



DOI: 10.26417/ejes.v4i3.p28-51

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Pecking Order and Trade – off Capital Structure Theories in the European Countries Supported by European Stability Mechanism

Georgios Chatzinas

PhD Candidate of the Department of Accounting & Finance University of Macedonia, Greece

Maria Markopoulou

Doctor of Accounting & Finance University of Macedonia, Greece

Simeon Papadopoulos

Assistant Professor, Department of Accounting & Finance, University of Macedonia, Greece

Abstract

The financial assistance provided by European Stability Mechanism during the recent European crisis was accompanied with severe austerity measures and strict reforms that changed significantly the economic environment in the countries that accepted it. The present study examines whether these changes affected the capital structure of the European firms in these countries. Using accounting data for firms in Cyprus, Greece, Ireland and Portugal, the researchers created a balanced panel database and applied the Shyam-Sunders and Myers (1999) methodology to investigate whether pecking order or trade-off hypotheses can better explain the financing decision of the firms in these countries during the period before and after the outset of the ESM financial assistance. The results indicate that the firms' capital structure decisions are explained by both theories in Greece, Cyprus and Portugal before the beginning of the EMS program, while only by trade-off in Ireland. On the other hand, after the beginning of the ESM program the firms' capital structures are better explained by trade-off hypothesis in Greece and Cyprus, while nothing changed in cases of Ireland and Portugal. The fact that Greek and Cypriot tax rates increased the most among the four examined countries may explain at least partially the above differentiations. So, the economic environment is a primary factor that affects the explanatory power of each capital structure theory. Moreover, a change in economic environment may lead to a change in the dominant capital structure theory.

Keywords: Capital Structure, Trade-Off, Pecking Order, Cyprus, Greece, Ireland, Portugal, European Stability Mechanism

1. Introduction

The ways that a firm chooses to finance its investments and the way that this selection influences the firm's value is the subject of a capital structure theory. Alternatively, a capital structure theory defines the ways that the mix of different capital sources affects the value of a firm as well as provides the reasons why these impacts exist (Grinblatt and Titman, 2002). Capital structure theories have been continuously in the center of interest for corporate finance theoretical scientists and practitioners since the introduction of Modigliani and Miller theorems in 1958 and 1963. These theorems set the basis for the development of various capital structure theories, such as Trade – Off theory, Pecking Order theory, Asymmetry Information theory, Signaling theory and Market Timing theory (Bradley et al, 1984).

The present study investigates the two basic competing capital structure theories that are Trade – Off and Pecking Order theories. The first one supports that firms determine an optimal capital structure that try to achieve. This optimal capital

structure is the one that minimizes the weighted average cost of capital of the firm and maximizes its value (Smart et al, 2004). On the other hand, the second theory supports that no optimal capital structure exists, but the firms are financed taking into account the level of each capital source's cost preferring cheaper to more expensive sources (Grinblatt and Titman, 2002).

There are numerous surveys that investigate which of these two capital structure theories are present in economies all over the world. However, their results are contradictory. In this study, this contradiction is taken into consideration based on the fact that there are researchers claiming that both theories can partially explain the firms' capital structure changes and that the two theories are not mutually exclusive (Chatzinas & Papadopoulos, 2018; Serrasqueiro & Caetano, 2015; Rahman and Arifuzzaman, 2014; Sogorb-Mira & Lopez-Gracia, 2003; Zhang & Kanazaki, 2007). Moreover, there are researchers who found that the managers' decisions on the firms' capital structure depend on the economic conditions of each country (Chatzinas & Papadopoulos, 2018; Banerjee, 2017). Based on this last proposition, the originality of the present study comes from the fact that it aims at investigating the explanatory power of trade – off and pecking order theories in countries with significantly changing economic conditions. These countries are Greece, Ireland, Portugal and Cyprus, which are the European countries that were fully supported by the European Stability Mechanism (ESM) during the recent European crisis. Spain was also supported by the ESM but only partially and this is the reason why it is excluded. Specifically, the present study used accounting data for 135 non financial and non utilities firms that are based in Cyprus, Greece, Ireland, and Portugal during a period that begins in 2006 and ends in 2016. Using the Shyam-Sunders and Myers (1999) methodology, the results indicated that the economic environment is a primary factor that affect the explanatory power of each capital structure theory as well as that a change in economic environment may lead to a change in the dominant capital structure theory only under specific conditions.

Finally, the remainder of the present study is organized as follows: Section 2 displays comprehensively and concisely the basic points of trade – off and pecking order capital structure theories as well as the results of previous researches worldwide and the impact of crises in their predictions. Section 3 describes the economic environment of the four examined countries during the investigated period and previous researches' findings on the firms' capital structure of each country. Section 4 presents the scope, the research questions and hypotheses, the sample, the Shyam-Sunders and Myers (1999) methodology and the results of the present study followed by the necessary discussion. Finally, section 5 summarizes the basic conclusions of the total research and ideas for future researches are proposed.

2. Literature Review

Trade – off theory supports that there is an optimal capital structure that minimizes the firm's weighted average cost of capital and maximizes its value (Smart et al, 2004). This optimal capital structure is the targeted one by each manager and results from the fact that an increase in debt creates both advantages and disadvantages (Attiyet, 2012). The advantages of debt include the tax benefits of the interests paid (Modigliani & Miller, 1963) and the decreases of the costs of managers-shareholders agency conflicts (Jensen & Meckling, 1976). Specifically, the more the debt, the more the interests and the less the taxes paid by the firm. In the same way, the more the debt, the less the firm's profit which leads to lower managers' compensation moderating the conflicts between the shareholders and the managers. However, personal taxes (Miller, 1977) and non-debt tax shields such as amortizations (DeAngelo & Masulis, 1980) may distort the level of these advantages. On the other hand, the disadvantages of debt include the increase of financial distress risk (Modigliani & Miller, 1963) and the increase of the cost of debtors-shareholders conflicts (Jensen & Meckling, 1976). Specifically, the more the debt, the more the interests are leading to a situation of a possible financial distress. Moreover, the more the debt, the more part of the profit that claim the debtors is at the expense of the shareholders intensifying the costs of debtors-shareholders conflicts. Consequently, the managers have to find the optimal capital structure which is determined by the level of debt that the marginal cost of debt is equal to its marginal benefit (Cortez & Suzanto, 2012). Alternatively, the optimal capital structure is defined by the level of debt that the disadvantages of debt are counterbalanced by its advantages (Jahanzeb et al, 2014).

Pecking order theory suggests that the firms do not have an optimal capital structure, but the mix of funds is determined by the preferences of the managers, which are determined by the cost of each capital source. Specifically, the first reference to this theory was made by Donaldson in 1961 who claimed that “managers prefer funding investment, first, with retained earnings, second, after the supply of retained earnings has been exhausted, with debt and finally, when it is imprudent for the firm to borrow additional amounts, by issuing outside equity” (Grinblatt & Titman, 2002). The pecking order hypothesis was introduced by Myers (1984). Myers (1984) based on asymmetric information problems claimed that the firms prefer internal funds to external ones, while they prefer issuance of debt to issuance of stocks if the use of external funds is necessary. The reasons why they prefer internal to external funds is located on the fact that external funds usually require

high flotation cost and disclosure of additional financial information about the perspectives of the firm, which the managers do not want to make public (Niu, 2008). On the other hand, the preference of debt to equity issuance may be found on the fact that the equity issuance provides management rights to the new shareholders. This provision restricts the willingness of the existing shareholders to finance investments using equity issuance since they wish to retain the control of the firm (Niu, 2008). Moreover, this hierarchy is also explained in terms of risk (Myers & Majluf, 1984). The firms prefer safer sources to riskier sources resulting in preferring internal funds to external and debt to equity.

Many researchers have investigated the behavior of firms' capital structure aiming at detecting whether pecking order or trade – off hypothesis can better explain this behavior, but their results are contradictory. Using various methods, some of them conclude that pecking order hypothesis is dominant (Macas Nunes & Serrasqueiro, 2017; Trinh et al, 2017; Pacheco, 2016; Balios et al, 2016; Atiyet, 2012; Sheikh et al, 2012; Vijayakumar, 2011), while others support the superiority of trade – off theory over pecking order hypothesis (Sardo & Serrasqueiro, 2017; Rossi et al, 2015; Wang, 2013). Below, some of these surveys are presented, while a much more detailed presentation may be seen in Martinez et al (2018). Trinh et al (2017) conducted a survey for Vietnamese small and medium firms for the period 2003-2009 and found that pecking order have greater explanatory power than trade – off. Atiyet (2012) using a sample of 88 French companies supported that fund deficit is the major factor that drives the behavior of their capital structures for the period 1999-2005. This result favored pecking order. Sheikh et al (2012) examined whether pecking order hypothesis influenced the Pakistani firms' capital structure for the period 2001-2008 and claimed that pecking order in its weak form exists. Vijayakumar (2011) using a sample of 26 firms of Indian automobile sector investigated the adjustability of the two theories and concluded that pecking order paradigm overbears the trade – off hypothesis during the period 1996-2009. On the other hand, the research of Rossi et al (2015) resulted that trade – off theory is much more appropriate than pecking order hypothesis in explaining the managers' decisions on capital structure using a sample of 82 Italian firms in the Agro-food industry for a period beginning in 2007 and ending in 2011, while Wang's (2013) survey leads to the same conclusion using data for UK non-financial firms for a period from 2006 to 2011.

