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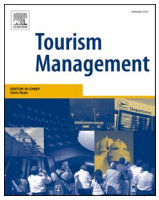

Does a VAT rise harm the tourism industry?Portuguese evidence

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ABSTRACT

This paper estimates consequences of the VAT increase on tourism industry, by analysing the impact of the significant VAT rise in Portugal on profitability and survival of firms related to food and beverage service activities. The analysis is divided into 3 periods: before and after the VAT hike and during the financial crisis, with the total time period from 2003 to 2013. The sample is composed of 23,388 Portuguese unique firms with 5.1 year-observations per firm. The impact of the massive VAT change is assessed in comparison to the performance of 4,969 Greek and 59,841 Spanish (for robustness) unique firms for the exact time period. The results show that a dramatic VAT increase significantly affects firm profitability in the country of implementation, with the effect even more dramatic than the recent financial crisis. The equivalent to the proposed 10 percent VAT rise in Portugal has caused a significant decline in firm profitability (an average drop of 8.7% compared to 1.5% during the financial crisis), a massive increase in the number of inactive firms and amplified the likelihood of firms to become bankrupt by about three times. Such consequences inevitably affect unemployment and may cause a slump in tax revenue in the long run. Hence, this research has wide practical implications and should be considered by the Greek and Portuguese governments before taking a next step of intervening in the tourism sector.

1. Introduction

The austerity programme imposed by Europe to Greece brought media attention and triggered polemic discussions around the world. A significant number of newspapers expressed the view that a rise in VAT on food and restaurant meals from 13 to 23% announced by the Greek Government on July 16th' 2015 with an expected similar rise for hotels will have a knock-on effect on the economy, will hamper economic growth and cost thousands of jobs and businesses. These concerns are understandable since the tourism industry represents one of the most important sectors of the Greek economy, with a share in total economic activity estimated at 15%–20% of GDP (Agiomirgianakis et al., 2013). Tourism is the sector of the economy which employs one in five Greek adults, while the number of tourists visiting the country is constantly growing. As a result, tourism has been seen by Greek business as an industry which must help to kick-start the economy. However, a significant jump in VAT may lead to repercussions on the holiday trade. The figures provided by the Greek Tourism Confederation for the middle of July showed a 30 percent drop in last minute bookings, which typically account for one-fifth of the bookings to the country, according to Reuters (The Independent, July 17, 2015). However, interestingly, another strand of news provided a different picture. For instance, the article in the Voice of America from July 11, 2015 has expressed possible concerns regarding proposed measures, while stating that tourists are "continuing to flock to Greece despite fears of looming economic catastrophe". The Wall Street Journal (July 26, 2015) wrote that after the Greek government reached a bailout deal, booking reservations are showing renewed vigour. The Institute of Greek Tourism Confederation (SETE) claims that the Greek crisis has made travel more affordable. In fact, the weak euro provides valuable opportunities for tourists travelling with pound sterling. As a result, it might indeed increase the number of tourists, taking into consideration that Britain is the second most important market for Greek tourism in terms of arrivals (1.9 million per year) and tourism revenues (1.4 billion euros), beaten only by Germany (Ekathimerini newspaper, January 01, 2014), consistent with N. Dritsakis (2004). So, what is the truth? Does a rise in VAT affect the tourism industry and hamper economic growth?

This paper aims to extrapolate/anticipate the consequences of the proposed VAT increase in Greece on its tourism industry by analysing the impact of an equivalent significant VAT rise in Portugal on profitability and survival of Portuguese firms related to food and beverage service activities. Portugal and Greece are the closest countries in

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Southern Europe with similar population, GDP per capita, Hofstede culture dimensions and tourism indicators.[1] Both countries are included in the PIIGS group (five countries in Eurozone most affected by the financial and sovereign debt crisis in terms of GDP growth, high unemployment and high debt levels in the area) and, according to World Bank figures for unemployment, international tourism receipts and expenditures (as a percentage of total exports and imports), have similar post sovereign crisis market conditions.[2]

Similar to the Greeks proposition, the Portuguese economy has implemented significant change in VAT in terms of catering services, restaurant meals and beverages, which equally jumped from 13% to 23% in January 2012. The VAT rise was massively criticised locally because such measures were believed to harm the economy and tax revenues due to the closure of many establishments, and will lead to unemployment of countless people. Portugal resident (November 4, 2011) wrote that a higher VAT tax would force some of the smaller establishments out of business since they already work with tight profit margins. The article warns that under the hard pressure of competition, the restaurants will be unable to pass on the increased costs to final consumers. Therefore, these changes will significantly add risk to the sustainability of some businesses and will inevitably lead to staff losses.

Based on the above, an analysis of firm profitability levels and the number of firms which became inactive/went bankrupt before and after the VAT change will provide a clear picture of whether a massive VAT change, introduced by the government to raise VAT tax and to reduce public debt, might in fact hamper one of the main sectors in the country's economy, such as tourism.

Taking into consideration the similarities between Portugal and Greece, and the unique scenario of the equal VAT change, the results of this research based on the Portuguese database can be extrapolated to estimate possible consequences of a similar VAT rise in Greece. This analysis has a wide practical implementation and is of a significant importance for policy makers, economic analysts, businesses and investors. To our knowledge, it is the first paper in the light of the recent VAT implementation in Greece which aims to anticipate the consequences of such intervention for the tourism industry.

This study examines an evident policy impact which can be projected on to other countries undertaking/planning a similar significant VAT change. Moreover, it represents a significant contribution to the existing academic evidence on the impact of a substantial VAT increase on tourism industry and future economic perspectives. To the best of our knowledge, the research conducted in this area is very limited.

Amongst the existing literature, we can mention Daniel and Ramos (2002) who used time series analysis to model Portuguese inbound international tourism demand from France, Germany, Netherlands, Spain and UK with the aim of examining the long run relationship between the demand for holiday visits and such variables as income, destination prices and travel costs. However, the number of observations was much reduced. As a result, authors raised concerns and stated that, unfortunately, it was not possible to present any comparative study with other forecast models in terms of forecasting accuracy.

Patsouratis et al. (2005) have analysed tourism competition among the Mediterranean countries, with a particular emphasis on Greece. The study provides the conclusion that exchange rate is one of the main determinants of Greece's tourism demand. Durbarry (2008) looked at the tourism taxes and its implications for tourism demand in the UK. The author claims that the amount of extra fiscal revenue generated from an increase of an existing tax or introduction of a new tax will depend on the tourists' response to the price effects of the taxes. According to the results of this study, demand for tourism is elastic and sensitive to price changes. Thus, the increase of 1% in tourist prices will lead to a drop in the number of tourist arrivals by around 2%. Moreover, the increase of UK's real effective tourism price by 1% will negatively affect the total real expenditure of tourism by around 1.5–2%, *ceteris paribus*. A similar negative impact on tourist arrivals was observed from the exchange rate appreciation of sterling. The importance of exchange rates and its influence on the tourism demand and international tourism flows has also been discussed by Webber (2001), Eilat and Einav (2004), Rosselló et al. (2005), Santana-Gallego et al. (2010) and De Vita (2014).

The research of Antonakakis et al. (2015) shows that the results of Durbarry (2008) might stand not only for the UK. This research has investigated the relationship between tourism and economic growth in Europe for 10 European countries (Cyprus, Greece, Italy, Portugal, Spain, Austria, Germany, the Netherlands, Sweden and the United Kingdom) over the period 1995–2012. The tests for spillover transmissions between industrial production (proxy of economic growth) and the number of international tourist arrivals (proxy of tourism performance) showed that the impact of economic events is more pronounced in Cyprus, Greece, Portugal and Spain. Thus, similar to the Durbarry (2008) concerns were raised by Voltes-Dorta et al. (2014) for Spain. The authors investigated the impact of tourism on local budgets with a comparative analysis carried out using a panel database of more than 3200 Spanish municipalities of all sizes between 2001 and 2010. The research also highlights the high price elasticity of international tourism demand for Spanish destinations and claims that any increase in taxes will reduce not only the number of visitors, but also the total tourism revenues. The problem of price-elasticity in the context of significant competition between destinations in the Mediterranean region was also discussed by Papatheorodou (1999), Garín-Muñoz (2006), and Garín-Muñoz and Montero-Martín (2007). Garín-Muñoz (2007) has provided evidence that German tourists are highly dependent on the evolution of relative prices and the cost of travel between Germany and the destination. Similar results were highlighted by De Mello et al. (2002) and Han et al. (2006) with respect to British and American tourists, respectively.

Aguiló et al. (2005) have proposed an approach of analysing the effect of a tax on tourism by modifying tourism expenditure figures for the Balearic Islands The analysis was based on yearly aggregate tourist arrivals from the four countries (the United Kingdom, Germany, France and the Netherlands) during the period from 1960 to 2000. The study applied a dynamic demand model and estimated the aggregated price effect with an approximation of the effect caused by a variation in exchange rates. The mean tourism expenditure was considered as being 69 euro. According to the paper, a 1-euro tax on tourists to the Balearic Islands will lead to a rise of 1.44% in the daily tourist expenditure, which, based on the projections conducted, will result in 117,113 fewer German, British, French and Dutch tourists. The work has highlighted the limitations of the methodology implemented and expressed the interest for the further research, which will be able to estimate more accurately the impact of a tax on tourism.

Gago et al. (2009) have analysed the possible effects arising from the introduction or increase of tourism taxation in Spain by comparing specific (hotel room tax) and general indirect tax (VAT tax). The methodology applied was a static Computable General Equilibrium (CGE) model with the simulations performed only for a specific year, more specific, the nation accounts for the year 1995 published by the Spanish Institute of Statistics. The research discussed two possible changes in VAT rates: a moderate increase (from 7 to 12%) and an

[1] According to the Travel and Tourism Economic Impact provided by World travel and tourism council (2014b) the total contribution of Travel & Tourism to GDP in Greece was 28.3bn euros (16.3% of GDP) in 2013, with the total contribution to employment of 18.2% (657,000 jobs) and Travel & Tourism investment of 2.9bn euros, which represents 13.7% of total investment. The figures from Portugal are very similar. The total contribution of Travel & Tourism to GDP in 2013 was documented at 25.6bn euros (15.6% of GDP), with the total contribution to employment of 18.2% (818,500 jobs) and Travel & Tourism investment of 2.8bn euros, or 12.5% of total investment (World travel and tourism council, 2014a).

[2] In addition, Portugal and Greece have seen their credit ratings downgraded since early 2010 at almost the same pace and faced an increase in borrowing costs starting from 2011.

ambitious increase (from 7 to 16%). The results showed that the ambitious increase in VAT rates would have significant effects on the economy, in particular on the tourism sector, and would carry a progressive increase in costs (almost double) in terms of GDP and inflation with respect to the moderate increase. The study highlights that a significant VAT change would results in a positive change for manufacturing services (0.6%). However, this would lead to negative changes in other services such as hotels and restaurants, employment, production of food and construction, −5.7%, −6.4%, −0.5% and −0.3% respectively. Moreover, the study emphasised a significant negative impact on non-resident tourism with an estimated decline in total expenditure of 6.2% in response to a 9% increase in prices, a fall of 2.6% in the sectoral consumption of goods and services by non-residents and a 9% reduction in spending at hotels and restaurants. Overall, authors warn that such consequences should be taken into consideration to prevent disproportionate tax increases.

The research of Bajo-Rubio and Gómez-Plana (2015) has also concentrated on the case of Spain. In contrast to other studies, it has examined the effects of six alternative measures intended to reduce government deficit. Half of them were intended to be applied through taxes (changes in VAT, other indirect taxes and income tax) and another half through spending. A computable general equilibrium model was used to project six possible scenarios and compare the outcomes. Thus, in line with the afore-mentioned evidence Table 3 of the results shows that an increase of VAT has a negative impact on GDP, employment, real wage rate and compensation of employees with a logical rise in unemployment.

Our paper contributes to the existing evidence and provides deeper results on the possible consequences of a significant increase in VAT. The analysis conducted is based on the sample of 23,388 Portuguese and 4,969 Greek unique firms where the number of year-observations per firm is 5.1 and 6.9 for Portugal and Greece, on average and respectively. The time period analysed is from 2003 to 2013 which we divide into 3 sub-periods: before and after the VAT rise, and during the financial crisis. For robustness checks, which were performed to confirm the impact of the VAT change and provide evidence that the results were not affected/driven by macroeconomic conditions or the European sovereign debt crisis, we used additional control samples. This was a control group for Spain that includes 59,841 unique firms and 308,078 firm-year observations, and the control group for Portugal (Manufacturing of Food and Beverages sector) with 6,578 unique firms and 42,010 firm year observations.

