, Profitability

RESUMO

Nesta dissertação analisamos que fatores, específicos à empresa e macroeconómicos, explicam a rendibilidade das empresas nos Açores. Procura-se também examinar que fatores têm mais impacto em cada sector de atividade e se a rendibilidade média varia entre sectores.

Desenvolve-se um modelo da rendibilidade baseado numa amostra de 516 empresas individuais, contendo 4160 observações, desde 1984 a 2019. As variáveis explicativas específicas à empresa neste modelo são o rácio de dívida, a dimensão, as oportunidades de crescimento, o risco, a rotação de ativos e a quota de mercado. Os fatores macroeconómicos são a taxa de crescimento do Produto Interno Bruto (PIB) e a taxa de inflação. Procede-se à estimação de regressões para as diferentes indústrias na amostra. Também estão incorporadas no modelo variáveis binárias associadas ao sector de atividade para estabelecer se a rendibilidade média varia entre sectores.

Ao considerar a amostra completa, os resultados da regressão estimada indicam que existe um efeito negativo do rácio de dívida e da dimensão da empresa na rendibilidade. Por outro lado, os resultados sugerem que as oportunidades de crescimento, o risco, a rotação de ativos e a quota de mercado têm um efeito positivo na rendibilidade. Em relação às variáveis macroeconómicas, a taxa de inflação tem um efeito negativo, enquanto a taxa de crescimento do PIB tem um efeito positivo na rendibilidade.

Os resultados sugerem que a rendibilidade de alguns sectores de atividade é afetada de forma diferente pelas variáveis explicativas incorporadas no modelo. No entanto, não se obtem resultados com significância estatística para todos os sectores. Além disso, os resultados indicam que a rendibilidade média é distinta entre diferentes sectores.

Palavras-chave: Empresas Açoreanas, Rendibilidade, Sectores de atividade

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CHAPTER I – INTRODUCTION

Profitability is the primary objective for most firms since it assures the firms' continuity. For a firm to maintain operations and compete in the marketplace, it needs to generate profits and reinvest in net positive projects. If a firm is unable to generate profits from its' business, its competitors certainly will. Therefore, maximizing profits is a very common business practice and strategy.

There are many different aspects and considerations that lead to a successful firm other than profitability. However, it is always on the mind of business managers how to maximize profits and what decisions will lead to a sustained growth. Some of the variables that impact profitability are factors that are within the firm control, such as leverage or size. On the other hand, macroeconomic variables, despite being outside the firms' control, also influence profitability. Therefore, the business manager will have to consider all these factors. Moreover, the profitability of different industries may be impacted by some factors more than others, as well as the expected results may be distinct regarding the industry of the firm. This dissertation seeks to analyze these questions. Considering the economic impact of Covid-19 over the last couple of years, it is important that business owners and managers can accurately assess the impact of their decisions on the profitability of the firm.

We examine the determinants of the profitability of Azorean firms based on a panel sample of 516 firms, with 4160 observations, for the period 1984 to 2019, gathered from *Açormedia*, through its magazine *As 100 maiores empresas dos Açores* (Açormedia, 1984-2019)

The method for answering the previously established questions is by estimating a profitability model, in which the profitability rate is the dependable variable. Based on the literature, the model assumes as explanatory factors a set of firm specific characteristics, namely, leverage, size, growth opportunities, risk, asset turnover and market share. Furthermore, as macroeconomic factors the model assumes the growth of the Gross Domestic Product (GDP) and the inflation rate. Firstly, the model is estimated for the full sample, providing an answer on how each factor impacts profitability for any given firm. Secondly, the model is estimated for each industry highlighted by *Açormedia*, namely agriculture and fishing, commerce/retail, automobile trade, construction, fuel distribution, manufacturing, transportation, communication, and energy, and tourism and services. This estimation allows us to allow us to examine if different variables have more

impact on specific industries. Lastly, this dissertation considers a model with dummy variables associated with each industry, to assess if the average profitability varies across different industries.

This dissertation contributes to the existing literature regarding the determinants of firms' profitability, as well as the one that looks at industry differences on these determinants. It is noteworthy that while this empirical study is conducted on Azorean enterprises, the implications are not exclusive to it.

The results suggest that firm's profitability is indeed determined by a set of firm specific and macroeconomic factors, including the profitability of the previous year. Moreover, the way these factors impact firms' profitability differs across industries. Finally, the results suggest there are differences on the average profitability across industries.

The dissertation is structured as follows. The second chapter focuses on the business profitability model, more specifically on its econometric specification and on the variables considered, based on a theoretical and empirical literature review of the topic. The third chapter describes the data collected to develop the study and the corresponding descriptive statistics. The fourth chapter displays the estimated regressions for the model of business profitability and presents the interpretations of the results. Finally, the fifth chapter concludes and discusses research and policy implications of the study.

CHAPTER II – BUSINESS PROFITABILITY MODEL

In this chapter, the model of business profitability is established, namely the econometric specification and the expected relation between the explanatory variables and the firm profitability. The developed model is based on a regression in which the dependent variable is profitability, and the explanatory variables are firm specific and macroeconomic variables. The model is determined by the following expression:

$$Prof_{it} = \beta_0 + \beta_1 Prof_{it-1} + \beta_2 X_{it} + \beta_3 Y_t + \varepsilon_{it} \tag{1}$$

where $Prof_{it}$ stands for the profitability of firm i in year t, the vector X_{it} represents the variables that are firm specific, namely leverage, size, growth opportunities, risk, asset turnover and market share. The vector Y_t corresponds to the macroeconomic variables, specifically the GDP and the inflation rate. The stochastic error is represented by ε_{it}.

Next, we discuss the expected relation between the explanatory variables and firms' profitability. Table 1 depicts the definition of the variables present in the model.

The relation between leverage and profitability has been discussed as early as with the Modigliani and Miller Theorem (Modigliani and Miller, 1958). There are two competing theories that explain the relation between profitability and leverage, with mixed results. According to the trade-off theory, it is expected a positive effect of leverage on profitability, as pointed out by Kraus and Litzenberger (1973), Jensen and Meckling (1976), Myers (1993), Berger and di Patti (2006), and Margaritis and Psillaki (2010). This happens because a firm is incentivized to contract more debt to shield its profits from taxes (through the deductibility of the interest payments). Moreover, according to the agency cost hypothesis, to align the interests of the equity owners and the managers, an increase in debt will pressure the latter to prioritize actions that benefit the firm and add value, since the risk of bankruptcy will jeopardize the manager's position. In summary, this theory suggests that leverage is a trade-off between the advantages of contracting debt in its tax benefits and the disadvantages of the agency costs associated with higher levels of debt. Some authors present empirical evidence of this positive effect, such as Abor (2005) or Gill, Biger and Mathur (2011). On the contrary, the pecking order theory predicts a negative effect of leverage on profitability, in line with the arguments of Myers and Majulf (1984), Myers (1993), Frank and Goyal (2003), and Serrasqueiro and Caetano (2015). Since there is a hierarchy of available funds, a manager will prefer

to employ internally generated funds before turning to outside capital such as debt or equity (preferring the issue of debt rather than equity). This preference for different sources of capital arises from the asymmetric information between the manager and the outside investors and the fact that the former will make decisions that favor the older stockholders. Moreover, a firm that can internally generate funds, will accumulate enough capital to invest in positive net value projects and will not have to finance itself (as much) with the issuing of equity or debt. The preference for debt over equity occurs since the premium paid by the firm is higher for equity in contrast to debt. This theory is supported by the empirical evidence of Rajan and Zingales (1995), Silveira (2012), Cortez and Susanto (2012), Velnampy and Niresh (2012), Filipovic and Demirovic (2016) and Muscettola and Naccarato (2016). Considering the reviewed literature, the expected effect of debt on profitability is uncertain.