Moreover, there are surveys that favor both theories (Chatzinas & Papadopoulos, 2018; Banga & Gupta, 2017; Mc Namara et al, 2017; Pacheco & Tavares, 2017; Serrasqueiro & Caetano, 2015; Zhang & Kanazaki, 2007; Sogorb-Mira & Lopez-Gracia, 2003) or none of them (Ohman & Yazdanfar, 2017; Dasilas & Papasyriopoulos, 2015; Wellalage & Locke, 2015; Rahman and Arifuzzaman, 2014). Chatzinas and Papadopoulos (2018) used data for 142 non-financial listed in Athens Stock Exchange firms and conclude that both theories can explain the capital structure's behavior depending on the general economic conditions. Banga and Gupta (2017) examined the capital structure of small and medium sized firms in India for a period from 2007 to 2012. Their findings support that the two theories are complementary, since they can explain different aspects of capital structure's behavior. Mc Namara et al. (2017) drew the same conclusion using data for European small and medium sized enterprises for a period from 2005 to 2011. In the same context, Zhang and Kanazaki (2007) using a sample of 1,325 non-financial Japanese firms for a period 2002 to 2006 concluded that both pecking order and trade – off theories can explain at least partially the movements of firms' capital structure. Sogorb-Mira and Lopez-Gracia (2003) examined 6,482 small and medium sized Spanish companies during 1994-1998. Their results suggest that both theories play significant role at the determination of the capital structure even if trade – off seems to exhibit greater explanatory power. On the other hand, Ohman and Yazdanfar (2017) using a sample of 15,897 Swedish small and medium sized firms between 2009 and 2012, Wellalage and Locke (2015) using data from 120 non-listed firms for a period 1998-2008, and Rahman and Arifuzzaman (2014) examining 60 and 51 firms of United Kingdom for periods 1992-2012 and 1995-2012 respectively claimed that there was not adequate evidence that allow the one or both theories to be favored.

During times of crisis, the risk and the uncertainty of economic environment sharply rise resulting in a decrease in the supply of capital loans, because of the reluctance of the economic units with surpluses to provide funds to the economic units with deficits. Consequently, the interest rates follow the path of risk and are formed in significantly higher levels (Demircug-Kunt et al., 2015). Another reason for these changes may be located on the increased adverse selection costs that raise the required returns and lower the market values making the access to the equity markets prohibitive for the firms (Doukas, 2011). Finally, this reluctance is intensified because of the negative perspectives that are created under these risky conditions resulting even in zero supply of funds for some firms (Campello et al, 2010).

All these new conditions influence various variables of the firms as well as their capital structure (Balios et al, 2016; Proenca et al, 2014; Truong & Nguyen, 2016). According to trade – off theory, the worsening of the economic environment increases the bankruptcy costs making the firms forming a lower level of debt in their optimal capital structure (Bradley et al., 1984; Howe & Jain, 2010). However, this prediction applies most in cases of financial crises. In cases of a debt crisis, the restriction in the supply of funds is accompanied by high fiscal deficits and / or high public debt ratios, forcing the government

to take various measures such as a rise of tax rates. This increase is expected to raise the tax benefits leading firms to increase the debt level in their optimal capital structure. As a result, the final effect on firms' capital structure of such an economic environment depends on whether the tax effect or the bankruptcy costs effect is greater (Chatzinas & Papadopoulos, 2018). On the other hand, according to pecking order theory, the decrease of the available cash flows that come from internal sources because of the reduction of sales and profits makes the firms seek increased external funds that lead to an increase of debt in their capital structure (Cetorelli & Goldberg, 2011; Hassan & Samour, 2015). This disagreement in the predictions of the two theories in times of crisis is not empirically resolved. Some research attempts concluded that firms' leverage increased during the financial crisis of 2008 (Demirguc-Kunt et al., 2015; Sumedrea, 2015; Ivashina and Scharfstein, 2010; Zeitun et al, 2017), other surveys support that the debt level reduced during the same period (Fosberg, 2012; Iqbal & Kume, 2015; Harisson and Widjaja, 2014; Proenca et al, 2016; Harisson & Widjaja, 2014), while there are some researchers that claimed that no significant changes in capital structures were provoked by the crisis (Mouton & Smith, 2016).

2. Presentation of Countries: Environment and Firms' Capital Structure

As mentioned above, the present study examined the capital structure of the European countries that were fully supported by the European Stability Mechanism (ESM) during the recent European crisis. These countries were Greece, Ireland, Portugal and Cyprus. In the present section some economic data for the economic environment of each country are presented as well as some surveys on the firms' capital structure. Specifically, Table I and Diagram 1 present the growth of real Gross Domestic Product (Diagram 1.a), the profit tax (Diagram 1.b) and the total tax rate (Diagram 1.c) as percent of commercial profits and the annualized lending rate to firms for loans with maturity over 1 year (Diagram 1.d) for each country during the period 2006-2016.

Cyprus is an economy that is based on the touristic, shipping and financial sectors. It entered the European Union in 2004 and the European Monetary Union in 2008. The global financial crisis of 2008 barely affected the Cypriot economy. However, it was major affected by the acute economic crisis in Greece, which led the Cypriot banking system to particularly high losses, its fiscal deficit at 6.3% of GDP in 2011 and the debt at 76% of GDP. Cyprus sought financial assistance from the member states of European Union and entered the European Stability Mechanism in 2013 undertaking a series of measures that restored its economy and its banking system. The level of the financial assistance package was equal to 10 billion. The austerity measures and the reforms that have been implemented led Cyprus to overcome all negative perspectives of the economic downturn in a short period of time and exited the financial assistance program in 2016. The first signs of the recovery of the Cypriot economy were visible from 2015 and continued in the coming years, with a growth rate close to 4% in 2017. The projections for 2018 are even more optimistic (Ioannou & Charalambous, 2017). According to Table I, the Cypriot GDP annual growth (%) declined sharply from 4.5% in 2006 to -5.9% in 2013, while the profit tax rose from 7.8% to 9.2% correspondingly, the total tax rate from 20.6% to 21.9% and the interest rate declined from 6.3% to 6.2%. On the other side, the Cypriot GDP annual growth (%) raised sharply from -5.9% in 2013 to 3.4% in 2016, the profit tax continued to rise to 9.2%, the total tax rate from to 24.2%, while the interest rate declined from 6.2% to 4.2% correspondingly. The accumulated changes of profit tax, total tax rate and lending interest rates are equal to 17.95%, 6.31% and -2.68% correspondingly for 2007-2013, 4.35%, 10.50% and -31.28% for 2013-2016, and 23.08%, 17.48% and -33.12% for the total examined period. Finally, as refers to the capital structure theories' ability to explain the firms' decision on financing, the lack of relevant studies is impressive. However, the majority of the studies that the researcher managed to find agree with the dominant position of the pecking order hypothesis (Mokhova & Zinecker, 2013; Machielsen, 2012).

TABLE I. GDP annual growth, profit tax, total tax rate and annualized lending interest rate in Cyprus, Greece, Ireland and Portugal for the period 2006-2016

Diagram 1: Gross Domestic Product annual growth, profit tax, total tax rate and annualized lending interest rate in Cyprus, Greece, Ireland and Portugal for the period 2006-2016

Greece was the major problem of European Monetary Union in facing the global financial crisis of 2008, since its macroeconomic environment converted a financial crisis to a severe debt crisis. Greece agreed with the terms of three Memoranda of Understanding and received a financial support of about 302 billion undertaking the responsibility to implement severe austerity measures and strict reforms of public sector. The first memorandum was signed in 2010 when the Greece's fiscal deficit of 2009 rose from 3.7% to 15.1% with a debt ratio of 126.8%. The implementation of the austerity measures in combination with the negative perspectives of Greek real economy led the country to the sharpest recession resulting in a loss of 25% of its Gross Domestic Product (Nelson et al, 2017). Greece has managed to exit the European Stability Mechanism programs in conditions of strict surveillance in 2018. According to Table I, the Greek GDP annual

growth (%) declined sharply from 5.7% in 2006 to -5.5% in 2010, while the profit tax decreased from 16.9% to 14.1% correspondingly, the total tax rate from 49.5% to 46.7% and the interest rate from 5.4% to 4.2%. On the other side, the Greek GDP annual growth (%) raised from -5.5% in 2010 to -0.2% in 2016, the profit tax increased to 22.4%, the total tax rate from 46.7% to 50.7%, while the interest rate remained almost stable at about 5% levels. The accumulated changes of profit tax, total tax rate and lending interest rates are equal to -16.57%, -5.66% and -23.06% correspondingly for 2006-2010, 58.87%, 8.57% and 3.84% for 2010-2016, and 32.54%, 2.42% and -20.11% for the total examined period. Finally, the Greek firms' capital structure behavior is investigated by many researchers, the majority of whom agree that the pecking order hypothesis can better explain the financing decisions of firms' managers (Balios et al., 2016; Dasilas & Papasyriopoulos, 2015; Noulas & Genimakis, 2011; Daskalakis & Psillaki, 2008, 2009; Eriotis et al., 2007; Agiomigianakis et al., 2004; Daskalakis et al., 2003). However, some other scholars conclude that the Greek firms define a long-term optimal capital structure, a conclusion that is in accordance to trade-off theory or that none of the two examined theories can explain adequately their capital structure behavior (Vasilioi et al., 2006; Vasilioi & Daskalakis, 2005; Chatzinas & Papadopoulos, 2018).