The analysis of the profitability of Portuguese firms before the VAT rise, after (2012–2013 years) and during the financial crisis (2008–2009) shows that the effect of the 10 percent VAT change was much more harmful for the tourism sector than the financial crisis. The average decrease in EBITDA levels after the tax introduction reached 9.4 percent versus 1.15 percent for the 2008–2009 years. Further tests controlling for the impact of government debt and domestic credit reconfirmed our findings and highlighted that the highest decline of 8.7% in profits of Portuguese firms occurred in 2012, the year following the implementation of the VAT reform.

Similarly, our results show that the impact of the VAT increase on the chances of Portuguese firms of becoming inactive/bankrupt was the strongest across all years analysed. Thus, in the years after the VAT increase, the ratio of inactive versus active firms rose to 8.1% and 9%, respectively, compared to 2–3% even during the time of the financial crisis. The test for the likelihood of a firm of becoming inactive revealed that the 10% VAT increase raises the probability of a firm to go bankrupt by 3.063 times.

Hence, the example of Portugal shows that a significant VAT increase on restaurant meals and beverages has negative consequences for the tourism industry and, considering the importance of this sector, may harm the country's economy. Bearing in mind the similarities of Portugal and Greece in terms of culture and countries' macroeconomic conditions/characteristics these results may be projected to Greece. Therefore, it is important for the Greek and Portuguese government to consider these outcomes and possible consequences before the next step of government interventions in the tourism sector.

This paper is organised as follows. Section 2 presents the data sources and discusses the sample selection. In section 3, the model and variables used to test the effect of firm specific characteristics and macroeconomic environment on firm profitability in Portugal and Greece are discussed. The empirical results and their robustness are presented in Section 4 and Section 5 concludes.

2. Sample selection and profitability analysis

The accounting and financial data for Portugal and Greece was obtained from the ORBIS database. This comprehensive database provides accounting and financial information in a comparable and uniform format which allows comparisons across countries. We started by selecting the major sector "*Hotels and Restaurants*" from which we selected all the data from the sub-sector "*Food and beverage service activities*" (Restaurants and mobile food services activities, Event catering and other food service activities and beverage servicing activities). The data is organised following the Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008); it is reported in ORBIS under NACE Rev. 2–56.1, 56.2 and 56.3.

Furthermore, we divide our sample into Micro, Small, Medium and Large firms following the European Commission Recommendation 2003/361/EC[3] grouped according to the number of employees, annual turnover or annual balance sheet total. The period of this study is from 2003 to 2013 although firms were permitted to "leave and enter" the database over time reducing the survival bias, therefore the dataset is unbalanced. Table 1 reports the panel data structure for the final sample presenting the number of firm-year observations for Portugal and Greece by year and firm size.

The sample is composed of 23,388 Portuguese and 4,969 Greek unique firms where the number of year-observations per firm is 5.1 and 6.9 for Portugal and Greece, on average and respectively. Considering the similarity of the two countries in the number of inhabitants and macroeconomic characteristics, we would expect the number of firms in both countries to be much close to each other. The difference arises at micro firm level and is reflected in the overall number of sampled firms and firm-year observations.

Table 2 provides a preliminary analysis of the overall profitability of the *Food and Beverage Service Activities* in Portugal and Greece. All the measures of profitability are scaled by total assets and include: earnings before interest, taxes, depreciation and amortization (EBITDA), Earnings before interest and taxes (EBT), Earnings before taxes (EBT) and Earnings after taxes (EAT). Overall, it is observed that for the full sample, Portuguese firms are less profitable than Greek counterparts. Since both countries were exposed to the recent financial and sovereign debt crises, further analysis is needed to understand the discrepancies among these values.

In Fig. 1, we start by analysing per year the average values for EBITDA over Total Assets (thereafter *PROFIT*). We have selected this measure of profitability since it is calculated before amortization and depreciation (which can be different per country, firm size and age, etc.), interest payments, corporate and municipal taxes.

The figure shows the average percentage of EBITDA (Earnings before interest, taxes, depreciation and amortization) over Total Assets per year for Portugal and Greece for the period 2003–2013.

Fig. 1 clearly shows that until 2007 (inclusive), the average *PROFIT* is between 7 and 9 percent for both countries. Starting from 2008, the impact of the recent financial crisis is observable in a steady decline in the average profitability in both countries. Portuguese firms have

[3] Published in the Official Journal of the European Union L 124, p. 36 of 20 May 2003.

Table 3
Profitability by firm group and year The table reports a two-sample Wilcoxon rank-sum (Mann-Whitney) test to compare values of average profitability for Portugal versus Greece for each firm size (Micro, Small, Medium, Large and all firms) and year. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels. P-values are reported in parenthesis.

	Micro	Small	Medium	Large	All Firms
2003	−1.273 (0.2029)	3.555*** (0.0004)	0.623 (0.5333)	0.998 (0.3181)	−0.549 (0.5832)
2004	−6.169*** (0.000)	2.266** (0.0234)	−0.393 (0.6946)	0.164 (0.8695)	−5.784*** (0.0000)
2005	−4.169*** (0.000)	4.992*** (0.000)	1.782* (0.0747)	2.033** (0.0421)	−3.229*** (0.0012)
2006	−0.338 (0.7355)	7.611*** (0.0000)	3.248*** (0.0012)	2.419** (0.0156)	−0.736 (0.4616)
2007	0.869 (0.3850)	6.362*** (0.0000)	2.279** (0.0227)	1.353 (0.1761)	−0.388 (0.6978)
2008	3.285*** (0.0010)	6.112*** (0.000)	2.997*** (0.0027)	3.109*** (0.0019)	3.011**8 (0.0026)
2009	4.425*** (0.0000)	6.693*** (0.000)	4.013*** (0.0001)	2.371** (0.0178)	3.021*** (0.0025)
2010	2.170** (0.0300)	4.350*** (0.000)	2.662*** (0.0078)	1.853* (0.0639)	0.108 (0.9144)
2011	3.726*** (0.0002)	6.591*** (0.000)	5.485*** (0.000)	2.731*** (0.0063)	6.327*** (0.0000)
2012	*11.363*** (0.000)*	*7.247*** (0.000)*	*5.986*** (0.000)*	*3.644*** (0.0003)*	*19.952*** (0.0000)*
2013	*15.899*** (0.000)*	*9.271*** (0.000)*	*7.247*** (0.000)*	*5.305*** (0.0000)*	*23.656 (0.0000)*
All Years	21.891*** (0.000)	21.846*** (0.000)	11.748*** (0.000)	7.484*** (0.000)	26.037*** (0.000)

Table 1
Number of firm-year observations. The table reports the number of firm-year observations per year for "*Food and beverage service activities*" in Portugal and Greece for the period 2003–2013. Micro, Small, Medium and Large size firms are according to the European Commission Recommendation 2003/361/EC.

	PORTUGAL					GREECE				
	Micro	*Small*	*Medium*	*Large*	*TOTAL*	*Micro*	*Small*	*Medium*	*Large*	*TOTAL*
2003	1,705	125	47	23	1,900	2,396	563	90	19	3,068
2004	1,812	140	54	19	2,025	2,433	709	137	24	3,303
2005	2,351	190	62	33	2,636	2,463	774	145	28	3,410
2006	11,714	447	133	41	12,335	2,393	829	169	28	3,419
2007	13,077	502	143	42	13,764	2,225	859	215	35	3,334
2008	13,747	546	149	49	14,491	1,981	979	253	47	3,260
2009	14,154	562	160	49	14,925	1,870	997	248	62	3,177
2010	14,141	588	174	49	14,952	1,887	963	254	65	3,169
2011	13,687	583	179	57	14,506	1,875	914	249	63	3,101
2012	13,364	592	174	51	14,181	1,495	815	224	61	2,595
2013	13,278	615	165	56	14,114	1,250	713	213	54	2,230
TOTAL	**113,030**	**4,890**	**1,440**	**469**	**119,829**	**22,268**	**9,115**	**2,197**	**486**	**34,066**

Table 2
Profitability in Food and Beverage Service activities. This table reports the average, standard deviation, median, 25th and 75th percentile profitability for Portugal and Greece. All measures are scaled by total assets. EBITDA is the Earnings before interest taxes depreciation and amortization, EBIT is Earnings before interest and taxes, EBT is Earnings before taxes and EAT is earnings after taxes. The sample comprises 119,829 and 34,066 firm-year observations over the period 2003–2013 for Portugal and Greece, respectively.

	PORTUGAL				
	Mean	Std. dev.	P25	P50	P75
EBITDA	0.0347	0.2179	−0.0241	0.0467	0.1278
EBIT	−0.0270	0.2169	−0.0770	0.0076	0.0583
EBT	−0.0400	0.2192	−0.0900	0.0015	0.0430
EAT	−0.0448	0.2173	−0.0851	0.0020	0.0357
GREECE					
EBITDA	0.0657	0.2403	0.0186	0.0060	0.1099
EBIT	−0.0072	0.2525	−0.0351	0.0020	0.0406
EBT	−0.0202	0.2565	−0.0484	−0.0064	0.02667
EAT	−0.0279	0.2629	−0.0466	−0.0049	0.02245

performed worse than Greek firms by 1–1.5 percent, with this difference being the smallest in 2011 (0.7 percent), the year before the adoption of the new VAT rate in Portugal. In fact, 2012 was a dramatic year for Portuguese firms with an average negative profitability of 5.27 percent.

The statistical significant difference for profitability (average values) between Portuguese and Greek firms per year and firm size are shown in Table 3. Table 3 also displays the results of the Wilcoxon rank-sum (Mann-Whitney) test, by which we test the null hypothesis that two independent samples (Portuguese and Greek firms) are the same against an alternative hypothesis that a particular population tends to have larger values than the other. A significant *Z value* indicates confidence in rejecting the null hypothesis. Overall (to all years), the results support

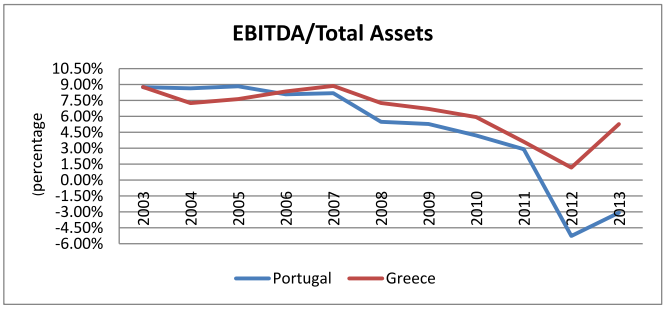

Fig. 1. Average Profitability per year.

the hypothesis that Portuguese firms are, on average, less profitable than Greek counterparts. Interestingly, after the VAT increase in Portugal (years 2012 and 2013) firm profitability in two countries became even more different, the results are statistically significant and show higher Z-statistic. The outcomes are independent of the firm group size (Micro, Small, Medium or Large).

3. Empirical model, variable specification and descriptive statistics

3.1. Model

As discussed previously, our study aims to investigate the impact of a massive VAT increase on the profitability levels of Portuguese firm and their probability of bankruptcy. The Portuguese experience can be used to anticipate and/or forecast the consequences of the recently proposed equivalent VAT rise in Greece.

We model the profitability of firm i at time t by:

$$PROFIT_{i,t} = \beta_{0,i} + \sum_{k=1}^{K} \beta_{1,k} Y_{i,\,k,\,t} + \sum_{l=1}^{L} \beta_{2,l} Z_{\,l,\,t-1} + \varepsilon_{i,t} \quad (1)$$

Where is the stacked vector of the dependent (endogenous) variable (the ith firm profitability on the tth period), $Y_{i,\,k,\,t}$ is the matrix of K firm-specific independent (explanatory) variables, $Z_{l,\,t-1}$ is the matrix of L macroeconomic and exchange rates independent (explanatory) variables, $\beta_{0,i}$ is the firm-specific intercept in the fixed-effects model, $\beta_{1,k}$ and $\beta_{2,L}$are the matrices of coefficients while $\varepsilon_{i,t}$is a vector of error terms.