Table 1. Definition of the variables incorporated in the model of profitability

Variable	Definition
Profitability	Ratio of net income and total assets (return on assets).
Leverage	Ratio of total liabilities and total assets.
Size	Natural logarithm of the value of total assets.
Growth opportunities	Growth rate of revenues.
Risk	Standard deviation of the growth rate in the last 3 consecutive years of turnover.
Asset Turnover	Ratio of revenues and total assets.
Market Share	Ratio of a firm's total revenues and the sum of the revenues of all the firms operating within the same industry (at any given year).
GDP	Growth rate of the Gross Domestic Product in the Azores.
Inflation Rate	Growth rate of the consumer price index in the Azores.

The literature concerning the effect of an enterprise's size on profitability is conflicting. Nevertheless, most studies conclude that the expected relation is positive. On the one hand, the idea is that larger firms are more profitable, as indicated by Hall and Weiss (1967), Fiegenbaum and Karnani (1991) and Nunes *et al*. (2009). Larger firms can take advantage of economies of scale and can operate in industries that require higher amounts of capital, diversifying their investments through a more robust production line, having more choices regarding customers and suppliers, owning to the fact that they have an increase in bargaining power. They also have lower bankruptcy costs, therefore contributing to better firm performance. Some studies that find empirical evidence of a positive effect of size on profitability are Winter (1994), Hardwick (1997), Wyn (1998), Gschwandtner (2005), Zeitun and Tian (2007), Lee (2009), Babalola (2013), Doğan (2013), Akbas and Karaduman (2012), Gaio and Henriques (2018) and Nguyen *et al*. (2020). On the other hand, a negative effect of size on profitability is presented in papers by Jensen and Murphy (1990), Schneider (1991), Dhawan (2001) and Goddard *et al*. (2005). This results from the fact that smaller firms have more flexibility, since the bureaucratic processes and hierarchies would tend to be shorter, and it may allow a firm to enact action at a faster rate. Furthermore, since bigger firms offers more job security, this could enable detrimental behavior that leads to a poor performance. Some papers that have found empirical evidence of a negative effect of size on firms' performance are Shepherd (1972), Abu-Tapanjeh (2006), Becker *et al*. (2010) and Banchuenvijit and Nguyen (2012). There is also some empirical data that points towards there being no effect of size on profitability, such as the work of Simon (1962), Amato and Wilder (1985) and Amato and Amato (2004). Overall, the expected effect of size on profitability is uncertain.

With regards to growth opportunities, most studies predict it has a positive effect on profitability, as discussed by Coban (2014). A firm with growth opportunities can generate more funds and reinvest in more net positive projects, generating a self-sustained loop of positive cashflow being invested in projects that add value to the firm. This positive impact on profitability is corroborated by the empirical results of Silveira (2012), Hermuningsih (2014), Andawasatya *et al*. (2017). Still, the studies by Nunes *et al*. (2009) and Sardo and Serrasqueiro (2018) point towards a different effect of growth opportunities on profitability: they argue that there is a non-linear relationship. It is expected a positive relation to a certain extent, suggesting that managers select net positive projects to invest in. However, it appears that at some point the projects

undertaken by the firm are not adding value, due to increasing agency costs and discretionary expenditure. The expected effect of growth opportunities on profitability is uncertain.

The existing literature regarding the effect of risk on profitability usually considers the volatility in the financial markets as a measure of risk. Yet, the postulated effects of risk should have the same effect on profitability at a firm level. In this instance, the literature offers mixed results. The positive effect of risk on profitability is supported by Markowitz (1952), Tobin (1958), Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1966). If a firm has different projects to select from, for the same level of risk, it will always select the project with the higher expected return. Moreover, if these projects have the same amount of perceived return, a firm will choose the less risky project. This relation is found in the empirical evidence of Fisher and Hall (1969), Lundblad (2007), León *et al*. (2005) and Brick *et al*. (2015). On the contrary, a negative effect of risk on profitability is suggested by Bowman (1980), whose empirical findings contradict the classical theory. The author theorized that successful managers may increase profitability and decrease the volatility associated with profitability (risk), or that less profitable (or unprofitable) firms may be forced to accept riskier projects. The negative effect of risk on profitability is supported by the empirical evidence of Fama and French (1992), Botoc (2015) and Becerra and Markarian (2021). Considering this discussion, the expected effect of risk on profitability is uncertain.

The literature predicts that asset turnover has a positive effect on profitability. According to Apan and Islamoğlu (2018), a higher value of this ratio indicates that the firm's assets are being used efficiently to generate sales. Supporting this relation are the empirical studies by Karadeniz and İskenderoğlu (2011), Meder-Çakır and Küçükkaplan (2012), Kryvoviaziuk (2016), Apan and Islamoğlu (2018), Gaio and Henriques (2018) and Nurlaela *et al*. (2019). Therefore, the expected effect of asset turnover on profitability is positive.

The effect of market share on profitability is positive, according to Buzzell *et al*. (1975). Market share has a positive effect on profitability because it enables economies of scale and gives more negotiating power to the firm. Similarly, an increase in market share leads to the "experience curve" proposed by Henderson (1968) and Reeves *et al*. (2013), which is an improvement of the processes of production and distribution in comparison to competitors, in addition to an increase in predictable costs contributing to the stability of prices. The empirical literature that points towards a positive effect of

market share on profitability consists of the studies by Capon *et al*. (1990), Karadeniz and İskenderoğlu (2011), Pantea *et al*. (2014) and Apan and Islamoğlu (2018). Therefore, it is expected that market share has a positive effect on profitability.

As regards the macroeconomic factors, the effect of Gross Domestic Product on profitability is predicted to be positive, as stated by Pacini, *et al*. (2017). Since GDP is an aggregate sum of the production or added value of every economic agent within a market, a higher GDP implies more purchasing power by the consumers and enterprises, which leads towards higher profitability. Some empirical evidence of the positive effect of GDP on profitability is found on papers by Hassan and Bashir (2005), Abdissa (2005), Davydenko (2011), Hailegebreal (2016), Egbunike and Okerekeoti (2018) and Dewi *et al*. (2019). Thus, the expected effect of gross domestic product on profitability is positive.