Ireland was an economic miracle for European Union. From 1998 to 2007, the Irish debt ratio decreased from 54% to 25% following a strictly controlled fiscal policy with high growth rates. When Lehman Brothers collapsed in September 2008, the crash spread all over the world and the Irish banks were found uncovered to the new risky conditions. The Irish government then took over all the obligations of the bankrupt Irish banks. As a result, bank balances were transferred to the public budget and Ireland's deficit from almost zero in 2007 reached 25% in 2010, and debt from 25% rose to 96.2% in 2010. So, Ireland was the second member state of European Union to seek financial assistance from European Union and entered into a Memorandum. As Greece did before, Ireland signed in November 2010 a Memorandum of Understanding accompanied by € 85 billion in funding, which is an amount equal to 58% of its GDP. Finally, Ireland was also the first country to exit the Memorandum by the end of 2013. The actions of the Memorandum consisted of austerity measures, reforms and banking restructuring (Whelan, 2013). According to Table I, the Irish GDP annual growth declined from 5.5% in 2006 to 1.8% in 2010 with its lowest value equal to -4.6% in 2009, while the profit tax reduced from 11.9% to 11.8% correspondingly, the total tax rate remain almost stable at 25.4% and the interest rate from 4.7% to 3.1%. On the other side, the Irish GDP annual growth (%) raised sharply from 1.8% in 2013 to 5.1% in 2016, the profit tax rose to 12.4%, the total tax rate to 26.0%, while the interest rate declined from 3.1% to 3.0% correspondingly. The accumulated changes of profit tax, total tax rate and lending interest rates are equal to -0.84%, 5.08% and 4.20% correspondingly for 2006-2010, 0%, 2.36% and 2.36% for 2010-2016, and -34.12%, -0.98% and -34.76% for the total examined period. Finally, as refers to the capital structure theories' ability to explain the firms' decision on financing, the relevant studies do not agree whether the pecking order hypothesis of the trade-off holds the dominant explanatory power (Mac an Bhaird & Lucey, 2010; Bancel & Mitto, 2004).

Finally, Portugal's economy followed a parallel course with that of the Greek economy between 2000 and 2008, with its GDP rising steadily until the time of the economic crisis in Europe. From 2008 to 2011, Portuguese Gross Domestic Product was significantly reduced as the economy of the country faced many pathogens such low exports, structural problems, extrovert economy and low industry. Its debt ratio climbed from 50.4% in 1995 at 120% in 2012, one year after its government requested financial assistance by the European Stability Mechanism. Portugal agreed with the terms of a Memorandum of Understanding and received a financial support of about 26 billion undertaking the responsibility to implement the austerity measures and reforms of public sector. The memorandum was signed in 2011 when the Portugal's fiscal deficit of 2010 rose at 10.0%. Portugal exited the European Stability Mechanism program in conditions of surveillance in 2014 (Portugal, 2015). According to Table I, the Portuguese GDP annual growth declined from 1.6% in 2006 to -1.8% in 2011, while the profit tax decreased from 15.3% to 15.2% correspondingly, the total tax rate from 43.8% to 42.6% and the interest rate from 4.7% to 4.1%. On the other side, the Portuguese GDP annual growth raised from -1.8% in 2010 to 1.6% in 2016, the profit tax decreased to 12.5%, the total tax rate from to 39.8%, while the interest rate to 2.9%. The accumulated changes of profit tax, total tax rate and lending interest rates are equal to -0.65%, -2.74% and -13.22% correspondingly for 2006-2011, -17.76%, -6.57% and -28.50% for 2011-2016, and -18.30%, -9.13% and -37.95% for the total examined period. Finally, the Portuguese firms' capital structure behavior is investigated by many researchers, the majority of who agree that the pecking order hypothesis can better explain the financing decisions of firms' managers (Macas Nunes & Serrasqueiro, 2017; Pacheco, 2016). However, some other scholars conclude that the Portuguese firms choose their financial mix in accordance to trade-off theory (Sardo & Serrasqueiro, 2017) or that both theories can explain adequately their capital structure behavior (Pacheco and Tavares, 2017; Serrasqueiro and Caetano, 2015).

3. Empirical Investigation

3.1 Scope, Research Questions and Research Hypotheses

The present study aims at examining whether the economic conditions formed by the financial assistance provided by the European Stability Mechanism influence the behavior of the firms' capital structure. Alternatively, the researchers investigate which of the two basic capital structure theories, which are trade – off and pecking order, can better explain the managers' decisions on the capital sources the firms use before and after the change of economic conditions that a package of financial assistance from European Stability Mechanism to a member-state of the European Monetary Union may cause. In this context, the research questions formed are:

1. Can the pecking order theory explain the behavior of the capital structure of the firm in countries assisted by the European Stability Mechanism?
2. Can the trade – off theory explain the behavior of the capital structure of the firm in countries assisted by the European Stability Mechanism?
3. Is there a change in the explanatory power of a capital structure theory provoked by the change in the economic conditions that a package of financial assistance from European Stability Mechanism may cause?
4. What may be the reasons for a possible shift from the one capital structure theory towards the other?

The trigger for the present study was given by Chatzinas and Papadopoulos (2018) who provided evidence that in case of Greek firms the two capital structure theories are complementary even if they found that trade – off theory was dominant after the financial assistance received from the European Stability Mechanism (2010-2014) and the pecking order hypothesis was slightly dominant in the period before (2008-2010). They attributed this shift to the fact that “when economic conditions change, firms adjust their capital structures according to the *Trade-off* theory, whereas when the economic conditions remain stable, firms behave according to both theories”. Based on these conclusions, we formed the following three research hypotheses:

H1: Both pecking order and trade – off theories can only partially explain firms' capital structure behavior.

H2: The pecking order hypothesis can explain a more significant part of firms' capital structure behavior in “normal” economic conditions.

H3: The trade – off theory can explain a more significant part of firms' capital structure behavior in “special” economic conditions.

The above research hypotheses aim at accepting or rejecting the already drawn implications by Chatzinas & Papadopoulos (2018). The present study aims at confirming the implication that the reinforcement of the power of trade – off theory may be attributed to the fact that the tax deductibility effect is larger than the bankruptcy costs effect. As mentioned above, the trade – off theory supports that because of the increased bankruptcy costs that incur during crises, the firms should lower their debt levels to meet their optimal capital structure (Bradley et al., 1984). However, in case of European crisis, the four financially assisted countries took strict austerity measures including in some cases increases of corporate tax rates. According to the same theory, the increased levels of corporate tax rates should increase the advantage of interests' tax deductibility leading firms to increase their debt levels to meet their optimal capital structure. So, if tax deductibility effect is greater than cost bankruptcy effect, the total effect to debt ratio of the firms is positive according to both trade – off theory and the pecking order theory. It is reminded that pecking order effect on debt ratio in times of crisis is based on the fact that the decreased levels of internal cash flows because of the reduced profits push firms to external funds. So, the fourth and fifth hypotheses are formed in the following way:

H4: The financial assistance received by European Stability Mechanism significantly affects the capital structure theory that the firms follow in financing decisions.

H5: In the context of trade – off theory, if the tax deductibility effect is higher (lower) than the bankruptcy costs effect, the firms are expected to increase (decrease) their debt ratio to meet their optimal capital structure in times of crisis.

3.3 Data and Methodology

The present studies focuses on the listed firms of the countries that received financial assistance by the European Stability Mechanism. These countries were Cyprus in 2013, Greece in 2010, Ireland in 2010 and Portugal in 2011. Spain also

received a financial assistance but it was only partial and for this reason it is excluded. The accounting data of these firms were drawn by the Bloomberg database for a period beginning in 2003 to 2016. The initial number of the listed Cypriot, Greek, Irish and Portuguese firms was 595, but the firms with missing values during the total period were excluded resulting in a final number of 135 firm. Out of these firms, 13 (9.63%) are Cypriot, 70 (51.85%) are Greek, 25 (18.52%) Irish and 27 (20.00%) were Portuguese. Finally, the data were winsorized at a 5% level.

The methodology applied is the one that Shyam-Sunders and Myers (1999) proposed. According to it, two regressions are estimated for each hypothesis. Equation (1) represents the regression for trade – off theory.

$$\Delta D_{it} = a_1 + b_{TA} (D_i^* - D_{it-1}) + U_{it} \quad (1)$$

Where D_{it} is the long-term debt ratio as a percentage of net total assets for firm i in period t , D_i^* is the optimal capital structure of firm i , a_1 is the constant coefficient of regression and b_{TA} is the trade – off coefficient, which has to be positive in order for adjustments to the optimal capital structure to be denoted, but smaller than 1 because of the existence of the transaction costs (Shyam-Sunders & Myers, 1999). As refers to the optimal capital structure, Shyam-Sunders and Myers (1999) supported that a three – year moving average is an effective proxy. This proxy is used in the present study, too. It worth mentioning the fact that net total assets are defined as the sum of net fixed assets and net working capital or as the residual of the subtraction of the short-term liabilities from the total assets.