3.2. Variable specification

3.2.1. Dependent variable: profitability

The dependent variable in this study is measured as Earnings before interest, taxes, depreciation and amortization over total assets.

3.2.2. Independent variables

The set of firm and sector/country determinant factors of profitability are as follows:

i. ***SIZE.*** Small businesses are often seen as innovators and job creators. For Portugal and Greece, small businesses represent a massive share in the tourism sector. The job, output growth and contribution to the economy of this group of firms are often compared with those of larger businesses. Size should influence profitability. Economies of scale, business diversification and scope indicate that a large firm will, in general, be more profitable than a smaller one. Additionally, they are likely to have easier access to bank financing, generally face lower borrowing costs and are less likely to go bankrupt since they can easier absorb higher costs in contrast to small firms. Under this logic, one expects a positive relationship among firm size (measured by the natural logarithm of total assets) and profitability.

ii. ***Age.*** As firms grow older, their profitability seems to decline. Older firms are less efficient compared to their industry peers, tending to have higher costs, slower growth, older assets and investment activities (Loderer & Walelchli, 2010). We hence measure firm age as the natural logarithm of years since incorporation.

iii. ***Current Liabilities.*** We consider short-term financing to be more important in the tourism industry than long term commitments. We define current liabilities as bank loans, creditors and other current liabilities over total assets.

iv. ***Liquidity.*** We expect that firms with a positive balance between debtors and creditors should be more profitable. We measure liquidity as working capital over total assets, while a positive relationship among firm liquidity and profitability is expected.

v. ***Currency exchange rate.*** As previously discussed, the tourism industry in Portugal and Greece has made a significant contribution to GDP. However, this industry is very exposed to overseas tourists and importing goods. We control our results by including two exchange rates: Euro to US dollar (EUR/USD) and Euro to British Pound (EUR/GBP).

vi. ***Government Debt.*** High levels of public debt are likely to be harmful to country/firm growth and might therefore negatively affect firm profitability. This is important as government debt has risen considerably in the last years. We measure government debt as government debt over GDP. A lagged negative relationship between firm profitability and government debt levels is expected.

vii. ***Domestic Credit.*** The development and increasing share of financial resources (like loans and non-equity securities) of private sector in the national economy or GDP is, in general, seen as a sign of economic development and prosperity in a country. However, the literature distinguishes between household and firm credit with the latter enhancing economic growth (by easing the liquidity constraints of the firms, formation of new firms and expansion of existing ones); in contrast, to the former with no effect on medium and long-term economic growth. Additionally, a rapid growth in bank credit to the private sector is a common factor associated with banking crises. According to this logic, one expects to see a hybrid relationship among domestic credit (measured by domestic credit provided by financial sector as a percentage of GDP) and profitability.

viii. ***Financial Crisis and VAT change.*** This study uses annual accounting data due to unavailability of quarterly or semester data for private firms (in particular, micro and SMEs).

We use binary variables to measure the effect during the Financial Crisis, pre- and post-VAT change periods on firm profitability and probability of bankruptcy. The first binary variable (*FCrisis*) is equal to one for 2008 and 2009 and zero otherwise. Even though the first sign of crisis was in August 9, 2007, when the French investment bank, BNP Paribas suspended three investment funds that invested in subprime mortgage debt, we claim that the effect of financial crisis was not immediately reflected in the private firm annual accounts in 2007. This is in line with Smeral (2009) who wrote that "in the euro zone the macroeconomic situation has deteriorated since the end of 2008". Kappeler and Nemoz (2010) have also considered 2008 and 2009 as basis years when referring to the financial crisis. The second binary variable (*VAT*) is equal to one for 2012 and 2013 and zero otherwise. The change of VAT rate from 13 to 23 percent was implemented in January 2012. Therefore, we expect the full effect of such increase to be reflected in 2012 and 2013, since VAT has almost an immediate impact on prices because every 3 months companies pay the VAT income (called VAT return). According to Gautier and Lalliard (2014), p. 50% of price changes in the month of the new VAT introduction and 40% in the following month. Berardi et al. (2013) provide evidence that price changes are much more frequent in the first quarter. Therefore the "first" increase in prices in our study is expected in the first quarter of 2012. However, in line with Carbonnier (2009), we claim that firms may take the sensible option to absorb some of the VAT increase into their margins to prevent an excessive slump in demand and so be able to survive in the competitive environment of the tourism industry. Hence, we anticipate a negative effect of such years on firm profitability.

3.3. Descriptive statistics

Table 4 (panels A and B) reports the summary statistics for firm characteristics and macroeconomic independent variables defined in the previous section. Portuguese firms in the sample are, on average, smaller due to the larger number of micro firms, as reported previously. Panel A represents information estimated for all years per each country. The average age of firms is quite similar in both countries, with a median age of 11 and 16 years for Portugal and Greece, respectively. Different statistics arise from the remaining two variables: current liabilities and liquidity. In fact, the average ratio of current liabilities to total assets is substantially higher for Portugal, but in opposite way firms are more liquid. Statistics show that Portuguese firms pay on average later to their suppliers and receive earlier from their customers than their Greek counterparts. The average government debt to GDP was higher for Greece in the period analysed and more domestic credit was provided in Portugal in comparison to Greece.

The panel reports to Portugal and Greece the mean, median, standard deviation and the 25th and 75 percentiles for the following variables: *SIZE* measured as the natural logarithm of total assets, *AGE* measured as the natural logarithm of years since incorporation date, *CURRENT LIABILITIES* defined as bank loans plus creditors plus other current liabilities over total assets, *LIQUIDITY* is measured as working capital over total assets. *GOVERNMENT DEBT* is measured as

Table 4
Summary Statistics for the independent variables **Panel A**: All years **Panel B:** Years before (2010–2011) and after (2012–2013) VAT increase in Portugal.

	PORTUGAL				
	Mean	Std. dev.	P25	P50	P75
Size	5.2976	1.2239	4.4139	4.9794	5.800
Age	2.2076	1.0973	1.6094	2.3990	2.9957
Current Liabilities	0.5768	0.9945	0.1543	0.4406	0.8410
Liquidity	0.0533	0.5077	−0.0447	0.0498	0.2075
Government Debt	0.9349	0.2597	0.7000	0.8885	1.1865
Credit	1.7318	0.2712	1.4197	1.7574	2.0125
GREECE					
	Mean	Std. dev.	P25	P50	P75
Size	7.2029	1.33559	6.2996	7.0888	7.9697
Age	2.4991	0.9529	1.9460	2.7739	3.1781
Current Liabilities	0.0327	0.4691	0.0740	0.1949	0.4258
Liquidity	−0.0356	0.3013	−0.0646	0.0010	0.0500
Government Debt	1.3848	0.2910	1.0950	1.3785	1.6535
Credit	1.1981	0.2121	1.0674	1.1543	1.3697

	PORTUGAL						
	(Before Tax Reform) 2010–2011			(After Tax Reform) 2012–2013			Wilcoxon rank-sum test
	Mean	Std. dev.	# obs	Mean	Std. dev.	# obs	
Size	5.2981	1.214402	29,458	5.3156	1.2323	28,295	1.166
Age	2.2532	1.086311	29,458	2.2952	1.0846	28,291	5.094***
Current Liabilities	0.5393	1.45178	29,458	0.5458	0.7317	28,295	0.379
Liquidity	0.1179	.2803875	29,315	0.1150	0.3089	28,119	−1.063
GREECE							
	Mean	Std. dev.	# obs	Mean	Std. dev.	# obs	**Wilcoxon rank-sum test**
Size	7.3594	1.3966	6,270	7.4405	1.4478	4,825	3.142***
Age	2.3549	1.0134	5,526	2.3676	0.9942	4,308	0.246
Current Liabilities	0.3442	0.5804	6,270	0.3541	0.6487	4,825	−3.653***
Liquidity	−0.0314	0.3221	6,270	−0.0347	0.37364	4,825	4.971***

Government Debt to GDP. *CREDIT* is defined as Domestic credit provided by financial sector (percentage of GDP). The sample consists of 119,829 and 34,066 firm-year observations over the period 2003–2013 for Portugal and Greece, respectively.

Panel B provides summary statistics for Portugal and Greece before and after VAT rate increase in Portugal. For Portugal, we do not observe any significant changes in the average values of independent variables, before and after (tested by Wilcoxon rank-sum). Significant difference in mean values was found only for variable age. However, this result is expected, since as the time goes on firms get older. For Greece, we found a slight increase in size and current liabilities, and observed a decrease in liquidity. However, even though these differences are statistically significant, the absolute difference is less than 1 percent in all cases. To quantify the severity of multicollinearity for Portugal and Greece, we performed Pearson and Spearman correlation matrix analysis and a Variance Inflation Factors (VIF) test and found that multicollinearity is not a problem in the sample.[4]

The panel reports the mean and standard deviation for Portugal and Greece during the period 2010–2011 (before VAT increase in Portugal) and 2012–2013 (after VAT increase in Portugal). *SIZE* is measured as the natural logarithm of total assets, *AGE* is measured as the natural logarithm of years since incorporation date, *CURRENT LIABILITIES* is defined as bank loans plus creditors plus other current liabilities over total assets, *LIQUIDITY* is measured as working capital over total assets. The sample consists of 29,458 and 6,270 (2010–2011) and 28,295 and 4,825 (2012–2013) firm-year observations for Portugal and Greece, respectively. Wilcoxon rank sum test is performed to test statistical significant differences in mean values for Portugal and Greece. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

[4] Tables are available upon request.

4. Empirical results

4.1. Determinants of profitability

In Table 5, we start by testing the use of fixed versus random effects using the Hausman test statistic. The test strongly rejects random-effects specification; thus, fixed-effects estimation is employed to both Portugal and Greece regressions.

Firstly, we address the question of whether a firm's specific characteristics, currency exchange rates, government debt levels, credit provided by private sector and the impact of the recent financial crisis discussed in section 3, affect profitability in Portugal and Greece.

The results are reported in models 1 and 2 (Portugal) and 3 and 4 (Greece). All four firm's specific characteristics variables are statistically significant at 1 percent level (p-value below 0.01). Besides the variable *AGE,* all other variables have an equal sign for both countries. For Portugal, in contrast to Greece, as firms grow older, their profitability seems to decline.

We also include the impact of end of year lagged currency exchange rate on firm profitability. One can observe the negative impact of Euro appreciation against the British pound in terms of firm profitability. On average, a 1 percent appreciation of the Euro has a negative impact of 0.27 and 0.20 percent on the profitability of Portuguese and Greek firms, respectively (models 1 and 3). This can be explained, in line with Dritsakis (2004), by the fact that the Britain is one of the most important markets for Greek and Portuguese tourism in terms of arrivals and revenues. The results here confirm the study of Durbarry (2008) who states that the demand for tourism is elastic and sensitive to exchange rate fluctuations. Thus, the appreciation of pound has a positive impact on firm profitability because it stimulates tourist arrivals. An opposite effect is observed for the US dollar. The explanation can arise from the fact that the US dollar is the relevant currency for tourists coming from America (North and South) and Asia. Tourists from these regions come in reduced numbers compared to European visitors. Therefore, no significant impact on firm profitability is expected with the Euro's appreciation. Additionally, and maybe more importantly, a positive impact on

Table 5
Multivariate regression results. The sample consists of 119,829 and 34,066 firm-year observations for Portugal and Greece, respectively, on ORBIS database over the period 2003–2013. $Profit_{i,t}$(dependent variable) is the EBITDA (Earnings before interest, taxes, depreciation and amortization) over Total Assets of firm *i* in year *t*. $SIZE_{i,t}$ is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,t}$ is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,t}$ is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,t}$ is defined as working capital over total assets of firm *i* in year *t*. *EUR_USDt-1* and *EUR_GBPt-1* is the end of year currency exchange rate among Euro/US dollar and Euro/British Pound in year *t-1*, respectively. *GOVERNMENT DEBT_GDPt-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECTORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. *FCrisis* is a binary variable equal to one if year are 2008 and 2009 and zero otherwise. Based on Hausman test fixed-effects estimations are reported. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

Variables	PORTUGAL		GREECE	
	Models			
	1	**2**	**3**	**4**
Size	0.064*** (29.31)	0.059*** (27.59)	0.032*** (12.21)	0.031*** (11.74)
Age	−0.070*** (−28.80)	0.021*** (7.14)	0.005*** (3.89)	−0.002 (−1.54)
Current Liabilities	−0.007*** (−8.22)	−0.006*** (−7.04)	−0.151*** (−31.66)	−0.149*** (−31.37)
Liquidity	0.018*** (9.62)	0.021*** (11.64)	0.072*** (12.54)	0.072*** (12.51)
EUR_USD t-1	0.075*** (8.24)	–	−0.039*** (−3.52)	–
EUR_GBP t-1	−0.269*** (−26.72)	–	−0.200*** (−13.41)	–
Government Debt_GDP t-1	–	−0.239*** (−42.31)	–	−0.103*** (−9.59)
Credit_Financial_Sector t-1	–	−0.035*** (−6.77)	–	−0.008 (−0.71)
Fcrisis	–	−0.015*** (−9.87)	–	−0.018*** (−7.36)
Constant	−0.028* (−1.77)	−0.056*** (−4.28)	0.069*** (3.16)	0.033 (1.55)
Observations	95,053	95,053	22,521	22,521
Firms	19,504	19,504	4,074	4,074
R-Squared	0.0540	0.0889	0.1706	0.1705
Hausman Test	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
	2062.61***	1319.99***	547.89***	493.78***

profitability might be observed with the US dollar's depreciation caused by importing cheap goods from outside the Eurozone.