As far as the inflation is concerned, most literature predicts a positive effect of this factor on firms' profitability. Pacini, *et al*. (2017) explain that inflation leads, on one hand, to an increase in revenues (due to higher prices of products and services sold) and, on the other hand, to an increase production factors. Overall, by assuming a continuous production, it will lead to an increase in profitability. There is empirical evidence to support a positive effect of inflation on profitability, namely the studies by Kosmidou *et al*. (2008), Bhayani (2010), Davydenko (2011), Gado (2015) and Pervan *et al*. (2019). Nevertheless, a negative effect of inflation on profitability happens if the management of the firm cannot predict the rise in inflation, as pointed out by Revell (1979) and Perry (1992). The authors refer specifically to banks in their respective studies and postulate that if management can accurately predict the inflation rate, it can raise its interest rate, accordingly, mitigating the effect of the higher costs resulting in a higher profitability. However, if it does not, it could result in a decrease in profitability. The negative effect of inflation on profitability is supported by the empirical evidence of Mirza and Javed (2013) and Kanwal and Nadeem (2013). The expected effect of the inflation rate on profitability is uncertain.

Although there is extensive body of work by multiple authors, over the span of decades, discussing the effect of firm specific and macroeconomic factors on profitability, this paper aims to contribute to such studies by considering a sample of the biggest firms in the Azores and by examining where there could be a potential sector effect on these effects.

CHAPTER III – DATA AND DESCRIPTIVE STATISTICS

The data that concerns the accounting information of the firms presented in this dissertation was collected by *Açormedia* (1984-2019) as part of the magazine *As 100 maiores empresas dos Açores*, which originally compiled financial information on the 100 larger firms in the Azores. From 2009 onwards, the dataset comprises information for the 200 largest firms. The macroeconomic data regarding the Gross Domestic Product and the inflation rate was obtained from the Regional Service of Azorean Statistics (1984-2019) (*Serviço Regional de Estatísticas dos Açores*).

The statistics concerning the population of the Azores was obtained from the National Institute of Statistics (2019) (*Instituto Nacional de Estatística*) and the information with respect to the number of firms registered in the Azores was obtained from the Employment and Professional Qualification Observatory of the Azores (1984-2019) (*Observatório do Emprego e Formação Profissional dos Açores*).

The sample of data gathered ranges from the year 1984 to 2019. With a 36 years period it is possible to observe different phases of the economic cycle, namely recessions and growth stages, with new firms initiating their business and others that go extinct. The data from *Açormedia* had previously been examined in studies by Aguiar (2014), regarding the effect of debt on profitability. Furthermore, Silva (2016), investigates the predictions of the pecking order and trade off theories regarding the determinants of corporate performance.

This chapter is structured in two parts. The first analyses the Azorean economy in order to better understand the context in which this study is conducted, and the second focuses on the data that was extracted regarding the sample and the industries that are a part of it.

3.1 The Azores economy and marketplace

The Azores are an archipelago composed of 9 islands, in the Atlantic Ocean, corresponding to an autonomous region with a regional government, even though it is a part of Portugal.

To better illustrate the nature and size of the Azores economy, consider the following statistics: it has a population of approximately 240.000 people, most firms are small or medium sized, the tourism industry has grown the most in recent years and taken a "front seat" in the government planning of the region's economic growth.

The number of firms in the Azores has grown since 1984, reaching a peak of registered firms in 2008, with 6267, as seen in Figure 1. Since then, it has steadily decreased due to the economic turmoil of the aftermath of the financial crisis of 2008. In terms of registered firms, the recovery has only begun in 2017, having presented a slight growth in every year since.

Figure 1. Number of registered firms in the Azores from 1984 to 2019

The data was collected from the Employment and Professional Qualification Observatory of the Azores (*Observatório do Emprego e Formação Profissional dos Açores*).
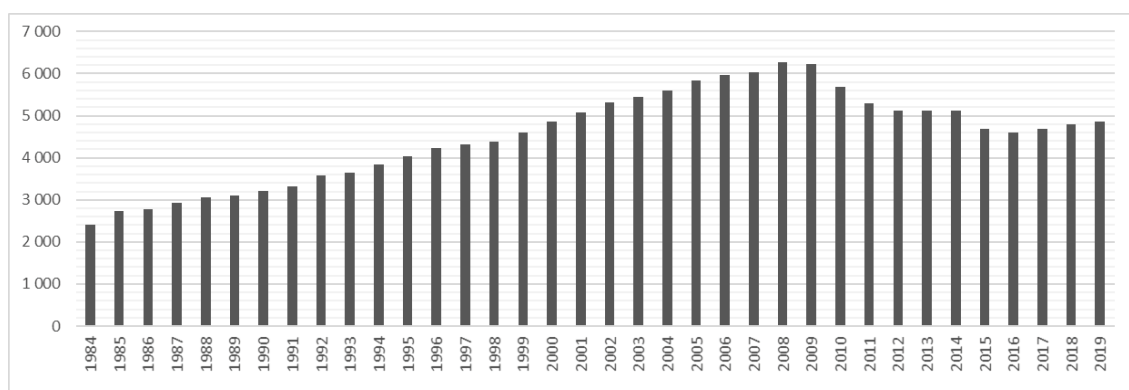
As it can be observed in Figure 2, the profitability of firms in the sample, measured by the return on assets (ROA), has closely followed the pattern of the GDP growth rate illustrated in Figure 3. This would indicate a positive relation between both variables, which is to be expected according to the reviewed literature, and the fact that the GDP is, in essence, an amalgamation of the performance of all the individual firms.

The GDP's growth rate has consistently decreased between the period that marks the beginning of this study (1984), up until 2009 when it first presented a negative value, indicating a regression of the Azorean economy, and displaying its lowest value in 2012 (-4%). The unusual high growth in the 1980's and 1990's might have been due to the fact that Portugal had recently joined the European Union and benefited of a higher volume of capital to invest in the region.