Equation (2) shows the respective regression for pecking order hypothesis.

$$\Delta D_{it} = a_2 + b_{PO} Def_{it} + U_{it} \quad (2)$$

Where D_{it} as above, a_2 is the constant coefficient of regression, and b_{PO} is the pecking order coefficient which has to be equal to one for the pecking order to exist (Shyam - Sunder & Myers, 1999). In cases of positive but smaller than one pecking order coefficient, a weak form of pecking – order hypothesis may be concluded (Atiyet, 2012; Sheikh et al, 2012). Finally, Def_{it} is the financial deficit for firm i in period t and is computed by the equation (3):

$$Def_{it} = (Div_{it} + X_{it} + \Delta W_{it} + R_{it} - C_{it}) / Net\ Total\ Assets_{it} \quad (3)$$

Where Div_{it} , X_{it} , ΔW_{it} , R_{it} , and C_{it} are the dividend payments, the capital expenditures, the net change in net working capital, the current portion of long-term debt at start of period, and the operating cash flows after interests and taxes for firm i in period t respectively.

The above methodology is completed with two diagnostic tests. For first one, variations of the models of equations (1) and (2) are estimated. These variations are estimated by scaling the long-term debt and the deficit with sales, by using fixed effects model and by using random effects model. If the regression coefficients of the variations are virtually identical to the ones of the initial equations, then the estimators of the equations (1) and (2) are considered to be robust. For the second one, the anticipated deficits are used instead of the current deficits computed by equation (3) in order to be confirmed that the good fit of equation (2) results from the planned financing and not from short-term adjustments. Two proxies are used for the anticipated deficits. The first one is the deficit of the previous year ($Def_{i,t-1}$). The second one is computed with equation (3) using the operating cash flows after interests and taxes and the net changes in the net working capital of the previous years. If the regression coefficients of the anticipated deficits satisfy the conditions of a positive but smaller than one value, then the good fit of pecking order model is not based on short-term adjustments (Shyam - Sunder & Myers, 1999).

The above regressions and their diagnostic tests are executed separately for each of the four examined countries for two periods. The first period corresponds to the period beginning in 2006 and ending in the year that each government signed its Memorandum of Understanding and the second period begins in the year after the government signed the Memorandum of Understanding and ends in 2016. It is reminded that Cyprus, Greece, Ireland and Portugal signed their memoranda in 2013, 2010, 2010 and 2011 respectively. As a result, different periods are formed for each country.

3.4 Results of Statistical Analysis

3.4.1 Cyprus

Cypriot Government signed the Memorandum of Understanding with European Stability Mechanism in 2013. So, the first period lasts from 2006 to 2013, while the second from 2014 till 2016. Table II shows the estimation of equations (1) and (2) for firms of Cypriot economy during these two periods.

During the first period (2006-2013), pecking order hypothesis seems to explain greater percent of the volatility of the financial leverage in comparison to trade-off theory. Specifically, the trade-off theory presents a statistically significant coefficient equal to 0.568 ($p < 0.01$) and a non significant constant coefficient ($p > 0.10$). As refers to pecking order, its coefficient is equal to 0.911 and statistically significant ($p < 0.01$), while the constant coefficient may be assumed to be zero ($p > 0.10$). The explanatory power of pecking order, as it may be measured by the coefficient of determination, is equal to 31.7% which is higher than the 17.4 which is the level of the explanatory power of trade-off theory. However, when the two equations are simultaneously estimated the coefficient of determination is almost equal to the sum of the two models, which leads to the conclusion that both regressions are statistically significant and both theories are present during this first period. On the other hand, during second period (2014-2016), the explanatory power of trade – off rises sharply at 48.2%, while the one of pecking order falls heavily at just 3.7%. The constant coefficients of the two models remain statistically not significant ($p > 0.10$), the coefficient of trade-off remains statistically significant ($p < 0.10$) equal to 0.998, while the one of pecking order is equal to 0.167 and not statistically significant ($p > 0.10$). The addition of the two regressions in one confirms the dominance of the trade-off theory over the pecking order hypothesis.

TABLE II. Estimation of the Models of Pecking Order and Trade-Off Theories for Cypriot firms

Table III presents the results of the first diagnostic test for Cypriot firms. Equations (1) and (2) were estimated scaling the variables with sales, using fixed effects and using random effects. These results do not appear significantly different in signs, in magnitude and in statistical significance from the ones displayed in Table II. So, according to the first diagnostic test, the results from it, and the conclusions may be drawn by it, are robust.

TABLE III. First Diagnostic Test based Variations of Dependent Variable for Cypriot firms

Table IV displays the results of the second diagnostic test. Using the two proxies of anticipated deficits, the results of Table IV are in agreement with the results of Table II, since the coefficients of the two theories during the two periods are similar in terms of signs, magnitude and statistical significance which leads to the conclusion that the pecking order equation and the trade – off equations for the Cypriot firms are able to capture and express the planned financial needs of the firms.

TABLE IV. Second Diagnostic Test based on Anticipated Deficit for Cypriot firms

3.4.2 Greece

Table V presents the estimation for the equations of Trade – Off and Pecking Order Theories, while Table VI and Table VII display the results of the first and the second diagnostic tests respectively. It worth mentioning that the first period for Greece begins in 2006 and ends in 2010 resulting in a six-year second period, which lasts from 2011 to 2016, since Greece's Memorandum of Understanding was signed in 2006.

TABLE V. Estimation of the Models of Pecking Order and Trade-Off Theories for Greek firms

According to Table V, the trade – off regression is able to explain 20.4% of debt's variance during the first period, while pecking order regression 21.3% of it. The constant coefficients of both regressions are equal to 0.021 and -0.069 respectively and not statistically significant ($p > 0.10$), while the coefficients of the independent variable are equal to 0.759 and 0.810 and statistically significant ($p < 0.01$). The estimation of a common model can explain 40.0% of the total variance, which indicates that both the regressions, and therefore both theories, have a significant contribution. On the other side, during the second the proportion of the debt's variance explained by the two regressions amounts to 25.0% and 0.4% for trade – off and pecking order respectively. Furthermore, the constant coefficients are again not statistically significant ($p > 0.10$) while the coefficient of trade – off model is again statistically significant ($p < 0.01$) and equal to 0.935. However, the coefficient of pecking order is equal to 0.810, but not statistically significant ($p > 0.10$). As a result, pecking order theory has zero explanatory power.

According to Table VI, the estimations of the variations of equation (1) and (2) using sales as scale variable and applying fixed and random effects are virtually identical in terms of magnitude, sign and statistical significance. As a result, the first diagnostic test supports that the estimations of Table V for Greece are robust.

TABLE VI. First Diagnostic Test based Variations of Dependent Variable for Greek firms

Finally, according to Table VII, the pecking order coefficients and the trade-off coefficients remain positive and most of them statistically significant, while the constant coefficients are still not statistically significant indicating that the results of

Table V express the planned financing and not short-term adjustments. These results strengthen the robustness of the estimated regression (1) and (2).

TABLE VII. Second Diagnostic Test based on Anticipated Deficit for Greek firms

3.4.3 Ireland

Irish Government signed the Memorandum of Understanding with European Stability Mechanism in 2010. So, the first period lasts from 2006 to 2010, while the second from 2011 till 2016. Table VIII shows the estimation of equations (1) and (2) for firms of Irish economy during these two periods.

TABLE VIII. Estimation of the Models of Pecking Order and Trade-Off Theories for Irish firms

During the first period (2006-2010), trade-off hypothesis seems to explain greater percent of the volatility of the financial leverage in comparison to pecking order theory. Specifically, the trade-off theory presents a statistically significant coefficient equal to 0.768 ($p < 0.01$) and a non significant constant coefficient ($p > 0.10$). As refers to pecking order, its coefficient is equal to 0.460 and statistically significant ($p < 0.05$), while the constant coefficient may be assumed to be zero ($p > 0.10$). The explanatory power of pecking order, as it may be measured by the coefficient of determination, is equal to 4.1% which is lower than the 21.8 which is the level of the explanatory power of trade-off theory. On the other hand, during second period (2011-2016), the explanatory power of trade – off remains almost at the same level of 27.0%, while the one of pecking order slightly rises at just 6.7%. The constant coefficients of the two models remain statistically not significant ($p > 0.10$), the coefficient of trade-off and pecking order remain statistically significant ($p < 0.10$) equal to 0.857 and 0.497 respectively. The above results indicate the dominance of the trade-off theory over the pecking order hypothesis during both periods in the Irish economy.

Table IX presents the results of the first diagnostic test for Irish firms. Equations (1) and (2) were estimated scaling the variables with sales, using fixed effects and using random effects. These results do not appear significantly different in signs, in magnitude and in statistical significance from the ones displayed in Table VIII. So, according to the first diagnostic test, the results from it, and the conclusions may be drawn by it, are robust.

TABLE IX. First Diagnostic Test based Variations of Dependent Variable for Irish firms

Table X displays the results of the second diagnostic test. Using the two proxies of anticipated deficits, the results of Table X are in agreement with the results of Table VIII, since the coefficients of the two theories during the two periods are similar in terms of signs, magnitude and statistical significance which leads to the conclusion that the pecking order equation and the trade – off equations for the Irish firms are able to capture and express the planned financial needs of the firms.