In models 2 and 4, we test the impact of government debt levels and credit provided by private sector on firm profitability across the years. The results strongly confirm that increased levels of public debt and domestic credit provided by the financial sector to the economy negatively affect firm profitability. The latter might indicate that the private credit provided in Portugal and Greece could mainly be household credit (mortgages) with no effect on medium and long-term economic growth. Additionally, micro and SME firms are always considered to face severe financial constraints (in comparison to their larger counterparts) with a negative impact on their growth and consequent profitability. Therefore, we attribute this negative impact of domestic credit to both the increased importance of household credit in overall credit and to the fact that most of the firm's credit goes to large firms.

We have further tested the impact of the recent financial crisis on the tourism industry. As discussed previously, a binary variable has been used to control for the level of change in profitability in 2008 and 2009. These results strongly show that the financial crisis *per se* has a very similar statistically significant negative effect on Portuguese and Greek firms' profitability (1.5 and 1.8 percent, respectively).

4.2. Difference in differences estimator

We now address our research question by applying the difference in the differences estimator to calculate the VAT effect comparing the pre- and post-VAT differences in firm profitability in Portugal with a control group, in this case Greece.[5] Fig. 1, displayed earlier, shows a similar downward trend for Portuguese and Greek firm profitability, which significantly deviates in the year 2012, due to the VAT rate change in Portugal, as we have claimed.[6] Fig. 2 summarises the expected effect of the VAT rate increase in Portugal.

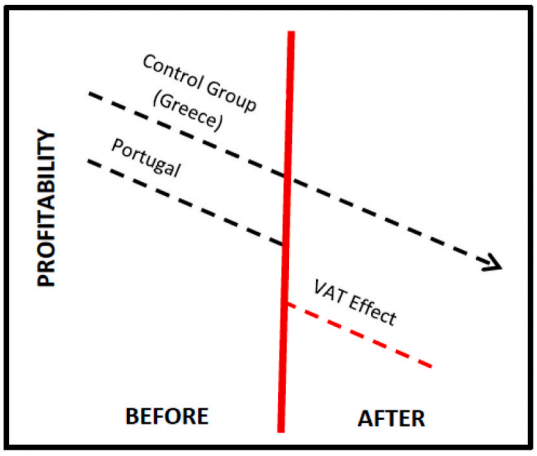

Fig. 2. Difference in differences analysis.

The effect of the VAT change in Portugal is the difference in firm profitability for a country where this increase took place (Portugal) and the one where it does not (e.g. Greece). Table 6 presents the results. In model 1, we perform the difference in difference estimator to measure the impact of the financial crisis for the sub-period 2003–2011.[7] One can infer that the variable *Control_Fcrisis,* which captures the average difference in profitability for Portuguese firms in 2008 and 2009 versus Greek firms, is not statistically significant.

This finding confirms the results from Table 5 where differences in the impact of the financial crisis on firm profitability for Portugal and Greece were almost identical (−0.15 and −0.018, respectively). In contrast, differences were observed from testing firm profitability

[5] Later, in the robustness of the results session we perform the difference in difference estimator for Portugal and Spain.

[6] In order for the parallel trend assumption to hold, the slope of the trend lines for the two groups, or the first derivative must be similar. We performed a linear trend estimation to both, Portugal and Greece, and confirmed that the pre-treatment trend to both the control and the treatment groups in the absence of the treatment is similar. These results are available upon request.

[7] We exclude the years 2012 and 2013 from the analysis not to bias the results due to the VAT increase in Portugal in 2012.

Table 6
Difference-in-difference estimation (Portugal and Greece).

Variables	PORTUGAL and GREECE		
	Models		
	1	2	3
Size	0.007*** (8.45)	0.029*** (27.55)	0.029*** (27.56)
Age	0.001 (1.48)	−0.001 (−0.63)	0.001 (0.35)
Current Liabilities	−0.009*** (−12.04)	−0.020*** (−22.03)	−0.020*** (−22.06)
Liquidity	0.026*** (18.05)	0.063*** (16.33)	0.062*** (16.26)
Government Debt_GDP t-1	−0.088*** (−6.20)	0.068*** (5.35)	0.057*** (4.88)
Credit_Financial_Sector t-1	−0.058*** (−7.20)	−0.128*** (−10.39)	−0.157*** (−3.47)
Fcrisis	−0.007** (−2.50)	–	–
Control_Fcrisis	−0.002 (−0.54)	–	–
VAT	–	−0.020*** (−3.99)	−0.022 (−4.32)
Control_VAT	–	−0.078*** (−17.17)	
Control_VAT_2012			−0.087*** (−17.00)
Control_VAT_2013			0.017 (0.99)
Constant	0.190*** (16.98)	−0.080*** (−4.22)	−0.203*** (−3.78)
Observations	88,232	60,689	60,689
Firms	21,539	20,168	20,168
R-Squared	0.0276	0.0907	0.0916
Time Period	2003–2011	2010–2013	2010–2013

between the two countries for the years 2012–2013 (after the VAT rate increase in Portugal). The results are displayed in Models 3 and 4.[8]

The results show that the years 2012–2013 were, in general, the worst to both Portugal and Greece (variable *VAT*, model 2). A more relevant and significant finding is the negative impact on the profitability of Portuguese firms arising after controlling for the VAT change. Indeed, the negative coefficient for the variable *Control _VAT* shows, on average, a decrease in profitability of Portuguese firms of 7.8 percent (statistically significant at 1 percent level in years 2012 and 2013 versus Greek firms).[9] In model 3 we specifically control the impact on Portuguese firm profitability for each of the years, 2012 and 2013. We found that the negative impact on Portuguese firms was more realised in the year 2012, the first year after the implementation of the VAT change (−0.087, statistically significant at 1 percent level) with the effect disappearing in 2013 (not significant).[10]

The sample consists of 119,829 and 34,066 firm-year observations for Portugal and Greece, respectively, on ORBIS database over the period 2003–2013. $Profit_{i,t}$(dependent variable) is the EBITDA (Earnings before interest, taxes, depreciation and amortization) over Total Assets of firm *i* in year *t*. $SIZE_{i,t}$is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,t}$is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,t}$is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,t}$is defined as working capital over total assets of firm *i* in year *t*. *GOVERNMENT DEB*T_GDP*t-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECTORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. Country is a binary variable equal to one if Portugal and zero if Greece. *FCrisis* is a binary variable equal to one if year are 2008 and 2009 and zero otherwise. *Control_FCrisis* is calculated as the product between variable country and FCrisis. VAT is a binary variable equal to one if years are 2012 and 2013 and zero otherwise. *Control_VAT* is calculated as the product between variable country and *VAT*. *Control_VAT2012 and Control_VAT2013 are* calculated as the product between variable sector and *if year 2012 and 2013, respectively*. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

4.3. VAT rate increase and firm's bankruptcy

The fact of covering additional costs at the expense of a company's own profitability raises a question about the rate of surviving firms. Hence, we check if the VAT change in Portugal had an impact on the overall number and percentage of firms that became inactive in the following years after the government intervention (2012 and 2013). Moreover, we test if the probability of a firm becoming inactive has increased in recent years. This analysis is possible since the ORBIS database provides information not only about the active firms but also inactive firms. Besides their status as inactive (dissolved, bankruptcy or in liquidation), the occurrence date and previous year's accounting and financial information is available. Table 7 reports per year (2003–2013) the number of firms that have become inactive, while presenting the number of active firms in the sample and the ratio inactive versus active firms.

Looking at Table 7, we can highlight three different periods regarding the inactive/active firm ratio. Until 2007 the percentage of inactive firms in each year as a portion of active firms was below 2 percent. During the period of the financial crisis, this value has crossed the level of 2 percent and, more significantly, in the post-VAT implemented years the ratio of inactive firms has reached 8–9 percent. On average, 3.5 times more firms have gone bankrupt in the post VAT increase period than the average for the four previous years including the recent financial crisis.

Overall, in the last 11 years one of each five active firms was dissolved, went bankrupt or was liquidated. The statistics clearly give evidence of an increase in the ratio of inactive firm after the VAT change. However, more detailed analysis is needed to measure the rise in default probability. This information will help to forecast the future

Table 7
Inactive versus Active firms The sample consists of 4,250 and 23,388 inactive and active (dissolved, bankruptcy or in liquidation) Portuguese firms from food and beverage service activities, respectively.

	PORTUGAL		
	INACTIVE	*ACTIVE*	RATIO Inactive/Active
2003	2	1,900	0.105%
2004	20	2,025	0.988%
2005	36	2,636	1.366%
2006	88	12,335	0.713%
2007	232	13,764	1.686%
2008	356	14,491	2.457%
2009	341	14,925	2.285%
2010	339	14,952	2.267%
2011	422	14,506	2.909%
2012	1,147	14,181	8.088%
2013	1,267	14,114	8.977%
TOTAL	**4,250**	**23,388**	**18.172%**

[8] In this analysis, we include only the years from 2010 to 2013 to eliminate a possible financial crisis effect. However, results for the full sample are robust and available upon request.

[9] We have re-estimated standard errors using the Petersen (2009) method and clustering by firm and years. Our findings do not change and the coefficients by and large remain significant. Tables are available upon request.

[10] The potential endogeneity issue of liquidity variable in this paper has been addressed in several ways. First, by the exclusion of liquidity as an explanatory variable. Second, by estimating the model with fixed effects where the time-invariant regressors are absorbed by the fixed effects. Third, we re-estimate the models using Two and three-Stage least squares (2SLS and 3SLS). In all instances, the conclusions remain unchanged. The results are available upon request.

consequences for Greece after the recent VAT increase in "food and beverage service activities".

To analyse the probability of bankruptcy we apply a panel logistic regression, where the dependent variable is equal to one for the year when the firm becomes inactive and zero otherwise. The results are reported in Table 8.