Figure 2. Average profitability of the Azores firms in the sample from 1984 to 2019

The annual average profitability, measured by ROA, was calculated based on the data of the sample from the magazine *As 100 maiores empresas dos Açores,* published by *Açormedia,* from 1984 to 2019, containing 516 firms and 4160 observations.
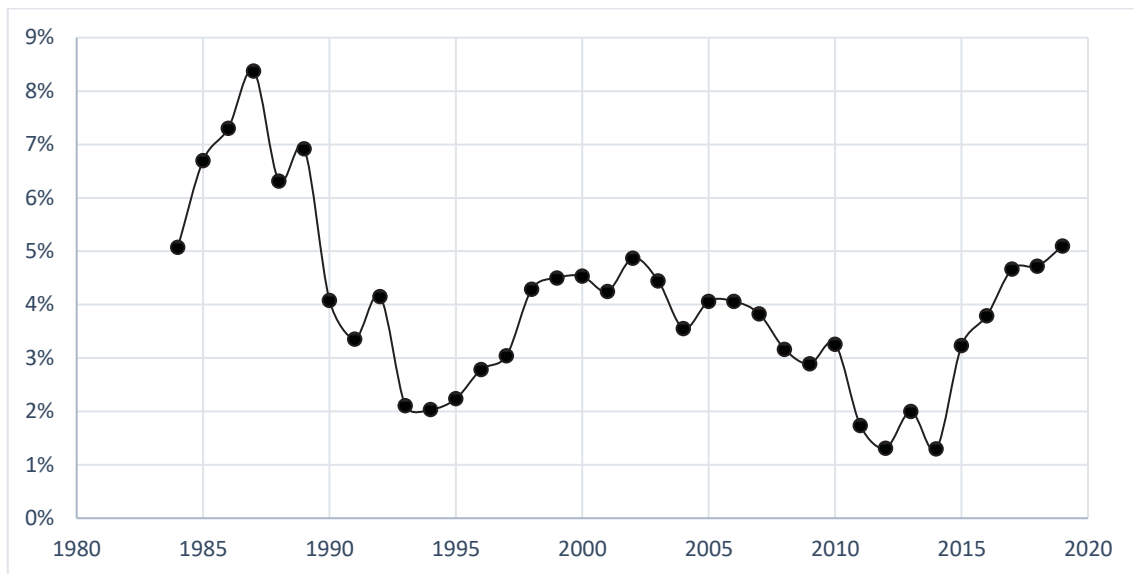
Figure 3. GDP growth rate in the Azores from 1984 to 2019

The data was collected from the Regional Service of Azorean Statistics (*Serviço Regional de Estatísticas dos Açores*).
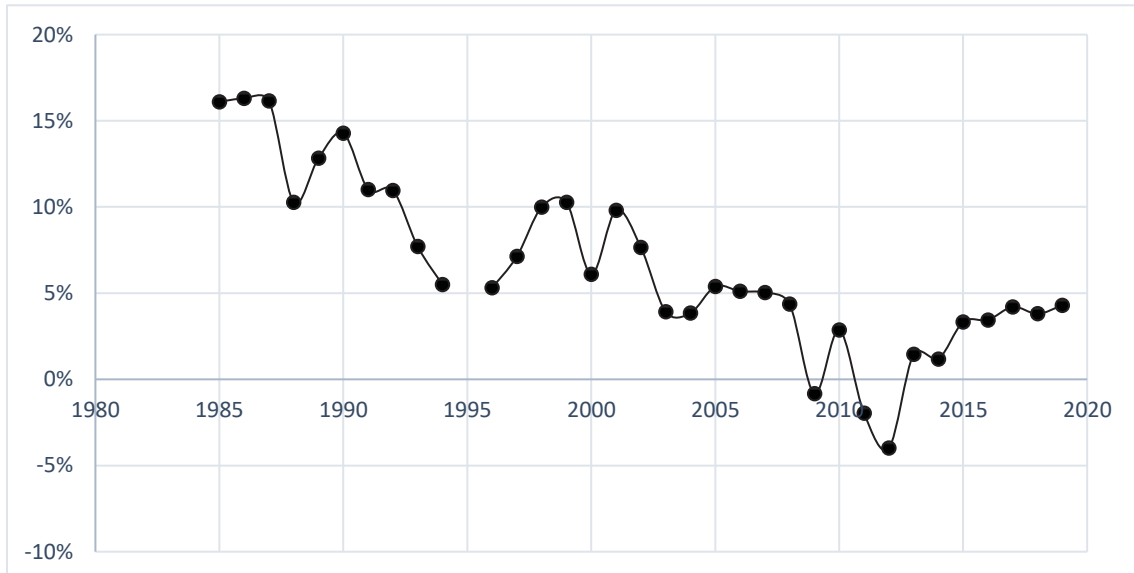
3.2 Descriptive statistics of the sample

This study is composed of 516 firms and amongst the 36 years, there is a total of 4160 observations, as seen in Table 2. The industry with the most cases is the commerce/retail, with a total of 203 firms and 1505 observations.

Table 2. Number of enterprises and observations for each industry in the dataset

The sample was obtained from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia* from 1984 to 2019, containing 516 firms and 4160 observations.

Industry	N. º of Firms	N. º of Observations
Agriculture and fishing	59	731
Commerce/retail	203	1 505
Automobile trade	38	320
Construction	57	343
Fuel distribution	28	292
Manufacturing	18	118
Transportation, communication and energy	42	425
Tourism and services	71	426
Total	**516**	**4 160**

Some of the initial data included in the magazine *As 100 maiores empresas dos Açores* was not used, such as the firms that operate in the financial industry and hospitals. This is due to the fact that these types of businesses have a very distinct business model with specific characteristics and there was not enough information to accurately draw any conclusions in regard to their respective industries. Additionally, were removed from the sample firms with negative equity.

The descriptive statistics regarding the variables analyzed, namely profitability, debt ratio, size, growth opportunities, risk, asset turnover, market share, GDP and inflation rate are compiled in Table 3 for the full of sample.

The average profitability is 3,637%, which does not appear to be very high, considering the high standard deviation of 6,042%. The median is only 2,80% and 25% of the observations have profitability of or above 5,95%, revealing some concentration of better performing firms at the top.

According to the data gathered, as can be observed in Table 4, the most profitable industry is tourism and services with an average of 5,246%, and the least profitable is the agriculture and fishing industry having a ROA of 2,274%. Alongside the fishing and agriculture, the only industries that have an average profitability lower than the average

of the sample are the construction and the transportation, communication, and energy industries.

Table 3. Descriptive statistics of the full sample in the dataset

The sample was obtained from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia* from 1984 to 2019, containing 516 firms and 4160 observations.

	N	Mean	St. Deviation	Min.	Max.	Distribution		
						25º	50º	75º
Profitability (%)	4094	3,637	6,042	-65,300	58,710	0,700	2,800	5,950
Leverage (%)	4160	60,181	21,021	3,689	101,282	45,408	63,283	76,579
Size (MM€)	4160	16,446	46,951	0,116	613,457	2,125	4,694	12,912
Growth opportunities (%)	3936	12,384	52,052	-88,410	961,020	-2,658	4,634	15,808
Risk (%)	2024	16,428	32,764	0,201	520,533	5,2445	9,955	17,431
Asset turnover	4160	45,539	112,812	0,000	2085,121	1,041	1,871	28,450
Market share (%)	4160	6,947	10,833	0,253	100,000	1,122	2,920	7,546
GDP (%)	4017	4,946	4,636	-3,986	16,295	2,856	4,200	7,656
Inflation rate (%)	4160	3,779	4,625	0,257	31,800	1,232	2,569	3,663

In order to better understand some key industry differences, it is shown in Figure 4 the mean values of leverage, size and market share, by industry.