TABLE X. Second Diagnostic Test based on Anticipated Deficit for Irish firms

3.4.4 Portugal

Table XI presents the estimation for the equations of Trade – Off and Pecking Order Theories, while Table XII and Table XIII display the results of the first and the second diagnostic tests respectively. It worth mentioning that the first period for Portugal begins in 2006 and ends in 2011 resulting in a five-year second period, which lasts from 2012 to 2016, since Portugal's Memorandum of Understanding was signed in 2006.

TABLE XI. Estimation of the Models of Pecking Order and Trade-Off Theories for Portuguese firms

According to Table XI, the trade – off regression is able to explain 29.8% of debt's variance during the first period, while pecking order regression 12.2% of it. The constant coefficients of both regressions are equal to 0.033 and 0.009 respectively and not statistically significant ($p > 0.10$), while the coefficients of the independent variable are equal to 0.865 and 0.690 and statistically significant ($p < 0.01$). The estimation of a common model can explain 40.4% of the total variance, which indicates that both the regressions, and therefore both theories, have a significant contribution. On the other hand, during the second the proportion of the debt's variance explained by the two regressions amounts to 18.3% and 7.8% for trade – off and pecking order respectively. Furthermore, the constant coefficients are again not statistically significant ($p > 0.10$) while the coefficients of trade-off and pecking order independent variables are again statistically significant ($p < 0.01$) and equal to 0.664 and 0.943 respectively. As a result, both theories are present during both periods.

According to Table XII, the estimations of the variations of equation (1) and (2) using sales as escalation variable and applying fixed and random effects are virtually identical in terms of magnitude, sign and statistical significance. As a result, the first diagnostic test supports that the estimations of Table XI for Portugal are robust.

TABLE XII. First Diagnostic Test based Variations of Dependent Variable for Portuguese firms

Finally, according to Table XIII, the pecking order coefficients and the trade-off coefficients remain positive and most of them statistically significant, while the constant coefficients are still not statistically significant indicating that the results of Table XI express the planned financing and not short-term adjustments. These results strengthen the robustness of the estimated regression (1) and (2).

TABLE XIII. Second Diagnostic Test based on Anticipated Deficit for Portuguese firms

3.5 Discussion of Results

In Cyprus, given the robustness of the equations that confirmed by the two diagnostic tests, both trade-off and pecking order hypotheses contribute to the interpretation of the behavior of the capital structure of the Cypriot firms during the first period (2006-2013), but the pecking order hypothesis in its weak form ($b_{PO}=0.911 < 1$) is the dominant one ($R^2_{PO}=0.317 > 0.174 = R^2_{TO}$). On the other hand, the pecking order's explanatory power is eliminated during the second period and trade-off prevails ($R^2_{PO}=0.037 > 0.482 = R^2_{TO}$). Previous studies supported that the pecking order hypothesis hold a dominant position in explaining the Cypriot firms' managers' decisions about the capital structure (Mokhova & Zinecker, 2013; Machielsen, 2012). The present results are in partial agreement with them, since the presence of pecking order is intense during the first period. So, it may be concluded that during 'normal' economic conditions Cypriot managers act in accordance to pecking order hypothesis. However, during the second period, where the economic conditions became extreme, the trade-off outbalances the pecking order. This observation is not in opposition to previous results because none of them examined the capital structure of Cypriot firms during crisis times. So, these extreme economic conditions led the Cypriot firms to redirect their capital structure choices in accordance to trade-off.

Greece is the first country that entered a European Stability Mechanism financial assistance program and the statistical results indicated a similar behavior of the Greek firms' capital structure to the Cypriot firms' one. Specifically, pecking order hypothesis in its weak form ($b_{PO}=0.810 < 1$) is slightly better than trade-off theory in explaining the Greek firms' capital structure during the first period ($R^2_{PO}=0.213 > 0.204 = R^2_{TO}$). On the other hand, during the second period the explanatory power of pecking order hypothesis was eliminated and the one of trade-off increased rapidly ($R^2_{PO}=0.004 < 0.250 = R^2_{TO}$). The majority of previous studies agree with the superiority of pecking order hypothesis for the Greek firms during 'normal' economic conditions (Daskalakis & Psillaki, 2008, 2009; Eriotis et al., 2007; Agiormigiannakis et al., 2004; Daskalakis et al., 2003), but even in times of crisis there are researchers that conclude that the superiority of pecking order hypothesis holds (Balios et al, 2016; Dasilas & Papasyriopoulos, 2015; Noulas & Genimakis, 2011). However, preceding studies indicated that there are evidence that support the trade-off hypothesis both in 'normal' economic conditions (Vasiliou et al., 2006) and in times of crisis (Chatzinas & Papadopoulos, 2018). The present study deduces that none of the two examined theories can adequately interpret the capital structure' movements of the Greek firms during 'normal' economic conditions (Chatzinas & Papadopoulos, 2018; Vasiliou & Daskalakis, 2005), but the trade-off theory outbalances pecking order during crisis times (Chatzinas & Papadopoulos, 2018).

In Ireland, only trade-off hypothesis appears to contribute to the interpretation of the behavior of the capital structure of the Irish firms during both the first (2006-2010) and the second period (2011-2016), since the explanatory power of the pecking order hypothesis in its weak form is significantly lower than the one of trade-off theory ($R^2_{PO}=0.041 < 0.218 = R^2_{TO}$ for the first period; $R^2_{PO}=0.067 < 0.270 = R^2_{TO}$ for the second period;). Previous studies do not agree whether the pecking order hypothesis of the trade-off holds the dominant explanatory power (Mac an Bhaird & Lucey, 2010; Bancel & Mittoo, 2004). In contrast, the present study claims that the dominant theory in financing decisions of Irish firms is trade-off regardless the prevailing economic conditions.

Finally, in Portugal pecking order hypothesis in its weak form ($b_{PO}=0.957 < 1$) is worse than trade-off theory in explaining the Portuguese firms' capital structure during the first period ($R^2_{PO}=0.122 < 0.298 = R^2_{TO}$). On the other hand, during the second period this situation is not overturned ($R^2_{PO}=0.078 < 0.183 = R^2_{TO}$). However, during both periods the coefficients of the respective models are statistical significant and positive, which may lead to the conclusion that both theories are present in the Portuguese firms' decision about their capital structure. This is not an unexpected conclusion, since there are previous studies that supported this behavior (Pacheco and Tavares, 2017; Serrasqueiro and Caetano, 2015). Furthermore, there

are many preceding studies both in favor of pecking order (Macas Nunes & Serrasqueiro, 2017; Pacheco, 2016) and in favor of trade-off (Sardo & Serrasqueiro, 2017).

Table XIV below summarizes the above conclusions for each country:

TABLE XIV. Summary of the Results of Statistical Analysis

According to Table XIV, the Greek and Cypriot firms changed the way they decided their capital structure after the Memorandum of Understanding, while nothing changed in Ireland and in Portugal. In particular, Greek and Cypriot firms' capital structure was shifted from pecking order hypothesis to trade-off theory. Moreover, in Cyprus, Greece and Portugal, both theories are applied during 'normal' economic conditions, as they can be expressed by the first period. The above results lead to a partial acceptance of the research hypotheses 1, 2 and 3. Specifically, research hypothesis 1 is accepted for Cyprus, Greece and Portugal, while research hypotheses 2 and 3 are accepted for Cyprus and Greece.

The reasons for the above differentiations may be found in tax and interest environment of the four countries. It is reminded that taxes express the tax deductibility and interest rates express the financial distress costs supported by trade-off hypothesis. During the whole examined period, profit tax raised by 23.08% in Cyprus and 32.54% in Greece and the total tax rate by 17.48% and 8.57% respectively. The same time the changes in Ireland and Portugal was equal to 4.20% and -18.3% for the profit tax and to 2.36% and -9.13% for the total tax rate respectively. Moreover, the interests for loans to firms with maturity over one year reduced by 33.12% in Cyprus, 20.11% in Greece, 34.76% in Ireland and by 37.95% in Portugal. So, Cyprus and Greece, which are the two countries with the highest increases in tax rates simultaneously with a medium deterioration of interest rates of debt, are the countries that a shift from pecking order to trade-off hypothesis was observed. On the other hand, Portuguese and Irish tax environment slightly changed, while the interest rates reduced rapidly. These observations support that in Greece and Cyprus the advantages of tax deductibility significantly increase, while the disadvantages of the financial distress costs slightly or moderately reduce, but in Portugal and Ireland the advantages of tax deductibility do not significantly change, while the disadvantages of the financial distress significantly reduce. The above developments provide the reasons why there is an increase of the explanatory power of the trade-off theory in Greece and Cyprus and not in Ireland and Portugal, while they partially confirm the research hypotheses 4 and 5.