The sample consists of 132,269 firm-year observations (27,638 unique firms) from the food and beverage service activities (Portugal). $Inactive_{i,t}$(dependent variable) is equal to one if inactive (dissolved, bankruptcy or in liquidation) and zero otherwise *i* in year *t*. $SIZE_{i,t}$is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,t}$is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,t}$is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,t}$ is defined as working capital over total assets of firm *i* in year *t*. *Year 2012/2013* is a binary variable equal to one if years are 2012 and 2013 and zero otherwise. *Year 2012* and *Year 2013* are binary variables equal to one if years are 2012 or 2013 and zero otherwise. *GOVERNMENT DEB*T_GDP*t-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECTORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. Odds-ratios is reported. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

Models 1 to 4 (Panel A) presents the first set of regressions for the full sample period (2003–2013) and for a sub-period from 2010 to 2013. We analyse this sub-period to reduce any possible effect arising from the financial crisis. We assess the probability of firm default with a set of firm-characteristics used previously. Both *CurrentLiabilities* and *liquidity* are lagged one year, as we would assume that even though the effect of these variables on firm profitability is immediate, the impact on the bankruptcy odds should be lagged.[11] We found that larger firms are less likely to go bankrupt, while older firms and firms with higher short-term debt levels have higher chances of becoming inactive. No statistically significant evidence was found for the impact of liquidity on the likelihood of bankruptcy. The results are statistically significant at 1 percent level and show that the likelihood of a firm to become inactive after the VAT increase is multiplied by 3.063. In other words, the VAT change from 13 to 23 percent in Portugal made firms more vulnerable with a probability of 3.063 times more likely to become dissolved, liquidated or go bankrupt. Model 2 (full period) and 4 (period 2010–2013) show the individual impact of 2012 and 2013 years. These results support the conclusion that the increase in bankruptcy likelihood is delayed in contrast to the results observed for the impact of the VAT change on firm profitability. In fact, the increase in bankruptcy odds in 2012 was 2.762 comparing to 5.335 in 2013. Overall, there is evidence of a tremendous impact of the 10 percent VAT rise on the probability of Portuguese firms going bankrupt/or become inactive. These results are important as they add additional information on the magnitude of the impact from a significant VAT change and show the possible consequences of such an impact on firm survival.[12]

In Panel B, Table 8, we develop a similar analysis but by interacting the variable *Government Debt over GDP* with the *post-VAT* increase binary variable (years 2012 and 2013, models 1 to 4) and by including an additional explanatory variable *Domestic Credit provided by the financial sector over GDP* (models 5 to 8) to assess the probability of a firm to become inactive, post-VAT increase Again, the results are presented for the full sample period and for the sub-period 2010–2013. Models 1 and 3 show that an increase of government debt over GDP in the years 2012 and 2013 has a significantly higher impact on the bankruptcy chances comparing to any other single year (statistically significant at 1 percent level). The results are robust for each of the post-VAT years analysed and for the two years jointly determined (models 2 and 4) for the full sample and post-financial crisis sub-period. Similar to Panel A, the results are quantitatively stronger for the sub-period when most of the effect of the financial crisis is eliminated.

We extend our analysis by including an additional explanatory variable *Domestic Credit provided by the financial sector over GDP* to assess the probability of a firm to become inactive, post-VAT increase. The results are aligned with the previous panels and models. Nevertheless, the impact of *Domestic Credit* interacting with the post-VAT years is lower than when it is controlled for the years 2012–2013 *per se* (Panel A) or when *Government Debt* is interacted with the post-VAT years. Therefore, we can conclude that the increase of domestic credit provided by the financial sector during the port-VAT years lowered the increase in probability of default for Portuguese firms.

Overall, in this section we have provided evidence of a tremendous impact of VAT increase (from 13 to 23 percent) on the chances of Portuguese firms going bankrupt/or becoming inactive.

4.4. Robustness of the results

Based on Table 6, after performing difference-in-difference estimation with Greece as a control country, our results show that the average drop in Portuguese firms' *EBITDA* levels was observed in the first year of its execution (drop to 8.7 percent, see Table 6 model 3). This result suggests that Portuguese companies were already operating with tight profit margins and under the condition of tough competition; they were unable to pass fully the increased costs to final consumers and has preferred to retain the customers at the expense of their own profitability.

In this section, we perform several robustness checks to confirm our previous results. *First*, we apply multivariate regression to test whether the results on firm profitability in Portugal would change if different time periods are analysed (Table 9). *Second*, we extend the difference-in-difference estimation between Portugal and Greece (in Table 6): a) by using a different country (but equal sector) as a control group (Spain, Food and Beverages service activities) and b) by using an additional control group for Portugal, *Manufacturing of Food and Beverages firms,* which represent a different however related group to the *Food and Beverages* sector that was not affected by the VAT increase back to 2012. *Third,* we apply matched sample method for Portugal, Greece and Spain (Food and Beverages service firms) and conduct a similar analysis for Portugal using the matching sample method for Food and Beverages service sector and the Manufacturing of Food and Beverages sector. *Fourth*, we test whether the increase in probability of Portuguese firms to become inactive was caused by the financial crisis or it was the impact from the VAT change (see previous Table 8). *Fifth*, we perform a time trend linear regression for Average Country Profitability, with government debt over GDP and domestic credit provided by financial sector (percentage of GDP) to assess whether we can observe a time trend for the afore-mentioned variables during the time period analysed without significant time trend breaks.

4.4.1. Different time periods

We start by testing whether the results on firm profitability in Portugal would change if different time periods are analysed (Table 9). In model 1, we test the effect of the financial crisis on profitability for the time period 2003–2010 (inclusive). The results are in line with those previously obtained (Table 5 model 4). It confirms the drop of 1.17 percent in profitability level for the years 2008–2009. Model 2 examines the impact of the VAT increase by comparing the years 2012–2013 with 2010–2011.

By performing this analysis, we aim to estimate the outcome without a possible influence arising from the financial crisis. The results are consistent with those in Table 5, model 5 and show the average 9.4 percent drop in profitability for the years 2012–2013 compared to

[11] We have not done so to *Age* and *Size* since these two variables do not have significant changes on a year basis.

[12] A similar analysis was performed for micro firms, while the results are quantitatively equivalent.

Table 8
Panel Logistic Regression **Panel A:** Firm Characteristics and post-VAT years Panel B: Firm Characteristics, Government Debt and Domestic credit.

Variable	Models			
	1	2	3	4
Size	**0.240*** (-17.14)**	**0.231*** (-17.21)**	**0.238*** (-12.75)**	**0.211*** (-12.70)**
Age	**1.623*** (14.44)**	**1.649*** (14.50)**	**1.371*** (6.80)**	**1.401*** (6.77)**
CurrentLiabilities t-1	**1.073** (2.34)**	**1.076*** (2.37)**	**1.061* (1.84)**	**1.067* (1.79)**
Liquidity t-1	**0.999 (-0.02)**	**1.002*** (0.04)**	**1.042 (0.30)**	**1.076 (0.46)**
Year 2012/2013	**3.063*** (12.30)**		**3.200*** (9.75)**	
Year 2012	–	2.530*** (8.40)	–	2.762*** (7.34)
Year 2013	–	4.193*** (12.60)	–	5.335*** (11.22)
Constant	0.088*** (−7.32)	0.035*** (−8.73)	0.042*** (−6.40)	0.030*** (−6.56)
Observations	104,617	104,617	55,329	55,329
Groups	22,521	22,521	18,467	18,467
Wald Chi (2)	454.82***	556.99***	256.16***	269.71***
Time Period	2003–2013	2003–2013	2010–2013	2010–2013

	Firm Characteristics and Government Debt		Firm Characteristics and Domestic credit					
Variable	Models							
	1	2	3	4	5	6	7	8
Size	0.233*** (−17.21)	0.231*** (−17.21)	0.232*** (−12.68)	0.211*** (−12.70)	0.241*** (−17.13)	0.231*** (−17.21)	0.242*** (−12.73)	0.211*** (−12.70)
Age	1.642*** (14.45)	1.649*** (14.50)	1.380*** (6.82)	1.401*** (6.77)	1.621*** (14.44)	1.649*** (14.50)	1.369*** (6.84)	1.401*** (6.77)
CurrentLiabilities t-1	1.076** (2.38)	1.076*** (2.37)	1.062* (1.83)	1.067* (1.79)	1.073** (2.34)	1.076** (2.37)	1.060* (1.84)	1.067* (1.79)
Liquidity t-1	1.001 (0.01)	1.002 (0.04)	1.043 (0.30)	1.076 (0.46)	0.999 (−0.03)	1.002 (0.04)	1.039 (0.28)	1.076 (0.46)
Government Debt t-1 × Year 2012/2013	2.720*** (12.85)	–	2.857*** (10.11)	–	–	–	–	–
Government Debt t-1 × Year 2012	–	2.306*** (8.40)	–	2.495*** (7.34)	–	–	–	–
Government Debt t-1 × Year 2013	–	3.114*** (12.60)	–	3.769*** (11.22)	–	–	–	–
Credit t-1 × Year 2012/2013	–	–	–	–	1.728*** (12.24)	–	1.748*** (9.59)	–
Credit t-1 × Year 2012	–	–	–	–	–	1.573*** (8.40)	–	1.642*** (7.34)
Credit t-1 × Year 2013	–	–	–	–	–	2.039*** (12.60)	–	2.298*** (11.22)
Constant	0035*** (−8.73)	0.035*** (−8.73)	0.039*** (−6.45)	0.030*** (−6.56)	0.039*** (−8.61)	1.573*** (8.40)	0.044*** (−6.36)	0.030*** (−6.56)
Observations	104,617	104,617	55,329	55,329	104,617	104,617	55,329	55,329
Groups	22,521	22,521	18,467	18,467	22,521	22,521	18,467	18,467
Wald Chi (2)	555.14***	556.99***	255.21***	269.71***	539.64	556.99	253.37	269.71
Time Period	2003–2013	2003–2013	2010–2013	2010–2013	2003–2013	2003–2013	2010–2013	2010–2013

2010–2011. Finally, in model 3, we re-estimate the impact excluding years 2003–2005 (inclusive) from the analysis. This period was analysed to control whether the early years of the sample with fewer observations, in contrast to the recent years, could affect the outcomes.[13] The findings are very similar (9.1 and 9.4 percent). Therefore, we have shown that the first three years of the sample do not influence the overall results.

The sample consists of 119,829 firm-year observations for Portugal, on ORBIS database over the period 2003–2013. $Profit_{i,t}$(dependent variable) is the EBITDA (Earnings before interest, taxes, depreciation and amortization) over Total Assets of firm *i* in year *t*. $SIZE_{i,t}$is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,t}$is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,t}$is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,t}$ is defined as working capital over total assets of firm *i* in year *t*. *GOVERNMENT DEBT_GDPt-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. *FCrisis* is a binary variable equal to one if year are 2008 and 2009 and zero otherwise. VAT is a binary variable equal to one if years are 2012 and 2013 and zero otherwise. Based on Hausman test fixed-effects estimations are reported. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

4.4.2. Portugal and Spain: Food and beverage service activities

Next, we extend the difference-in-difference estimation between Portugal and Greece performed in Table 6 to Spain, a country where the tourism industry is very important. Spain has also gone through European sovereign debt crisis and faced similar economic difficulties as Portugal and Greece. The Spanish Government underwent through two reforms of the VAT change which affected hotels, bars and restaurants. In July 2010 they raised the VAT from 7% to 8% and in September 2012 another 2 points until it reached 10%. We took this into consideration and implemented the difference-in-difference estimation with Spain being the treatment group and Greece as a control group. Similar to Portugal, the results indicate a negative impact of the VAT rise on Spanish firm profitability, however at a lesser extent, 1.5%, due to the smaller VAT change (statistically significant at1 percent level).[14] This analysis aims to highlight that results for Portugal deviate from the pattern of other South European countries. Table 10 summarises the

[13] One possible reason is that the online version of ORBIS only allows data collection for the last ten years. Therefore, one additional year is added to a particular firm for the observations for the first-year drop (for the firms with more than 10 years of available data).

[14] Results available upon request.

Table 9
Multivariate Regression Results for different time periods.

Variables	PORTUGAL		
	Models		
	1	2	3
Size	0.022*** (8.59)	0.151*** (34.53)	0.064*** (28.61)
Age	0.024*** (6.14)	0.017** (2.56)	0.021*** (6.54)
Current Liabilities	0.016*** (14.89)	−0.006*** (−4.63)	−0.006*** (−6.43)
Liquidity	0.032*** (16.86)	0.116*** (15.60)	0.021*** (11.38)
Government Debt_GDP t-1	−0.244*** (−6.54)	−0.173*** (−9.93)	−0.152*** (−20.78)
Credit_Financial_Sector t-1	−0.033* (−1.93)	−0.050*** (−3.39)	−0.007*** (−4.53)
Fcrisis	−0.017*** (−10.19)	–	
VAT	–	−0.094*** (−22.73)	−0.091*** (−23.91)
Constant	0.116*** (7.77)	−0.521*** (−12.73)	−0.079*** (−5.68)
Observations	56,533	51,946	92,341
Firms	16,539	17,027	19,463
R-Squared	0.0342	0.1145	0.0966
	Fixed Effects	Fixed Effects	Fixed Effects
Hausman Test	784.71***	1256.80***	984.37***
Time Period	2003–2010	2010–2013	2006–2013

Table 10
Number of firm-year observations (Spain - Food and beverage service activities).