Table 4. Descriptive statistics of the profitability ratio by industry in the dataset

The sample was obtained from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia* from 1984 to 2019, containing 516 firms and 4160 observations.

	N	Mean	St. Deviation	Min.	Max.	Distribution		
						25º	50º	75º
Agriculture and fishing	719	2,274	4,564	-28,400	20,600	0,540	2,100	4,600
Commerce/retail	1479	3,859	5,321	-50,940	41,740	0,900	3,010	6,250
Automobile trade	318	3,829	5,021	-9,550	29,380	0,758	2,747	5,770
Construction	339	3,432	6,879	-23,000	50,900	0,460	2,160	5,240
Fuel distribution	291	4,606	5,050	-10,270	22,91	1,400	3,832	7,260
Manufacturing	116	4,422	8,735	-16,700	31,260	0,178	1,770	5,587
Transportation, communication and energy	411	2,682	6,364	-65,300	24,880	0,500	2,710	5,650
Tourism and services	421	5,246	8,812	-21,960	58,710	0,400	3,500	8,450

Figure 4. Mean leverage, size and market share by industry of the Azores firms in the sample from 1984 to 2019

The mean was calculated based on the data of the sample from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia.*, from 1984 to 2019, containing 516 firms, and 4160 observations. Panel A depicts the mean leverage in percentage; Panel B depicts the mean size in million euros; and Panel C depicts the mean market share in percentage.
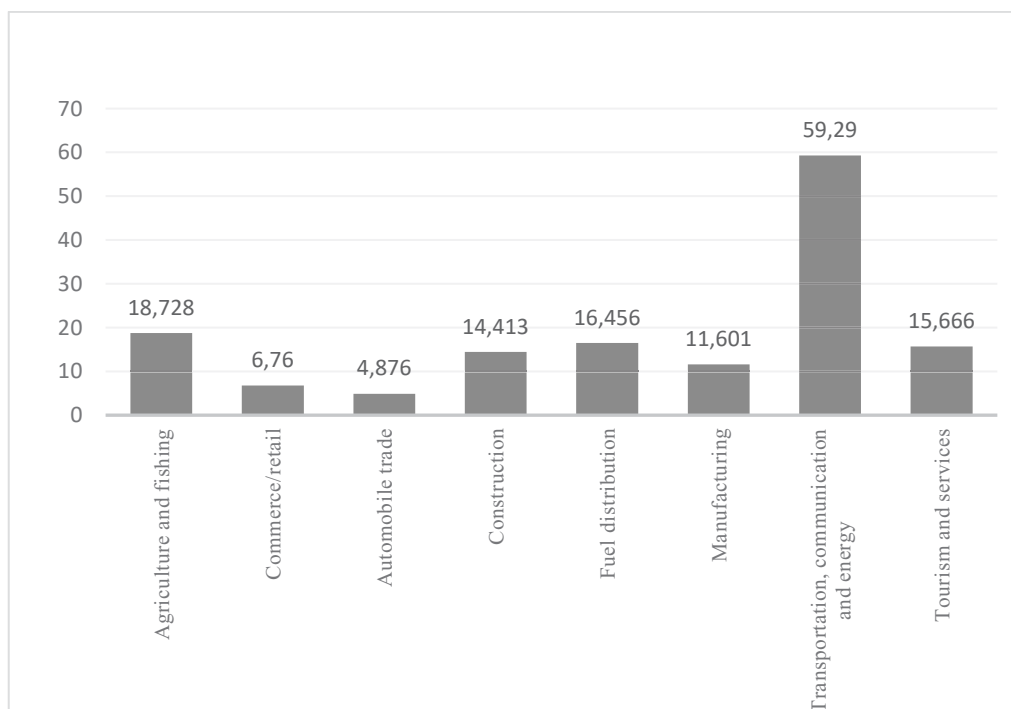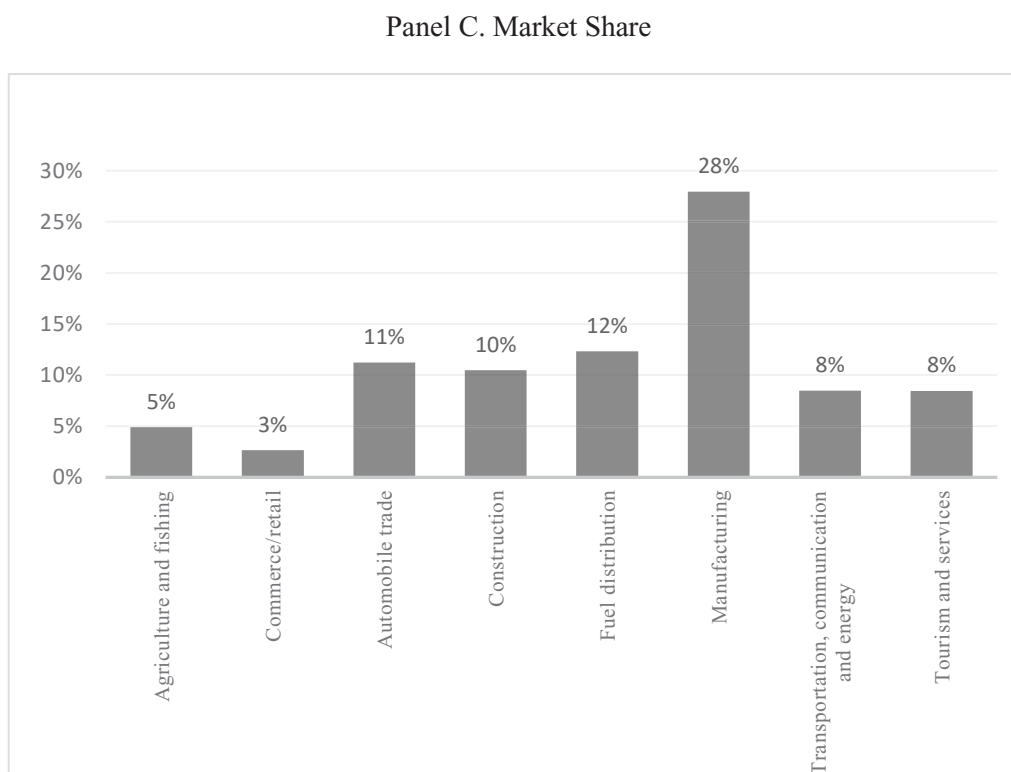
Panel A. Leverage
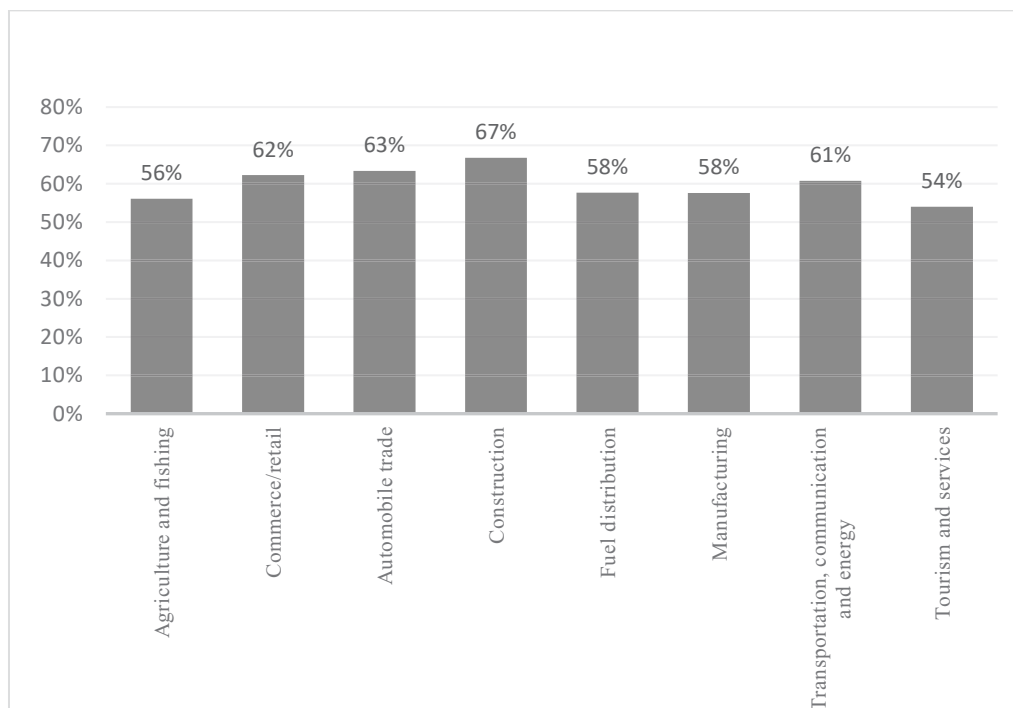
Panel B. Size