4. Conclusions

Modigliani and Miller (1958; 1963) theorem set the basis for the development of two competing capital structure theories, the pecking order and the trade-off. Among corporate finance theoretical scientists and practitioners, there is a continuous controversy over which of these two theories can better explain the changes of capital structures of the firms. Many researchers provided evidence in favor of the pecking order theory (Macas Nunes & Serrasqueiro, 2017; Trinh et al, 2017; Pacheco, 2016; Balios et al, 2016; Atiyet, 2012; Sheikh et al, 2012; Vijayakumar, 2011), as well as in favor of the trade-off theory (Sardo & Serrasqueiro, 2017; Rossi et al, 2015; Wang, 2013). However, during the last year there is an increasing trend in the studies that support that neither of them can alone explain fully the capital structure decisions but both of them can partially explain them (Chatzinas & Papadopoulos, 2018; Banga & Gupta, 2017; Mc Namara et al, 2017; Pacheco & Tavares, 2017; Serrasqueiro & Caetano, 2015; Zhang & Kanazaki, 2007; Sogorb-Mira & Lopez-Gracia, 2003). The present study belongs to this last one group of studies.

Specifically, the present study examined the behavior of capital structure in countries that have taken financial assistance from the European Stability Mechanism during the periods before and after the signing of the respective Memorandum of Understanding. These countries are Cyprus, Greece, Ireland and Portugal. Before the crisis, the Cypriot, Greek and Portuguese firms follow both pecking order and trade-off paradigms, while the Irish firms only the trade-off. After the crisis, the dominant capital structure theory is trade-off in Cyprus and Greece, while nothing changes for the Irish and the Portuguese firms. As a result, evidence is provided in favor of the aspect that the two theories are complementary and not mutually exclusive. However, the present study's originality is found on the fact that it investigated the explanatory power of trade – off and pecking order theories in countries with significantly changing economic conditions and tried to connect the observed differences with these changing economic conditions. As a result, the countries in which a shift to the trade – off theory was observed were Greece and Cyprus, whose tax environments were the ones that worsened the most among the four examined countries. So, the present study claims that a severe deterioration of the tax environment for the firms leads them to adjust their capital structures according to trade – off. This means that changing tax environment leads the firms to determine a new level of their optimal capital structure. Reaching this level, they can return to the principles of pecking order hypothesis.

The researchers of the present study are aware of the risk of their last proposition, which is that the changing economic environment causes changes in the firms' optimal capital structures that, after they are reached, are financed following the pecking order paradigm. This is the reason why, in our opinion, future researchers should focus on the behavior of the firms' capital structure after the normalization of the economic conditions. A return of the firms in the previous situation could confirm this proposition. After all, the recent European crisis is an excellent opportunity for its examination.

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Tables

TABLE I. GDP annual growth, profit tax, total tax rate and annualized lending interest rate in Cyprus, Greece, Ireland and Portugal for the period 2006-2016

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP annual growth (%)	Cyprus	4.5	4.8	3.9	-1.8	1.3	0.3	-3.1	-5.9	-1.4	2.0	3.4
	Greece	5.7	3.3	-0.3	-4.3	-5.5	-9.1	-7.3	-3.2	0.7	-0.3	-0.2
	Ireland	5.5	5.2	-3.9	-4.6	1.8	3.0	0.0	1.6	8.3	25.6	5.1
	Portugal	1.6	2.5	0.2	-3.0	1.9	-1.8	-4.0	-1.1	0.9	1.8	1.6
Profit tax (% of commercial profits)	Cyprus	NA	NA	7.8	7.8	9.4	9.2	9.1	9.2	9.5	9.3	9.6
	Greece	16.9	16.4	14.1	14.1	14.1	13.5	11.2	11.2	19.0	19.7	22.4
	Ireland	11.9	11.9	12.0	12.1	11.8	12.0	12.0	12.2	12.4	12.4	12.4
	Portugal	15.3	14.9	14.4	14.4	15.1	15.2	14.5	15.0	15.0	13.5	12.5
Total tax rate (% of commercial profits)	Cyprus	NA	NA	20.6	20.6	21.7	21.6	21.6	21.9	22.5	24.0	24.2
	Greece	49.5	48.9	46.7	46.7	46.7	45.9	44.1	44.0	50.7	49.6	50.7
	Ireland	25.4	25.4	25.5	25.6	25.4	25.5	25.6	25.9	26.0	26.0	26.0
	Portugal	43.8	42.9	42.5	42.3	42.6	42.6	41.9	42.2	42.3	40.9	39.8
Annualized lending rate to firms for loans with maturity over 1 year	Cyprus	NA	NA	6.3	6.0	5.8	6.3	6.5	6.2	5.8	4.9	4.2
	Greece	5.4	6.3	6.5	4.7	4.2	5.0	5.1	4.9	4.9	4.5	4.3
	Ireland	4.7	5.8	6.2	3.7	3.1	3.6	3.1	2.9	3.0	3.0	3.0
	Portugal	4.7	5.6	6.0	3.9	3.1	4.1	4.3	3.9	3.8	3.4	2.9

Source: Databases of World Bank and European Central Bank

Note: NA = Not Available

TABLE II. Estimation of the Models of Pecking Order and Trade-Off Theories for Cypriot firms

Dependent Variable	Period	
	2006-2013	2014-2016
	Long-Term Debt to Net Total Assets (ΔD_t)	
Trade – Off Regression		
Constant	0.173	-0.066
p –value	0.182	0.179
Target Adjustment coef (b_{1a})	0.568	0.998
p –value	0.000	0.000
R ²	0.174	0.482
Pecking Order Regression		
Constant	0.130	0.021

p -value	0.260	0.759
Pecking Order coef. (b_{po})	0.911	0.167
p -value	0.000	0.238
R ²	0.317	0.037
Both Regressions		
Constant	0.164	-0.066
p -value	0.105	0.222
Pecking Order coef. (b_{po})	0.941	-0.001
p -value	0.000	0.995
Target Adjustment coef (b_{ta})	0.573	0.999
p -value	0.000	0.000
R ²	0.503	0.482

TABLE III. First Diagnostic Test based Variations of Dependent Variable for Cypriot firms

Period	2006- 2013	2014- 2016	2006- 2013	2014- 2016	2006- 2013	2014- 2016
Dependent Variable	Long-Term Net Debt to Sales (ΔND_{it})		Long-Term Net Debt to Net Total Assets (ΔND_{it})		Long-Term Net Debt to Net Total Assets (ΔND_{it})	
Method	No effects		Random Effects		Fixed Effects	
Trade – Off Regression						
Constant	-0.004	-0.034	0.025	-0.066	0.175	-0.081
p -value	0.847	0.260	0.614	0.586	0.182	0.080
Target Adjustment coef (b_{ta})	0.044	0.330	0.099	0.996	0.611	1.250
p -value	0.751	0.022	0.449	0.000	0.000	0.000
R ²	0.001	0.140	0.009	0.512	0.317	0.732
Pecking Order Regression						
Constant	-0.029	0.008	0.088	0.021	0.129	0.034
p -value	0.128	0.769	0.428	0.848	0.271	0.692
Pecking Order coef. (b_{po})	0.158	0.166	1.134	0.170	1.023	0.245
p -value	0.000	0.108	0.000	0.222	0.000	0.272
R ²	0.141	0.014	0.414	0.040	0.430	0.174
Both Regressions						
Constant	-0.031	-0.010	0.164	-0.066	0.167	-0.114
p -value	0.109	0.713	0.112	0.194	0.087	0.037
Pecking Order coef. (b_{po})	0.171	0.174	0.941	-0.001	1.067	-0.165
p -value	0.000	0.005	0.000	0.995	0.000	0.235
Target Adjustment coef (b_{ta})	0.081	0.394	0.573	0.999	0.638	1.349
p -value	0.528	0.111	0.000	0.000	0.000	0.000
R ²	0.153	0.231	0.503	0.482	0.633	0.750

TABLE IV. Second Diagnostic Test based on Anticipated Deficit for Cypriot firms

Period	2006-2013				2014-2016			
	Long-Term Assets		Debt to Net Total Assets		Long-Term Assets		Debt to Net Total Assets	
Dependent Variable	(ΔD_{it})				(ΔD_{it})			
Trade – Off Regression								
Constant	0.172	0.162	0.151	0.163	0.012	0.009	-0.041	-0.059
p -value	0.186	0.106	0.178	0.109	0.775	0.851	0.404	0.258
Target Adjustment coef (b_{1a})	0.602	0.676	0.628	0.577	0.861	0.870	1.123	1.239
p -value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Coef. on $E(\text{Def}_1)^a$	0.066	1.168			0.455	0.437		
p -value	0.654	0.000			0.000	0.002		
Coef. on $\text{Def}_{it} - E(\text{Def}_1)^a$		0.969				-0.019		
p -value		0.000				0.830		
Coef. on $E(\text{Def}_2)^b$			0.523	0.935			0.180	0.111
p -value			0.000	0.000			0.083	0.348
Coef. on $\text{Def}_{it} - E(\text{Def}_2)^b$				0.900				0.180
p -value				0.000				0.083
R ²	0.176	0.518	0.391	0.503	0.682	0.682	0.525	0.542
Pecking Order Regression								
Constant	0.159	0.146	0.098	0.137	0.082	0.100	-0.019	0.005
p -value	0.249	0.203	0.441	0.238	0.158	0.103	0.790	0.943
Coef. on $E(\text{Def}_1)^a$	0.207	0.733			0.580	0.686		
p -value	0.089	0.000			0.000	0.000		
Coef. on $\text{Def}_{it} - E(\text{Def}_1)^a$		0.898				0.120		
p -value		0.000				0.317		
Coef. on $E(\text{Def}_2)^b$			0.428	0.926			-0.066	0.084
p -value			0.000	0.000			0.620	0.615
Coef. on $\text{Def}_{it} - E(\text{Def}_2)^b$				1.012				0.226
p -value				0.000				0.145
R ²	0.028	0.335	0.161	0.320	0.338	0.357	0.007	0.064