	SPAIN				
	Micro	*Small*	*Medium*	*Large*	*TOTAL*
2003	19,631	1,715	431	118	21,895
2004	23,531	1,831	471	138	25,971
2005	22,329	1,999	511	151	24,990
2006	24,718	2,257	565	87	27,627
2007	22,941	2,225	570	167	25,903
2008	26,153	2,394	575	175	29,297
2009	27,229	2,490	635	184	30,538
2010	27,295	2,552	633	201	30,681
2011	27,697	2,581	652	203	31,133
2012	24,750	2,399	589	167	27,905
2013	29,242	2,235	517	144	32,138
TOTAL	275,516	24,678	6,149	1,735	308,078

number of firm-year observations for micro, small, medium and large firms. The data was as well collected from ORBIS following the same sample selection as per Portugal and Greece.

The table reports the number of firm-year observations per year for "*Food and beverage service activities*" in Spain for the period 2003–2013. Micro, Small, Medium and Large size firms are according to the European Commission Recommendation 2003/361/EC.

The sample for Spain is composed of 59,841 unique firms where the number of year-observations per firm is 5.1, on average (equal to Portugal). Similar to the sample for Portugal and Greece, micro firms represent the biggest share, close to 96 percent of the firms. Table 11 displays the outcomes from the difference-in-difference estimation performed for Portugal and Spain, which controls for the impact of the financial crisis and the VAT increase on firm profitability (the pre- and post-VAT differences). The variable *FCrisis* shows that, on average, Portuguese and Spanish firm profitability dropped between 1.7 and 2.8 percent during the period of the financial crisis.

However, we can deduce from the variable *Control_Fcrisis* (which captures the average difference in profitability for Portuguese firms in 2008 and 2009 in comparison to Spanish firms) that Portuguese firms performed better during the financial crisis than their Spanish counterparts (statistically significant at 1 percent level). In terms of the VAT impact, the results support the ones presented in Table 6 and show that the years 2012 and 2013 were, in general, the worst in terms of firm profitability to both countries (variable *VAT*) vis-à-vis other years.

Table 11
Difference-in-difference estimation (Portugal and Spain).

Variables	PORTUGAL and SPAIN	
	Models	
	1	2
Size	−0.000 (−0.98)	0.004*** (11.32)
Age	0.002*** (6.94)	0.001 (1.01)
Current Liabilities	−0.001*** (−4.48)	−0.001*** (−3.29)
Liquidity	0.000*** (3.01)	0.001** (2.76)
Government Debt_GDP t-1	−0.210*** (−37.51)	−0.066*** (−11.89)
Credit_Financial_Sector t-1	−0.015*** (−11.15)	−0.073*** (−8.41)
Fcrisis	−0.028*** (−28.35)	–
Control_Fcrisis	0.011*** (9.33)	–
VAT	–	−0.013*** (−8.71)
Control_VAT	–	−0.049*** (−30.13)
Constant	0.174*** (86.96)	0.203*** (9.68)
Observations	311,974	177,309
Firms	71,136	63120
R-Squared	0.0378	0.0496
Time Period	2003–2011	2010–2013

The sample consists of 119,829 and 308,078 firm-year observations for Portugal and Spain, respectively, on ORBIS database over the period 2003–2013. $Profit_{i,t}$(dependent variable) is the EBITDA (Earnings before interest, taxes, depreciation and amortization) over Total Assets of firm *i* in year *t*. $SIZE_{i,t}$is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,t}$is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,t}$is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,t}$ is defined as working capital over total assets of firm *i* in year *t*. *GOVERNMENT DEB*T_GDP*t-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECTORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. Country is a binary variable equal to one if Portugal and zero if Spain. *FCrisis* is a binary variable equal to one if year are 2008 and 2009 and zero otherwise. *Control_FCrisis* is calculated as the product between variable country and FCrisis. VAT is a binary variable equal to one if years are 2012 and 2013 and zero otherwise. *Control_VAT* is calculated as the product between variable country and *VAT*. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

As in the analysis with Greece, the negative coefficient for the variable *Control_VAT* shows an average decrease in profitability of Portuguese relative to Spanish firms, statistically significant at 1 percent level for the years 2012–2013. It is important to notice (additionally to Table 6) that profitability levels in Portuguese firms began to drop in 2012 compared to both Greece and Spain. We claim that this fall in profitability should be attributed to the introduction of the new VAT rate in Portugal. It is a single and distinctive difference among the three countries after controlling for firm characteristics and macroeconomic factors. Additionally, the profitability levels drop in Portuguese firms is of lesser magnitude when Spain is used as a control group, more likely due to VAT changes implemented in Spain, as discussed previously.

4.4.3. Portugal: Services activities vs manufacturing (Food and beverages)

In this section, we apply an additional control group for our analysis but in this case for Portugal. In doing so, we control for possible bias that may arise from different macroeconomic conditions among countries (even though it is controlled by macroeconomic factors in different model specifications). Thus, we use *Manufacturing of Food and Beverages firms* as this sector is related to Food and Beverages activities and was not affected by the VAT change.

Our sample consists of 6,578 unique firms and 42,010 firm year

observations for the period 2003–2013. The data is collected from the Orbis database, as previously, for micro, small, medium and large firms. Table 12 provides a data summary. As it can be seen below, similarly to the sample of firms in Food and Beverage activities, the data for Manufacturing Food and Beverages sector is tilted toward micro firms (83.24% versus 94.33% in Food and Beverage services sector, Table 1).

The table reports the number of firm-year observations per year for "*Manufacturing Food and beverage*" in Portugal for the period 2003–2013. Micro, Small, Medium and Large size firms are according to the European Commission Recommendation 2003/361/EC.

Table 13 provides a similar analysis previously undertaken in Greece and Spain as control samples. The results show a strong impact on Portuguese firm profitability in *Food and Beverages Services sector* in the years 2012–2013 following the VAT increase. Thus, firm profitability dropped by 3.6 percent in comparison to the *Manufacturing Food and Beverages sector* (model 2, variable Control VAT) with the highest effect occurring in the first year after the VAT change implementation (4.4 percent for 2012 and 2.7 percent in year 2013). Thereby, this subsection confirms the previous evidence and documents a substantial drop in firm profitability following the VAT change, even when other control samples are used (Spain and Portugal *Manufacturing Food and Beverages*).

The sample consists of 119,829 and 42,010 firm-year observations for Portugal Food and Beverage Services activities and Manufacturing Food and Beverages, respectively, on ORBIS database over the period 2003–2013. $Profit_{i,\,t}$(dependent variable) is the EBITDA (Earnings before interest, taxes, depreciation and amortization) over Total Assets of firm *i* in year *t*. $SIZE_{i,\,t}$is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,\,t}$is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,\,t}$is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,\,t}$ is defined as working capital over total assets of firm *i* in year *t*. *GOVERNMENT DEB*T_GDP*t-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECTORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. Sector is a binary variable equal to one if Food and Beverage Services activities and zero otherwise. *FCrisis* is a binary variable equal to one if year are 2008 and 2009 and zero otherwise. *Control_FCrisis* is calculated as the product between variable sector and FCrisis. VAT is a binary variable equal to one if years are 2012 and 2013 and zero otherwise. *Control_VAT* is calculated as the product between variable sector and *VAT*. *Control_VAT2012 and Control_VAT2013 are* calculated as the product between variable sector and *if year 2012 and 2013, respectively*. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

4.4.4. Matched Samples

It can be argued that the Portuguese, Greek and Spanish sample firms are of different size (e.g. more micro and small firms in Portugal than in Greece). Alternatively, one can claim that firm profitability was already in decline before the application of the new VAT rate for Food and Beverages Services activities in Portugal. We extend our analysis by pairing Portuguese, Greek and Spanish firms (food and beverage services) and Portuguese firms (manufacturing of food and beverages sector with food and beverage services) by size and average profitability in the 3 years before the implementation of the new VAT rate in Portugal.

We match firm pairs by assigning one firm to a "treatment group" (Portuguese firms) and another unique firm to a "control group" (Greek and Spanish firms *Food and Beverage Services* sector and Portuguese firms *Manufacturing of Food and Beverages sector*). The requirement for this analysis is to have full 5 years of data (from 2009 to 2013) for each firm in treatment and control samples (balanced data sample).

Table 14 provides results for Greek matched sample (Panels A and B) with the following information. Panel A reports the mean profitability for both groups, treatment and control, (2009–2011, before the VAT change in Portugal) and the number of unique firms. As we can observe, all firm's mean values for the period 2009–2011 are statistically significant and we cannot reject (Wilcoxon rank sum test) the hypotheses that the values of average profitability for Portugal and Greece for each firm size are equal. Therefore, we can state that Portuguese and Greek firms are comparable. However, we can observe that the results are statistically different for the same unique firms for the period 2012–2013, where the average profitability of Portuguese firms dropped for all size groups. The same or equivalent drop was not observed in Greek firms. In contrast, the average profitability in all size groups, except micro firms, increased. Thus, we can reject the hypotheses that for the period 2012–2013 the average profitability in Portuguese firms in each size group is statistically equal to the Greek matched sample (at 1 percent significance level).

This is a very important result, confirming that the fall in profitability of Portuguese firms for the period 2012–2013 is not due to their

Table 12
Number of firm-year observations (Portugal - Manufacturing Food and beverage).

	Manufacturing – Food and Beverages				
	Micro	Small	Medium	Large	Total
2003	995	248	100	33	1,376
2004	996	266	104	36	1,402
2005	1,211	311	112	40	1,674
2006	3,563	457	162	44	4,226
2007	3,907	468	166	43	4,584
2008	4,011	498	172	45	4,726
2009	4,066	502	184	47	4,799
2010	4,094	509	201	54	4,858
2011	4,053	499	206	57	4,815
2012	4,051	493	198	56	4,798
2013	4,023	478	197	54	4,752
TOTAL	*34,970*	*4,729*	*1,802*	*509*	*42,010*

Table 13
Difference-in-difference estimation (Portugal - Services Activities vs. Manufacturing).

Variables	PORTUGAL (services activities vs manufacturing (Food and Beverages)		
	1	2	3
Size	0.003*** (5.21)	0.025*** (32.62)	0.025*** (32.62)
Age	0.0127*** (18.10)	0.003*** (2.86)	0.003*** (2.86)
Current Liabilities	−0.017*** (−31.69)	−0.016*** (−26.87)	−0.016*** (−26.90)
Liquidity	0.007*** (7.82)	0.017*** (5.87)	0.017*** (5.90)
Government Debt_GDP t-1	−0.139*** (−7.91)	0.033*** (3.89)	−0.037*** (−2.24)
Credit_Financial_Sector t-1	−0.041*** (−4.85)	−0.157*** (−14.37)	−0.104*** (−6.79)
Fcrisis	−0.001 (−0.54)	–	–
Control_Fcrisis	−0.013*** (−6.72)	–	–
VAT	—	−0.044*** (−13.88)	−0.025*** (−5.16)
Control_VAT	—	−0.036*** (−14.95)	–
Control_VAT 2012	—	–	−0.044*** (−15.16)
Control_VAT 2013	—	–	−0.027*** (−9.20)
Constant	0.196*** (39.66)	.1804878 (8.64)	.1375629 (6.08)
Observations	117,972	74,786	74,786
Firms	26,360	24,585	24,585
R-Squared	0.0389	0.1033	0.1036
Time Period	2003–2011	2010–2013	2010–2013

Table 15
Difference-in-difference estimation (Portugal and Greece), matched samples.

EBITDA	Micro	Small	Medium	Large	All
Size	0.0278*** (6.68)	−0.0031 (−0.72)	−0.0003 (−0.03)	0.0066 (0.47)	−0.0052* (−1.86)
Age	0.0007 (0.19)	0.0060** (2.59)	.0023801 (0.70)	0.0002 (0.03)	−0.0006 (−0.27)
Current Liabilities	−0.0894*** (−16.15)	−0.0135** (−2.26)	0.0076 (0.52)	−0.0351 (−1.27)	−0.0884*** (−21.40)
Liquidity	0.0163 (1.59)	0.0271*** (3.39)	−0.010 (−0.56)	0.1359** (2.24)	0.0226*** (3.08)
Government Debt_GDP t-1	0.0288 (1.32)	0.0503*** (6.49)	−0.0119 (−0.32)	−0.1810 (0.34)	0.0280** (1.99)
Credit_Financial_Sector t-1	−0.0253*** (−4.68)	−0.0309 (−1.62)	0.0121 (0.47)	0.0208 (0.34)	−0.0074 (−0.35)
VAT	−0.0728*** (−7.03)	−0.0040 (−1.08)	0.0141 (1.58)	0.0210 (0.94)	−0.0204*** (−4.27)
Control_VAT	−0.0404*** (−4.82)	−0.0263*** (−8.84)	−0.0212*** (−2.91)	−0.0442** (−2.28)	−0.0419*** (−8.37)
Constant	0.2554*** (3.00)	0.0472 (1.04)	0.4584 (0.46)	−0.0276 (−0.16)	0.0635** (1.99)
Unique Firms/#obs	1,280/5,120	634/2,536	168/672	56/224	2,138/8,552
R-Squared	0.1644	0.0649	0.0357	0.1478	0.1260
Time Period	2010–2013	2010–2013	2010–2013	2010–2013	2010–2013

Table 14
Matched Sample Portugal/Greece (*Food and Beverage Services Activities)* Panel A: Average Profitability before and after VAT increase Panel B: Average Profitability (years after VAT change).