Figure 4. (continuation)

Panel C. Market Share

The mean leverage for the full sample is 60,161% and, as seen in Figure 4, the industry with the highest value of leverage is the construction industry, with a leverage ratio of 67%. Interestingly, this industry has a low profitability ratio of 3,432%, whereas the least leveraged industry is the tourism and services with a leverage ratio of 54% and a profitability ratio of 5,246%. It seems to indicate that high leverage industries tend to have low profitability.

Most industries do not divert very much from the mean size of 16,446 million of euros. However, the transportation, communication and energy industry has an average size of 59,290 million euros, which is significantly higher (almost 4 times) than the average of the sample. This suggests that the transportation, communication and energy industry has a high barrier to entry, shielding the existing firms from new competitors.

Regarding market share, it is important to state that the values displayed in this study are an approximation based on the data collected. Market share was calculated based on the total amount of sales for each industry per year that are present in the dataset gathered by *Açormedia*. Therefore, it does not consider all other firms that operate within the Azorean market that are not present in this study. It also does not make the distinction between the different islands that compose the archipelago. However, it does give an

indication towards the overall significance that each firm plays in its specific industry and gives an approximate value of the real market share. The mean value estimated for market share of the manufacturing industry is 28%. This result is very distinct from the remaining industries, pointing towards a large concentration of sales amongst few firms. Considering that this industry has the least number of firms in this study, this result is in line with what would be expected.

The correlation between the variables included in the model are depicted in Table 5. Regarding the firm specific variables leverage, size and risk, there is a negative correlation with profitability. On the other hand, growth opportunities, asset turnover and market share have a positive correlation with profitability. For the macroeconomic variables, both the growth rate of GDP and the inflation rate display a positive correlation with profitability.

Table 5. Correlation coefficients of the variables included in the profitability model

The sample was obtained from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia* from 1984 to 2019, containing 516 firms and 4160 observations. The p-value is displayed between the parentheses.

	Profitabi-lity	Leverage	Size	Growth opportu-nities	Risk	Asset turnover	Market share	GDP	Inflation rate
Profitability	1								
Leverage	-0,308 (0,000)	1							
Size	-0,155 (0,000)	-0,099 (0,251)	1						
Growth opportunities	0,101 (0,000)	0,056 (0,000)	-0,042 (0,008)	1					
Risk	0,076 (0,001)	0,009 (0,687)	-0,015 (0,496)	0,003 (0,901)	1				
Asset turnover	0,082 (0,000)	-0,034 (0,027)	-0,153 (0,000)	0,028 (0,076)	-0,015 (0,503)	1			
Market share	0,088 (0,000)	0,050 (0,001)	0,384 (0,000)	0,015 (0,353)	0,034 (0,126)	-0,117 (0,000)	1		
GDP	0,181 (0,000)	0,139 (0,000)	-0,229 (0,000)	0,092 (0,000)	0,006 (0,784)	-0,130 (0,000)	0,196 (0,000)	1	
Inflation rate	0,086 (0,000)	0,158 (0,000)	-0,240 (0,000)	0,030 (0,058)	0,001 (0,946)	-0,241 (0,000)	0,202 (0,000)	0,714 (0,000)	1

CHAPTER IV – RESULTS

This chapter is structured in three sections. The first addresses the estimations of the model for the full sample, the second analyzes the estimated coefficients for each industry and the third examines the estimations model considering dummy variables associated with the industries. The estimations were developed using the system generalized methods of moments (GMM), from Arellano and Bover (1995) and Blundell and Bond (1998), in accordance with the literature regarding models of firm profitability.

4.1 The model for the full sample

The estimation results for the full sample as well as for the individual industries are presented in Table 6. The estimated coefficients for the full sample are displayed in model 1. The firm specific variables included in the model, namely leverage, size, growth opportunities, risk, asset turnover, market share, as well as the macroeconomic variables of GDP and inflation rate, have a statistically significant relation with the dependent variable profitability, at the 1% level. Moreover, the fact that the estimated coefficient of the profitability of the previous year displays statistical significance confirms the dynamic nature of the model.

The negative sign of the estimated coefficient for leverage suggests that an increase in debt leads to a decrease in profitability, which is in line with the arguments of the pecking order theory supported by Myers and Majulf (1984), Myers (1993), Frank and Goyal (2003), and Serrasqueiro and Caetano (2015). According to Myers (1993), firms prefer internal to external financing, however, if they lack the funds to invest in a positive net present value project, they will seek outside investment. Debt is preferred due to its lower cost when compared to equity and, for that reason, the issuance of debt indicates a lack of internally generated funds by the firm.