^a $E(\text{Def}_1)$ is the anticipated Financial Deficit expressed by the Financial Deficit of the previous year [$E(\text{Def}_1) = \text{Def}_{it-1}$]

^b $E(\text{Def}_2)$ is the anticipated Financial Deficit expressed by the deficit with lagged values of funds from operations and the changes in the net working capital

TABLE V. Estimation of the Models of Pecking Order and Trade-Off Theories for Greek firms

Dependent Variable	Period	
	2006-2010	2011-2016
	Long-Term Debt to Net Total Assets	

	(ΔD_{it})	
Trade – Off Regression		
Constant	0.021	-0.009
p –value	0.862	0.935
Target Adjustment coef (b_{ta})	0.759	0.828
p –value	0.000	0.000
R ²	0.204	0.250
Pecking Order Regression		
Constant	-0.069	-0.069
p –value	0.555	0.686
Pecking Order coef. (b_{po})	0.810	0.810
p –value	0.000	0.192
R ²	0.213	0.004
Both Regresions		
Constant	-0.046	0.000
p –value	0.654	0.999
Pecking Order coef. (b_{po})	0.778	0.104
p –value	0.000	0.215
Target Adjustment coef (b_{ta})	0.726	0.826
p –value	0.000	0.000
R ²	0.400	0.253

TABLE VI. First Diagnostic Test based Variations of Dependent Variable for Greek firms

Period	2006-2010	2011-2016	2006-2010	2011-2016	2006-2010	2011-2016
Dependent Variable	Long-Term Net Debt to Sales		Long-Term Net Debt to Net Total Assets		Long-Term Net Debt to Net Total Assets	
	(ΔND_{it})		(ΔND_{it})		(ΔND_{it})	
Method	No effects		Random Effects		Fixed Effects	
Trade – Off Regression						
Constant	0.028	0.002	-0.020	-0.009	0.022	-0.011
p -value	0.007	0.892	0.905	0.939	0.861	0.924
Target Adjustment coef (b_{ta})	0.187	0.186	0.668	0.828	0.820	0.861
p -value	0.008	0.012	0.000	0.000	0.000	0.000
R ²	0.020	0.115	0.164	0.250	0.292	0.323

Pecking Order Regression

Constant	0.004	0.032	-0.069	0.052	-0.088	0.051
p -value	0.675	0.555	0.555	0.686	0.467	0.708
Pecking Order coef. (b_{po})	0.258	0.529	0.810	0.126	1.028	0.122
p -value	0.000	0.110	0.000	0.192	0.000	0.300
R ²	0.148	0.009	0.213	0.004	0.336	0.064
Both Regressions						
Constant	0.009	0.032	-0.046	0.000	-0.063	-0.003
p -value	0.360	0.000	0.655	0.999	0.535	0.981
Pecking Order coef. (b_{po})	0.262	0.524	0.778	0.104	0.991	0.098
p -value	0.000	0.000	0.000	0.215	0.000	0.328
Target Adjustment coef (b_{ta})	0.210	0.103	0.726	0.826	0.784	0.860
p -value	0.001	0.073	0.000	0.000	0.000	0.000
R ²	0.173	0.152	0.400	0.253	0.541	0.325

TABLE VII. Second Diagnostic Test based on Anticipated Deficit for Greek firms

Period	2006-2010				2011-2016			
	Long-Term Debt to Net Total Assets		Debt to Net Total Assets		Long-Term Debt to Net Total Assets		Debt to Net Total Assets	
Dependent Variable	(ΔD_{it})				(ΔD_{it})			
Trade – Off Regression								
Constant	0.021	-0.046	0.001	0.046	0.019	0.027	0.024	0.012
p -value	0.859	0.655	0.992	0.654	0.865	0.803	0.829	0.915
Target Adjustment coef (b_{ta})	0.704	0.670	0.819	0.755	0.826	0.824	0.806	0.798
p -value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Coef. on $E(\text{Def}_1)^a$	0.144	0.630			0.293	0.397		
p -value	0.088	0.000			0.001	0.001		
Coef. on $\text{Def}_{it} - E(\text{Def}_1)^a$		0.779				0.104		
p -value		0.000				0.211		
Coef. on $E(\text{Def}_2)^b$			0.464	0.869			0.194	0.057
p -value			0.000	0.000			0.006	0.557
Coef. on $\text{Def}_{it} - E(\text{Def}_2)^b$				0.680				0.194
p -value				0.000				0.006
R ²	0.211	0.407	0.293	0.412	0.270	0.273	0.264	0.271
Pecking Order Regression								
Constant	0.012	-0.058	-0.018	0.070	0.069	0.080	0.017	0.032
p -value	0.923	0.606	0.887	0.552	0.584	0.529	0.890	0.796
Coef. on $E(\text{Def}_1)^a$	0.387	0.425			0.302	0.428		
p -value	0.000	0.000			0.003	0.002		
Coef. on $\text{Def}_{it} - E(\text{Def}_1)^a$		0.807				0.126		
p -value		0.000				0.189		
Coef. on $E(\text{Def}_2)^b$			0.371	0.842			0.285	0.106
p -value			0.000	0.000			0.000	0.339

Coef. on Def _{it} - E(Def ₂) ^b				0.776				0.225
p -value				0.000				0.022
R ²	0.058	0.269	0.058	0.214	0.022	0.026	0.030	0.042

^a E(Def₁) is the anticipated Financial Deficit expressed by the Financial Deficit of the previous year [E(Def₁) = Def_{it-1}]

^b E(Def₂) is the anticipated Financial Deficit expressed by the deficit with lagged values of funds from operations and the changes in the net working capital

TABLE VIII. Estimation of the Models of Pecking Order and Trade-Off Theories for Irish firms

Dependent Variable	Period	
	2006-2010	2011-2016
	Long-Term Debt to Net Total Assets (ΔD _{it})	
Trade – Off Regression		
Constant	-0.286	0.026
p –value	0.236	0.916
Target Adjustment coef (b _{ta})	0.768	0.857
p –value	0.000	0.000
R ²	0.218	0.270
Pecking Order Regression		
Constant	-0.307	-0.003
p –value	0.251	0.992
Pecking Order coef. (b _{po})	0.460	0.497
p –value	0.024	0.001
R ²	0.041	0.067
Both Regressions		
Constant	-0.332	-0.001
p –value	0.161	0.996
Pecking Order coef. (b _{po})	0.454	0.372
p –value	0.012	0.006
Target Adjustment coef (b _{ta})	0.766	0.815
p –value	0.000	0.000
R ²	0.258	0.306

TABLE IX. First Diagnostic Test based Variations of Dependent Variable for Irish firms

Period	2006-2010	2011-2016	2006-2010	2011-2016	2006-2010	2011-2016
Dependent Variable	Long-Term Net Debt to Sales (ΔND _{it})		Long-Term Net Debt to Net Total Assets (ΔND _{it})		Long-Term Net Debt to Net Total Assets (ΔND _{it})	
Method	No effects		Random Effects		Fixed Effects	
Trade – Off Regression						
Constant	0.002	0.018	-0.286	0.026	-0.289	0.026
p -value	0.915	0.356	0.343	0.916	0.243	0.922
Target Adjustment coef (b _{ta})	0.031	0.562	0.766	0.857	0.881	0.863
p -value	0.007	0.000	0.000	0.000	0.000	0.000
R ²	0.211	0.333	0.216	0.270	0.364	0.318

Pecking Order Regression						
Constant	-0.013	-0.025	-0.307	-0.003	-0.304	-0.009
p -value	0.438	0.164	0.341	0.992	0.290	0.976
Pecking Order coef. (b_{po})	0.157	0.337	0.452	0.497	0.430	0.581
p -value	0.002	0.000	0.026	0.001	0.072	0.003
R ²	0.080	0.298	0.040	0.067	0.149	0.128
Both Regressions						
Constant	-0.012	-0.019	-0.332	-0.001	-0.326	-0.002
p -value	0.486	0.242	0.161	0.996	0.185	0.995
Pecking Order coef. (b_{po})	0.198	0.323	0.454	0.372	0.366	0.377
p -value	0.001	0.000	0.012	0.006	0.073	0.028
Target Adjustment coef (b_{ta})	0.171	0.516	0.766	0.815	0.868	0.808
p -value	0.159	0.000	0.000	0.000	0.000	0.000
R ²	0.284	0.407	0.258	0.306	0.386	0.346