	2009–2011			Unique firms	2012–2013		
EBITDA	Mean		wilcoxon		Mean		wilcoxon
	Portugal	Greece			Portugal	Greece	
Micro	0.080*** (24.49)	0.080*** (25.95)	−0.269	1,280	−0.016*** (−2.62)	0.036*** (7.32)	11.060***
Small	0.052*** (24.93)	0.055*** (31.49)	1.941*	634	0.037*** (14.03) (	0.060*** (26.20)	7.148***
Medium	0.041*** (12.82)	0.044*** (14.89)	1.41	168	0.030*** (4.51)	0.057*** (14.24)	3.586***
Large	0.042*** (4.56)	0.037*** (9.64)	1.36	56	0.012 (1.18)	0.053*** (9.92)	4.178***
	2012			Unique firms	2013		
EBITDA	Mean		wilcoxon		Mean		wilcoxon
	Portugal	Greece			Portugal	Greece	
Micro	−0.030*** (−3.17)	0.024*** (4.08)	6.732***	1,280	−0.002 (−0.26)	0.049*** (6.11)	8.909***
Small	0.034*** (8.80)	0.052*** (17.79)	4.255***	634	0.041*** (11.13)	0.068*** (19.59)	5.943***
Medium	0.030*** (3.70)	0.048*** (9.33)	2.078**	168	0.030*** (2.84)	0.065*** (10.95)	3.023***
Large	0.014 (1.14)	0.044*** (6.43)	2.507**	56	0.009 (0.60)	0.062*** (7.78)	3.277***

different size (as controlled by the control matching sample) or different profitability trend in the previous 3 years before the adoption of new VAT. In Panel B, we analyse the post VAT years, 2012 and 2013, independently. Again, strong statistical significance confirms that Portuguese firms underperformed their Greek counterparts in both 2012 and 2013 years, with a more significant drop in firm profitability observed in the first year (2012). Hence, this finding confirms the previous results in Table 6.

We further analyse the impact of VAT change by performing difference-in-difference estimations for each size group (micro, small, medium and large). Table 15 provides the results. After controlling for firm characteristics and lagged macroeconomic factors (Government debt and Domestic credit provided by financial sector) the results confirm that independently of the size group there is a strong and significant impact of VAT change (years 2012 and 2013) on Portuguese firm's profitability in comparison to Greek counterparts. Indeed, the fall in profitability is between 2.12 and 4.42 percent (medium and large firms, respectively) confirming the overall results presented in Table 6, model 2.

The results from the matched sample for Spain (*Food and Beverage Services*) are similar to the outcomes presented in the previous Tables 14 and 15 (panels A and B).[15] For all size groups (micro, small, medium and large) for the 2012–2013 period there is a statistically significant difference in the profitability mean values for Portugal and Spain. Portuguese firms have experienced a fall in profitability independent of the group's size, controlled by firm characteristics and macro factors. The highest decline is observed for micro firms with a 5.96 percent drop in comparison to Spanish firms. This sub-section shows that the matching sample methodology confirms the previous evidence of the substantial reduction in profitability of Portuguese firms occurring in the following years after the VAT change implementation. The highlighted impact on Food and Beverage services sector was not observed in Greece and Spain for the same time period.

4.4.5. Estimation of the impact of the global financial crisis and firm bankruptcy

Next, we analyse whether the probability of Portuguese firms becoming inactive increased during the financial crisis. The previous results (Table 8 panels A to C) clearly show in different model specifications a significantly higher impact of the VAT increase on the bankruptcy odds. Table 16 reports the results for the period 2003–2011 and 2006–2011. Panel A presents the outcomes when only firm characteristics as exogenous variables are used. Overall and for the different specifications, the financial crisis did not raise the risk of bankruptcy. Indeed, none of the variables *Year 2008/2009*, *Year2008* and *Year2009* are statistically significant. This reinforces the importance of the years 2012 and 2013 as presented in Table 8.

The sample consists of 132,269 firm-year observations (27,638 unique firms) from the food and beverage service activities (Portugal). $Inactive_{i,t}$(dependent variable) is equal to one if inactive (dissolved, bankruptcy or in liquidation) and zero otherwise *i* in year *t*. $SIZE_{i,t}$is defined as the natural logarithm of total assets of firm *i* in year *t*. $AGE_{i,t}$is measured as the natural logarithm of years since incorporation date of firm *i* in year *t*. $CurrentLiabilities_{i,t}$is defined as bank loans plus creditors plus other current liabilities over total assets of firm *i* in year *t*. $Liquidity_{i,t}$ is defined as working capital over total assets of firm *i* in year *t*. *Year 2008/2009* is a binary variable equal to one if years are 2008 and 2009 and zero otherwise. *Year 2008* and *Year 2009* are binary variables

[15] Note that equivalents of Tables 14 and 15 are available on Appendix A but are not reported here due to space constraints.

Table 16
Panel logistic regression Panel A: Firm characteristics and financial crisis Panel B: Firm characteristics and government debt Panel C: Firm characteristics and Domestic credit.

	2003 to 2011					2006–2011				
Variable	Models									
	1	2	3	4	5	6	7	8	9	10
Size	0.215*** (−14.19)	0.214*** (−14.20)	0.216*** (−14.19)	0.227*** (−14.10)	0.227*** (−14.11)	0.221*** (−13.81)	0.221*** (−13.81)	0.221*** (−13.80)	0.222*** (−13.80)	0.222*** (−13.80)
Age	1.926*** (15.65)	1.931*** (15.66)	1.923*** (15.64)	1.862*** (15.46)	1.865*** (15.48)	1.900*** (15.16)	1.896*** (15.16)	1.896*** (15.16)	1.891*** (15.14)	1.889*** (15.13)
CurrentLiabilities t-1	1.064 (1.59)	1.064 (1.59)	1.064 (1.58)	1.059 (1.51)	1.059 (1.52)	1.062 (1.59)	1.062 (1.58)	1.062*** (1.59)	1.062 (1.58)	1.061*** (1.57)
Liquidity t-1	0.980 (0.29)	0.981 (−0.28)	0.980 (−0.28)	0.975 (−0.37)	0.9759 (−0.36)	0.980 (−0.30)	0.979 (−0.31)	0.980 (−0.30)	0.979 (−0.31)	0.979 (−0.31)
Year 2008/2009	–	0.995 (−0.05)	–	–	–	–	0.960 (−0.43)	–	–	–
Year 2008	–	–	1.046 (0.41)	–	1.036 (0.32)	–	–	1.013 (0.12)	–	0.994 (−0.05)
Year 2009	–	–	–	0.932 (−0.60)	0.942 (−0.50)	–	–	–	0.925 (−0.66)	0.923 (−0.66)
Constant	0.024*** (−7.73)	0.024*** (−7.72)	0.024*** (−7.74)	0.0308*** (−7.53)	0.030*** (−7.54)	0.026*** (−7.58)	0.027*** (−7.52)	0.026 (−7.58)	0.0270*** (−7.53)	0.027*** (−7.50)
Observations	78,001	78,001	78,001	78,001	78,001	74,741	74,741	74,741	74,741	74,741
Groups	20,578	20,578	20,578	20,578	20,578	20,418	20,418	20,418	20,418	20,418
Wald Chi (2)	402.48	403.72	403.06	389.51	390.50	375.75	375.87	375.62	376.27	375.44

	2003 to 2011				2006–2011			
Variable	Models							
	1	2	3	4	5	6	7	8
Size	0.2846*** (−17.15)	0.288** (−17.09)	0.291*** (−17.08)	0.288*** (−17.10)	0.221*** (−13.80)	0.221*** (−13.80)	0.222*** (−13.80)	0.222*** (−13.80)
Age	1.518*** (14.39)	1.512*** (14.39)	1.5057*** (14.34)	1.511*** (14.37)	1.894 (15.15)	1.896*** (15.16)	1.891*** (15.14)	1.889*** (15.13)
Current Liabilities t-1	1.061*** (2.29)	1.060** (2.29)	1.059** (2.26)	1.060** (2.26)	1.062 (1.58)	1.0624 (1.59)	1.062 (1.58)	1.061 (1.57)
Liquidity t-1	1.014 (0.29)	1.018 (0.36)	1.014 (0.29)	1.012 (0.25)	0.979 (−0.31)	0.980 (−0.30)	0.979 (−0.31)	0.979 (−0.31)
Government Debt t-1 × Year 2008/2009	0.642*** (−3.90)	–	–	–	0.943 (−0.44)	–	–	–
Government Debt t-1 × Year 2008	–	0.803 (−1.53)	–	0.724** (−2.22)	–	1.020 (0.12)	–	0.991 (−0.05)
Government Debt t-1 × Year 2009	–	–	0.609*** (−3.37)	0.572*** (−3.72)	–	–	0.897 (−0.66)	0.894 (−0.66)
Constant	0.092*** (−7.09)	0.088*** (−7.28)	0.093*** (−7.19)	0.094*** (−7.10)	0.027*** (−7.52)	0.026*** (−7.58)	0.027*** (−7.53)	0.027*** (−7.50)
Observations	104,617	104,617	104,617	104,617	74,741	74,741	74,741	74,741
Groups	22,521	22,521	22,521	22,521	20,418	20,418	20,418	20,418
Wald Chi (2)	467.7	456.34	464.40	467.45	375.33	375.62	376.27	375.44

	2003 to 2011				2006 to 2011			
Variable	Models							
	1	2	3	4	5	6	7	8
Size	0.214*** (−14.20)	0.216*** (−14.19)	0.227*** (−14.10)	0.227*** (−14.11)	0.221*** (−13.81)	0.221*** (−13.80)	0.222*** (−13.80)	0.222*** (−13.80)
Age	1.930*** (15.65)	1.923*** (15.64)	1.862 (15.46)	1.865*** (15.48)	1.895*** (15.15)	1.896*** (15.16)	1.891*** (15.14)	1.889*** (15.13)
Current Liabilities t-1	1.064 (1.59)	1.064 (1.58)	1.059 (1.51)	1.059 (1.52)	1.062 (1.58)	1.062 (1.59)	1.062 (1.58)	1.062 (1.57)
Liquidity t-1	0.981 (−0.28)	0.980 (−0.28)	0.975 (−0.37)	0.976 (−0.36)	0.979 (−0.31)	0.980 (−0.30)	0.979 (−0.31)	0.979 (−0.31)
Credit t-1 × Year 2008/2009	0.996 (−0.08)	–	–	–	0.975 (−0.45)	–	–	–
Credit t-1 × Year 2008	–	1.028 (0.41)	–	1.022 (0.32)	–	1.008 (0.12)	–	0.996 (−0.05)
Credit t-1 × Year 2009	–	–	0.961 (−0.60)	0.967 (−0.50)	–	–	0.957 (−0.66)	0.956 (−0.66)
Constant	0.024*** (−7.72)	0.0242*** (−7.74)	0.031*** (−7.53)	0.030*** (−7.54)	0.027*** (−7.52)	0.026*** (−7.58)	0.027*** (−7.53	0.027*** (−7.50)
Observations	78,001	78,001	78,001	78,001	74,741	74,741	74,741	74,741
Groups	20,578	20,578	20,578	20,578	20,418	20,418	20,418	20,418
Wald Chi (2)	403.74	403.06	389.51	390.50	375.72	375.62	375.62	375.44

equal to one if years are 2008 or 2009 and zero otherwise. *GOVERNMENT DEB*T_GDP*t-1* is measured as Government Debt to GDP in year *t-1*. *CREDIT_FINANCIAL_SECTORt-1* is defined as Domestic credit provided by financial sector (percentage of GDP) in year *t-1*. Odds-ratios is reported. Superscripts indicate statistical significance at 0.01 (*), 0.05 (**) and 0.10 (***) percent levels.