The estimated coefficient of size suggests that as a firm increases size, its profitability rate decreases. This result is explained by the reasoning of Jensen and Murphy (1990), Schneider (1991), Dhawan (2001) and Goddard *et al*. (2005). These authors argue that the job security and lower flexibility of larger firms leads to poorer performance, leading smaller firms to be more profitable.

The estimated coefficient of growth opportunities suggests that firms with higher growth opportunities tend to have higher profitability. This is in line with the idea

explained by Coban (2014) that growth opportunities generate a self-sustained loop of positive results that increase the firms' value.

Table 6. Estimation results of the profitability model for the full sample and for each industry

The estimation contains 516 firms and 4160 observations obtained from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia* from 1984 to 2019. The dependable variable is profitability. ***, ** and * stands for the statistical significance at 1%, 5% and 10% respectively. The standard error is displayed between the parentheses.

	Model 1	Model 2A	Model 2B	Model 2C	Model 2D	Model 2E	Model 2F	Model 2G	Model 2H
	Full sample	Agriculture and fishing	Commerce/retail	Automobile trade	Construction	Fuel distribution	Manufacturing	Transportation, communication and energy	Tourism and services
Profitability$_{t-1}$	0,541*** (0,000)	0,591*** (0,135)	0,137*** (0,009)	0,626** (0,289)	0,370 (0,225)	0,662*** (0,162)	-3,006 (3,996)	0,401*** (0,016)	0,766*** (0,035)
Leverage	-0,052*** (0,000)	-0,056*** (0,021)	0,094*** (0,004)	0,069 (0,086)	-0,104** (0,050)	0,015 (0,070)	-0,587 (0,548)	-0,052*** (0,011)	-0,020 (0,015)
Size	-0,251*** (0,001)	-1,861** (0,763)	-2,997*** (0,094)	0,876 (2,046)	-1,471 (1,032)	-0,429 (1,097)	0,000 (omitted)	0,211 (0,233)	-0,329 (0,428)
Growth Opportunities	0,020*** (0,000)	0,024* (0,012)	0,093*** (0,002)	0,004 (0,038)	0,024 (0,018)	0,009 (0,022)	0,332 (0,215)	0,022*** (0,004)	0,090*** (0,009)
Risk	0,013*** (0,000)	0,032* (0,019)	-0,047*** (0,001)	0,036 (0,043)	0,028 (0,037)	-0,071* (0,036)	-0,106 (0,154)	0,006 (0,004)	0,080*** (0,027)
Asset Turnover	0,000*** (0,000)	-0,006* (0,003)	-0,021*** (0,000)	0,012 (0,009)	-0,016 (0,023)	-0,005 (0,009)	0,564 (0,735)	0,002* (0,001)	0,008*** (0,001)
Market Share	0,031*** (0,000)	0,184 (0,153)	0,124*** (0,025)	0,132 (0,102)	0,155 (0,121)	0,074 (0,119)	0,422 (0,607)	0,012 (0,058)	-0,047 (0,030)
GDP	0,160*** (0,001)	0,284*** (0,055)	-0,768*** (0,019)	0,204 (0,176)	0,066 (0,144)	0,206 (0,191)	0,547 (1,556)	0,376*** (0,054)	0,533*** (0,065)
Inflation Rate	-0,182*** (0,015)	-0,611** (0,272)	-0,132*** (0,015)	-0,403* (0,234)	-0,019 (0,284)	-0,486 (0,539)	0,000 (omitted)	-0,145 (0,106)	0,337 (0,223)

For risk, the positive sign of the estimated coefficient suggests that an increase in risk tends to lead to a higher profitability rate. This relation is in line with the arguments of Markowitz (1952), Tobin (1958), Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1966). These authors support the idea that when a firm is confronted with multiple projects, of similar estimated profitability, the firm will select the less risky project. On the other hand, if a firm has multiple projects with a similar risk, the firm will undertake the project with the highest expected profitability. Therefore, a firm will only accept to take more risk when the prospect of profitability is higher.

The estimated coefficient for asset turnover indicates that increasing the asset turnover on a firm will provide a higher profitability rate. This is line with the arguments of Apan and Islamoğlu (2018), pointing out that a higher value of this ratio suggests that the firm's assets are being used more efficiently regarding sales generation.

The estimated coefficient for market share suggests that an increase in this variable has a positive effect on the profitability rate, in line with the arguments of Buzzell, *et al*. (1975), Henderson (1968) and Reeves *et al*. (2013). The authors propose that economies of scale and negotiating power leads to an increase on profitability. Other contributing factors are the improvements in the core business, such as optimizing production or distribution, as well as maintaining stability of prices due to predictable costs.

Regarding the macroeconomic variables, the estimated coefficient for GDP suggests that an increase in GDP tends boost the profitability rate. This is in accordance with the arguments of Pacini *et al*. (2017). A higher GDP implies more purchasing power of the consumers, thus generating more sales for the firm. On the other hand, the estimated coefficient for the inflation rate points towards a decrease in the profitability rate if the inflation rate rises. This is in line with the arguments of Revel (1979) and Perry (1992), that the effect of the inflation rate is dependent on whether firms' managers can accurately predict it and can adjust prices accordingly.

The variables that have a stronger positive impact on profitability are the lagged profitability, with a coefficient of 0,541, and GDP, with a coefficient of 0,160. On the other hand, the variables with a stronger negative influence on profitability are size and inflation rate, with a coefficient of -0,251 and -0,182, respectively.

4.2 The model for the individual industries

Table 6 shows that for the industry of agriculture and fishing, model 2A, all the estimated coefficients, excluding the one for market share, display a p-value under 10%, denoting their statistical significance at the 10% level. The estimated coefficients suggest that the lagged profitability rate and GDP are the variables that have the most positive impact on profitability, with an estimated coefficient of 0,591 and 0,284, respectively. Moreover, size and inflation rate are the variables that tend to decrease the profitability rate the most as they raise, with an estimated coefficient of -1,861 and -0,611, respectively.

In the commerce/retail industry, model 2B suggests there is a robust statistical significance for all the variables, considering that the p-value is always under 1%. For

this industry, the estimated coefficients suggest that lagged profitability and market share tend to have the highest positive effect on profitability. On the other hand, the estimated coefficients of size, -2,997, and GDP, -0,768, show that these variables have the most negative effect on profitability.

The estimated coefficients for the industries of automobile trade, model 2C, construction, model 2D, fuel distribution, model 2E, and manufacturing, model 2F, do not display statistically significant values for most variables. Therefore, these results do not allow for a good insight into these industries. In any case, regarding the automobile industry, the estimated coefficients suggest that the higher the profitability of the previous year, the higher the profitability of the current year. Furthermore, as inflation rate increases, the profitability rate tends to decrease. As for the construction industry, the estimated coefficient for leverage suggests that as it increases, the profitability rate of the firm decreases. In the fuel distribution industry, the estimated coefficient of the lagged profitability rate indicates that as it increases, the profitability rate also tends to increase. In contrast, when risk increases, the profitability rate is likely to decrease. Lastly, for the manufacturing industry, the estimated coefficients do not display any statistically significant values.