TABLE X. Second Diagnostic Test based on Anticipated Deficit for Irish firms

Period	2006-2010				2011-2016			
	Long-Term Assets		Debt to Net Total		Long-Term Assets		Debt to Net Total	
Dependent Variable	(ΔD_{it})				(ΔD_{it})			
Trade – Off Regression								
Constant	-	-	-	-	0.039	0.011	0.065	0.074
p –value	0.217	0.157	0.231	0.210	0.874	0.963	0.782	0.754
Target Adjustment coef (b_{ta})	0.796	0.779	0.791	0.788	0.909	0.864	0.864	0.873
p –value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Coef. on $E(Def_1)^a$	0.130	0.505			0.246	0.580		
p –value	0.467	0.032			0.090	0.002		
Coef. on $Def_{it} - E(Def_1)^a$		0.444				0.358		
p –value		0.016				0.008		
Coef. on $E(Def_2)^b$			0.437	0.524			0.471	0.437
p –value			0.000	0.003			0.000	0.001
Coef. on $Def_{it} - E(Def_2)^b$				0.134				0.471
p –value				0.515				0.000
R ²	0.221	0.258	0.304	0.306	0.284	0.318	0.363	0.364
Pecking Order Regression								
Constant	-	-	-	-	-	-	-	-
p –value	0.244	0.288	0.249	0.269	0.033	0.006	0.072	0.049
	0.369	0.282	0.343	0.308	0.911	0.984	0.795	0.862
Coef. on $E(Def_1)^a$	0.164	0.263			0.038	0.445		
p –value	0.097	0.009			0.815	0.043		
Coef. on $Def_{it} - E(Def_1)^a$		0.497				0.498		
p –value		0.016				0.001		
Coef. on $E(Def_2)^b$			0.403	0.521			0.460	0.548
p –value			0.002	0.011			0.000	0.001
Coef. on $Def_{it} - E(Def_2)^b$				0.182				0.196
p –value				0.440				0.348
R ²	0.026	0.052	0.073	0.077	0.000	0.067	0.089	0.094

^a $E(Def_1)$ is the anticipated Financial Deficit expressed by the Financial Deficit of the previous year [$E(Def_1) = Def_{it-1}$]

^b $E(Def_2)$ is the anticipated Financial Deficit expressed by the deficit with lagged values of funds from operations and the changes in the net working capital

TABLE XI. Estimation of the Models of Pecking Order and Trade-Off Theories for Portuguese firms

Dependent Variable	Period	
	2006-2011	2012-2016
	Long-Term Debt to Net Total Assets (ΔD_{it})	
Trade – Off Regression		
Constant	0.033	-0.053
p –value	0.825	0.733
Target Adjustment coef (b_{ta})	0.865	0.664
p –value	0.000	0.000
R ²	0.298	0.183
Pecking Order Regression		
Constant	0.009	0.009
p –value	0.957	0.943
Pecking Order coef. (b_{po})	0.690	0.690
p –value	0.000	0.001
R ²	0.122	0.078
Both Regressions		
Constant	-0.015	-0.017
p –value	0.914	0.914
Pecking Order coef. (b_{po})	0.646	0.312
p –value	0.000	0.042
Target Adjustment coef (b_{ta})	0.843	0.588
p –value	0.000	0.000
R ²	0.404	0.209

TABLE XII. First Diagnostic Test based Variations of Dependent Variable for Portuguese firms

Period	2006-	2012-	2006-	2012-	2006-	2012-
	2011	2016	2011	2016	2011	2016
Dependent Variable	Long-Term Net Debt to Sales (ΔND_{it})		Long-Term Net Debt to Net Total Assets (ΔND_{it})		Long-Term Net Debt to Net Total Assets (ΔND_{it})	
Method	No effects		Random Effects		Fixed Effects	
Trade – Off Regression						
Constant	0.014	0.027	0.034	-0.053	0.032	-0.049
p –value	0.473	0.249	0.885	0.738	0.840	0.768
Target Adjustment coef (b_{ta})	0.253	0.743	0.876	0.664	0.893	0.771
p –value	0.014	0.000	0.000	0.000	0.000	0.000
R ²	0.237	0.200	0.306	0.183	0.360	0.287
Pecking Order Regression						
Constant	-0.028	0.045	0.009	-0.012	0.003	0.008
p –value	0.061	0.026	0.957	0.942	0.986	0.965
Pecking Order coef. (b_{po})	0.567	0.545	0.690	0.514	0.769	0.673
p –value	0.000	0.000	0.000	0.001	0.000	0.001
R ²	0.466	0.411	0.122	0.078	0.186	0.156
Both Regressions						
Constant	-0.027	0.044	-0.014	-0.016	-0.020	-0.005
p –value	0.062	0.027	0.929	0.935	0.891	0.974

Pecking Order coef. (b_{pc})	0.560	0.469	0.641	0.321	0.705	0.372
p-value	0.000	0.000	0.000	0.038	0.000	0.063
Target Adjustment coef (b_{ta})	0.206	0.331	0.850	0.583	0.864	0.682
p-value	0.006	0.007	0.000	0.000	0.000	0.000
R ²	0.490	0.443	0.408	0.211	0.467	0.312

TABLE XIII. Second Diagnostic Test based on Anticipated Deficit for Portuguese firms

Period	2006-2011				2012-2016			
	Long-Term Debt to Net Total Assets				Long-Term Debt to Net Total Assets			
Dependent Variable	(ΔD_{it})				(ΔD_{it})			
Trade – Off Regression								
Constant	0.034	0.014	0.026	0.008	0.006	0.016	0.041	0.016
p-value	0.819	0.920	0.849	0.953	0.969	0.910	0.794	0.916
Target Adjustment coef (b_{ta})	0.852	0.812	0.939	0.905	0.797	0.738	0.693	0.590
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Coef. on $E(Def_{1t})^a$	0.066	0.511			0.595	0.774		
p-value	0.611	0.002			0.000	0.000		
Coef. on $Def_{it} - E(Def_{1t})^a$		0.670				0.211		
p-value		0.000				0.145		
Coef. on $E(Def_{2t})^b$			0.543	0.892			0.103	0.314
p-value			0.000	0.000			0.336	0.049
Coef. on $Def_{it} - E(Def_{2t})^b$				0.482				0.103
p-value				0.000				0.336
R ²	0.299	0.411	0.407	0.460	0.299	0.310	0.189	0.209
Pecking Order Regression								
Constant	0.064	0.010	0.059	0.016	0.052	0.006	0.078	0.020
p-value	0.716	0.951	0.731	0.924	0.752	0.972	0.642	0.900
Coef. on $E(Def_{1t})^a$	0.296	0.356			0.378	0.827		
p-value	0.046	0.059			0.009	0.000		
Coef. on $Def_{it} - E(Def_{1t})^a$		0.743				0.484		
p-value		0.000				0.002		
Coef. on $E(Def_{2t})^b$			0.408	0.842			0.031	0.422
p-value			0.001	0.000			0.782	0.011
Coef. on $Def_{it} - E(Def_{2t})^b$				0.591				0.605
p-value				0.000				0.000
R ²	0.025	0.164	0.063	0.143	0.050	0.120	0.001	0.096

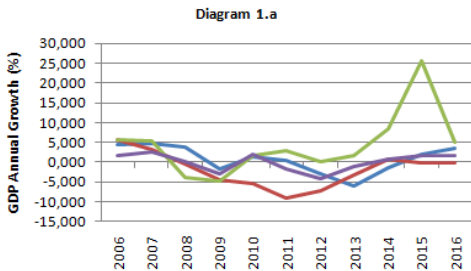
^a $E(Def_{1t})$ is the anticipated Financial Deficit expressed by the Financial Deficit of the previous year [$E(Def_{1t}) = Def_{it-1}$]

^b $E(Def_{2t})$ is the anticipated Financial Deficit expressed by the deficit with lagged values of funds from operations and the changes in the net working capital

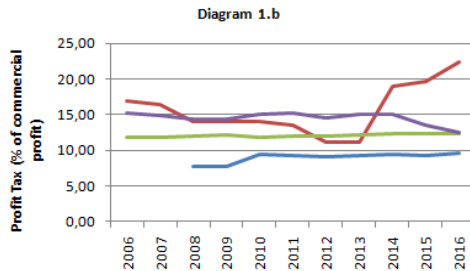
TABLE XIV. Summary of the Results of Statistical Analysis

	Before Crisis: First period		During Crisis: Second Period	
	Trade-Off	Pecking Order	Trade-Off	Pecking Order
Cyprus	Yes	Yes	Yes	No
Greece	Yes	Yes	Yes	No
Ireland	Yes	No	Yes	No
Portugal	Yes	Yes	Yes	Yes

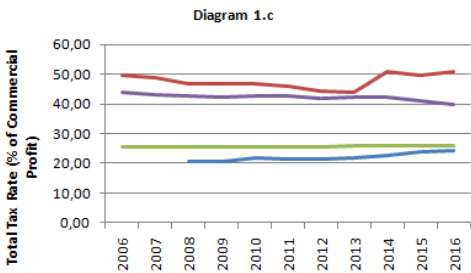
Figures



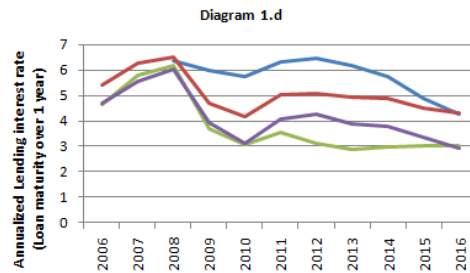
Source: World Bank Database



Source: World Bank Database



Source: World Bank Database



Source: European Centra Bank Database

— Cyprus — Greece — Ireland — Portugal

Diagram 2: Gross Domestic Product annual growth, profit tax, total tax rate and annualized lending interest rate in Cyprus, Greece, Ireland and Portugal for the period 2006-2016