Panels B and C present a similar analysis but interacting the lagged *Government Debt over GDP* and the percentage of *Domestic Credit* variables with the previously defined binary variables. The results are mixed. We observe that an increase of *Government Debt over GDP* in the years 2008–2009 has a negative statistically significant effect on the bankruptcy likelihood in comparison to any other single year (Panel B,

Table 17
Time trend analysis (Portugal, Greece, Spain).

	PORTUGAL			GREECE			SPAIN		
	Debt_GDP	Credit	EBITDA	Debt_GDP	Credit	EBITDA	Debt_GDP	Credit	EBITDA
Time/year	0.105*** (9.37)	0.092*** (5.81)	−0.019** (−4.08)	0.116*** (6.36)	0.074** (3.41)	−0.012*** (−6.27)	0.080*** (7.00)	0.108 (5.17)	−0.013*** (−8.21)
R-Squared	0.9461	0.8709	0.7690	0.8900	0.6995	0.8870	0.9073	0.8425	0.9310
D2006	0.132 (2.11)	0.083 (−0.68)	−0.030 (−0.90)	0.148 (1.16)	0.047 (0.27)	−0.023* (−2.17)	0.1606** (3.54)	−0.231 (−1.87)	−0.010 (−0.88)
D2007	0.013 (0.17)	−0.052 (−0.48)	0.005 (0.16)	−0.061 (−0.49)	−0.006 (−0.04)	0.007 (0.54)	−0.040 (−0.52)	−0.033 (−0.23)	0.021*** (6.41)
D2008	−0.075 (−1.20)	−0.002 (−0.02)	−0.006 (−0.20)	−0.103 (−0.96)	−0.054 (−0.39)	0.001 (0.08)	−0.082 (−1.33)	0.124 (1.02)	−0.008 (−0.84)
D2009	−0.055 (−0.83)	0.083 (0.90)	0.014 (0.48)	−0.038 (−0.33)	−0.134 (−1.11)	0.008 (0.73)	−0.011 (−0.15)	0.117 (0.97)	−0.008 (−0.81)
D2010	−0.060 (−0.90)	0.141 (1.85)	0.024 (0.86)	0.017 (0.15)	0.156 (1.32)	0.014 (1.35)	−0.034 (−0.47)	0.078 (0.59)	0.001 (0.08)
D2011	0.023 (0.29)	0.017 (0.15)	0.035 (1.31)	0.212** (2.97)	0.188 (1.58)	0.000 (0.00)	−0.024 (−0.30)	0.034 (0.23)	0.003 (0.29)
D2012	0.116 (1.65)	−0.117 (−2.08)	−0.073*** (−8.69)	−0.156 (−1.25)	−0.232 (−1.77)	−0.023 (−2.06)	0.122 (1.75)	−0.267** (−2.55)	0.001 (0.09)

period 2002–2011). This is an interesting result supporting the proposition that a rise of government debt during the financial crisis had a positive impact in diminishing the probability of bankruptcy. However, an opposite effect was observed in the years 2012–2013 (as reported in Table 8). The results were not confirmed when the sub-period 2006–2011 is analysed and there is no statistically significant evidence that an increased percentage of domestic credit will either increase or decrease the risk of bankruptcy.

4.4.6. Time trend analysis

In this final robustness analysis, we perform a time trend linear regression for the following variables: *Average Country Profitability, Government Debt over GDP and Domestic credit* provided by financial sector (percentage of GDP) to Portugal, Greece and Spain. Results are presented in Table 17 and strongly support a persistent upward pattern for both, *Government Debt to GDP and Domestic Credit over GDP*. The *Government Debt over GDP* increases between 11.6 and 8 percent for the period analysed (statistically significant at 1 percent level), on average. Similar results were obtained for *Domestic credit over GDP*. For the average profitability per country, our results show a downward time trend. Indeed, the average profitability dropped by 1.9 percent in Portugal compared to a 1.2 and 1.3 decline for Greece and Spain, respectively. In the next analysis, we control this upward/downward tendency per year (with the use of year dummies) to assess whether any unusual year of increased government debt and/or domestic credit is reflected in firm profitability. By doing so, we want to test whether the substantial decrease in firm profitability in Portugal in 2012 (statistical significant at 1 percent level) was accompanied by a similar statistical significant trend change in government debt and/or domestic credit factors in the same year or the year before.

The sample consists of 119,829, 34,066 and 308,078 firm-year observations for Portugal, Greece and Spain, respectively, on ORBIS database over the period 2003–2013. $EBITDA_t$is the average Earnings before interest, taxes, depreciation and amortization over Total Assets in year *t*. *DEB*T_GDP is measured as Government Debt to GDP in year *t*. *CREDIT* is defined as Domestic credit provided by financial sector (percentage of GDP) in year. D2006 to D2012 are year binary variables. Superscripts indicate statistical significance at 0.01 (***), 0.05 (**) and 0.10 (*) percent levels.

The results clearly show that none of the year binary variables is statistically significant for government debt and domestic credit trend. Except for the year 2012, the binary variable for the average profitability, which is negative and strongly statistical significant. Thus, for Greece and Spain we cannot observe any abnormal year in firm profitability similar to Portugal. Therefore, based on the results, we conclude that the significant drop in firm profitability in Portugal in 2012 was not driven by a substantial abnormal trend change in the government debt and/or domestic credit.

5. Conclusion

In this paper, we estimate the impact of the 10% VAT increase on the food and beverages sector in Portugal, implemented in January 2012, on Portuguese firm's profitability and firm survival. This study aims to measure the evident policy impact which can be used to anticipate/project possible consequences of a similar to the proposed VAT change in Greece. The sample is composed of 23,388 Portuguese and 4,969 Greek unique firms with 5.1 and 6.9 year-observations per firm for Portugal and Greece, on average and respectively.

The data was collected from the ORBIS database for the period from 2003 to 2013. Additional control samples, a Spanish control group that includes 59,841 unique firms and 308.078 firm-year observations, and a different Portuguese sector control group (Manufacturing of Food and Beverages) with 6,578 unique firms and 42,010 firm year observations were used for robustness checks. The analysis has been performed for 3 sub-periods: before and after the VAT raise and during the financial crisis.

Our findings show that the negative impact of 10% VAT rise on firm profitability in Portugal was even stronger than during the financial crisis; a 8.7% drop in EBITDA in 2012 versus 1.15% in 2008–2009. The inclusion of such variables as *Government Debt* over GDP and *Domestic Credit* provided by financial sector as a percentage of GDP have reconfirmed that a significant drop of firm profitability in Portugal was not due to a substantial abnormal increase of the government debt and/or domestic credit. Moreover, it indicated that the highest impact of the VAT change on Portuguese firm profitability was observed in the year after the implementation of the VAT reform.

In addition, our results show that the VAT change significantly affects the Portuguese firm survival rate. Thus, in the years following the implementation, the ratio of inactive versus active firms reached 8.1% and 9% for years 2012 and 2013, respectively. The effect was the strongest across all the years analysed, even when compared to the effect of the financial crisis. These outcomes have confirmed the facts discussed by Esteves (2014). The test for the likelihood of a firm to become inactive showed that such dramatic VAT change, as was shown in Portugal in 2012, amplifies by 3.063 times the probability of a firm going bankrupt.

To confirm the results of our analysis, we have run numerous robustness checks. Thus, the difference-in-difference estimator for all alternative model specifications with Greece and Spain acting as a control group reconfirmed the negative impact of the VAT reform on Portuguese firm's profitability. The matching sample methodology as well as the introduction of additional macroeconomic and firm specific variables showed that the results and the pattern observed in years 2012–2013 in Portugal cannot be explained by the country macroeconomic conditions and were unique compared to other South European countries. The difference-in-difference estimation for Portuguese manufacturing food and beverages sector as an additional control group highlighted that the afore-mentioned effect during the 2012–2013 period was observed only for the food and beverages services sector. Based on the above, we posit that the negative impact on Portuguese firm profitability should be attributed to the exogenous shock caused by the massive VAT rate increase in Portugal. The negative impact of the VAT rise on firm profitability was also observed for Spain (when used as a treatment group versus Greece as a control group); however, to a lesser extent as the VAT change in Spain was smaller and more gradual.

Overall, our analysis shows that a significant VAT change may substantially affect the tourism industry. The example of Portugal reveals that the 10% VAT change implemented in January 2012 have led to a significant decrease in firm profitability and a rise of inactive/bankrupt firms in the following years. Considering the similarities in cultural and macroeconomic characteristics, the recently proposed VAT rate in Greece may provoke similar outcomes. These results are of significant importance for policy makers and should be taken into consideration by the Greek and Portuguese government before taking the next step of government intervention in the tourism sector. This study hence explains/represents the evident policy impact which can be applied not only to Greece, but also to other countries considering a significant change in VAT rates. Even though this research provides strong and robust evidence of the considerable negative impact of the Portuguese VAT reform on firm profitability, it is important to note that the magnitude of the impact could be affected by uncontrollable factors.

Author's contribution

Both authors, Professor Cesario Mateus and Dr. Irina B. Mateus contributed equality in the elaboration of this article as well in all the review rounds.

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tourman.2020.104234.

Appendix A

Table A1
Matched Sample Portugal/Spain (*Food and Beverage Services Activities)* Panel A: Average Profitability – before and after VAT increase Panel B: Average Profitability - -years after VAT change

	2009–2011				2012–2013		
EBITDA	Mean		wilcoxon	Unique firms	Mean		wilcoxon
	Portugal	Spain			Portugal	Spain	
Micro	0.076***	0.079***	12.936***	7,194	−0.023***	0.0447***	38.032***
Small	0.051***	0.059***	1.752*	320	0.039***	0.058***	3.281***
Medium	0.049***	0.048***	0.224	626	0.031***	0.050***	3.694***
Large	0.029***	0.029***	1.120	68	0.010***	0.058***	3.747***
	2012				2013		
EBITDA	Mean		wilcoxon	Unique firms	Mean		wilcoxon
	Portugal	Spain			Portugal	Spain	
Micro	−0.024***	0.047***	29.348***	7,194	−0.021***	0.042***	24.452***
Small	0.035***	0.055***	2.765***	320	0.0440***	0.061***	1.873**
Medium	0.027***	0.048***	3.259***	626	0.036***	0.052***	1.981**
Large	0.011	0.047***	2.330**	68	0.008	0.068***	2.956***

Table A2
Difference-in-difference estimation (Portugal and Spain) – matched samples

EBITDA	Micro	Small	Medium	Large
Size	0.0053*** (9.25)	−0.0017 (−1.18)	−0.0010 (−0.79)	−0.0005 (−0.11)
Age	−0.0020*** (−2.89)	0.0002 (0.13)	−0.0004 (−0.32)	0.00200 (0.33)
Current Liabilities	−0.0001 (−1.02)	−0.0055** (−2.38)	−0.0055** (−2.33)	−0.0135 (−1.07)
Liquidity	−0.0006 (−0.62)	0.0145*** (2.47)	0.0137*** (2.73)	−0.0514* (−1.87)
Government Debt_GDP t-1	−0.0353*** (−4.83)	0.0455*** (3.16)	0.0368*** (2.92)	0.0474 (0.80)
Credit_Financial_Sector t-1	−0.1019*** (−9.35)	−0.0098 (−0.46)	−0.0190 (−1.02)	−0.0401 (−0.46)
VAT	−0.0178*** (−8.54)	−0.0108*** (−2.62)	−0.0045 (−1.26)	0.0187 (1.11)
Control_VAT	−0.0596*** (−29.57)	−0.0132*** (−3.33)	−0.0219*** (−6.31)	−0.0488*** (−2.98)
Constant	0.3133*** (12.02)	0.0664 (1.29)	0.0791* (1.75)	0.1140 (0.54)
Unique Firms/# obs	14,386/59,344	640/3,200	626/2,504	68/272
R-Squared	0.1215	0.0199	0.0360	0.1290
Time Period	2010–2013	2010–2013	2010–2013	2010–2013

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