The regression for the transportation, communication and energy industry, model 2G, has statistically significant estimated coefficients for the lagged profitability rate, leverage, growth opportunities, asset turnover and GDP. The estimated coefficients suggest that the lagged profitability rate and GDP tend to be the variables that increase the profitability rate the most as they increase, with an estimated coefficient of 0,401 and 0,376, respectively. On the other hand, it seems that leverage is the only variable that has a negative effect on profitability rate.

Regarding the tourism and services industry, the lagged profitability, growth opportunities, risk, asset turnover and GDP estimated coefficients are statistically significant. All the variables tend to have a positive effect on profitability. However, the estimated coefficients of the lagged profitability (0,766) and GDP (0,533) suggest that these variables are the ones with a stronger effect on profitability.

4.3 The model including dummy variables associated with the industries

To examine whether the profitability rate differs across industries, the profitability model of the full sample was further developed by including dummy variables associated with

each industry. The industry of commerce/retail was removed from the regression, so that the results are analyzed with comparison with this industry. This model is designated as model 3 and its results are shown in Table 7.

All the estimated coefficients for the dummy variables associated with the industries have statistical significance, except the one associated with the construction industry. The estimated coefficients for the industries of agriculture and fishing, fuel distribution transportation, communication and energy and tourism and services display a negative sign, suggesting that the firms operating in these industries have, on average, a lower profitability than firms in the commerce/retail industry. Moreover, the estimated coefficients for the industries of automobile trade and manufacturing display a positive sign, indicating that the average profitability rate of the firms in these industries are higher than that of the firms in the commerce/retail industry.

Table 7. Results of the estimation of the profitability model for the full sample with dummy variables associated with the industries

The estimation contains 516 firms and 4160 observations obtained from the magazine *As 100 maiores empresas dos Açores* published by *Açormedia* from 1984 to 2019. The dependable variable is profitability. ***, ** and * stands for the statistical significance at 1%, 5% and 10% respectively. The standard error is displayed between the parentheses.

	Model 3
Variables	Full sample
Profitability$_{t-1}$	0,535*** (0,001)
Leverage	-0,060*** (0,000)
Size	-0,041*** (0,005)
Growth Opportunities	0,021*** (0,000)
Risk	0,013*** (0,000)
Asset Turnover	0,001*** (0,000)
Market Share	0,018*** (0,001)
GDP	0,186*** (0,000)
Inflation Rate	-0,133*** (0,001)
Agriculture and fishing	-1,224*** (0,018)
Automobile trade	0,136*** (0,026)
Construction	-0,009 (0,024)
Fuel distribution	-0,427*** (0,034)
Manufacturing	1,341*** (0,027)
Transportation, communication and energy	-0,181*** (0,031)
Tourism and services	-0,561*** (0,026)

CHAPTER V - CONCLUSION

This dissertation has examined the profitability of the Azorean enterprises and its determinants. Furthermore, this analysis was conducted at an industry level to attempt to better explain the behavior of profitability in different industries. Lastly, this dissertation attempted to determine if the average profitability rate differs by industry.

It develops a profitability model that includes as explanatory factors firm specific characteristics and macroeconomic variables. As firm specific characteristics, it considers leverage, size, growth opportunities, risk, asset turnover and market share. Regarding macroeconomic variables, it assumes the GDP and the inflation rate. A total of eight different industries are examined, namely agriculture and fishing, commerce/retail, automobile trade, construction, fuel distribution, manufacturing, the transportation, communication and energy industry, and tourism and services. For this empirical study, the data used was gathered by *Açormedia*, through its magazine *As 100 maiores empresas dos Açores* from 1984 to 2019 for the 100 largest firms in the Azores and for the 200 largest since 2009. This has resulted in a panel data of 516 individual firms and 4160 observations.

All the variables displayed statistically significant coefficients for the full sample. The results suggests that leverage has a negative effect on profitability, in line with the arguments of the pecking order theory. Regarding size, the estimated regression points towards a negative effect of size on profitability. This result may be due to poorer performance because of job security and lower flexibility. For growth opportunities, the results indicate that it has a positive effect on profitability, since they generate a self-sustained loop. Additionally, the dissertation shows that risk has a positive effect on profitability, suggesting that firms will only accept more risk for more profitable projects. The estimated regression indicates a positive influence of asset turnover on profitability, since a higher asset turnover ratio indicates that the firm's assets are being used efficiently regarding sales generation. As for market share, it has a positive effect on profitability, due to the "experience curve", economies of scale and negotiation power. Regarding the macroeconomic variables, the estimated coefficients suggest that GDP has a positive effect on profitability, due to the increase in purchasing power of the consumers. On the contrary, inflation has a negative effect on profitability, as firms' managers are not able to accurately predict the increase in prices.

It was not possible to produce statistically significant coefficients for all the industries, namely the automobile trade, construction, fuel distribution and manufacturing. In these instances, there were not enough observations, and no more than two coefficients displayed statistical significance for any given industry.

The results of the estimated regression for the industry of agriculture and fishing suggest that asset turnover has a negative effect on profitability rather than a positive one, as seen for the estimation of the full sample. Moreover, the size of the firm has a much more negative effect on profitability when compared to the full sample. Considering this, the reasoning for these firms to be less profitable may be due to the loss of flexibility. Therefore, it may be beneficial for firms in this specific industry to manage their size carefully.

In contrast to the full sample, the profitability of the firms in the commerce/retail industry tends to increase when the value of leverage also increases. On the other hand, risk, asset turnover and GDP have a negative effect on profitability. This industry is also very susceptible to differences in size when compared to the full sample. Furthermore, GDP also has a substantial impact on profitability.

Regarding the transportation, communication and energy and the tourism and services industries, the results do not differ much from those obtained for the full sample. However, it is noteworthy that the transportation, communication and energy industry barrier to entry appears to be particularly high given the mean size of 59,290 million euros.

The model containing the dummy variables points towards there being different average profitability levels across industries. The industries of agriculture and fishing, fuel distribution transportation, communication and energy and tourism and services tend to have, on average, lower profitability. On the contrary, the industries of automobile trade and manufacturing display, on average, higher profitability.

This empirical study, while it does give some insights, has some problems that could be addressed in the future. Firstly, to use a larger sample. While 4160 observations do enable an empirical analysis, an increase in the sample would be the more direct improvement for this study. Moreover, the sample only contains firms from the Azores, which is a small archipelago, therefore, the results of this study might not apply for firms in more considerable markets. It would also be of interest to incorporate more variables for an empirical analysis, for example, a dummy variable for the state of the economy.

Lastly, regarding the different industries, determining the impact of the variables in the model would enable the results to be more precise if the industries were more specific.

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2022