National Bank of the Republic of Macedonia

Determinants of Corporate Capital Structure: Evidence from Macedonian Panel Data[1]

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December 2015

Abstract

The purpose of this study is to analyze capital structure decisions of Macedonian companies by using firm level data for the period 2000-2014. More specifically the study is focused on two specific questions. First, by using dynamic panel methodology we try to identify the financial leverage determinants of Macedonian firms. Second, we analyze changes in firms' leverage decisions by comparing the post-crisis outcome with the pre-crisis determinants. Our results show that the size of the companies and growth opportunities are positively related to leverage, while profitability, tangibility and non-debt tax shield are negatively associated with leverage. Regarding the second question, the pre-crisis state of the theoretical determinants does not explain the post-crisis behavior of the Macedonian firms. On the other hand, the leverage decisions after the crisis were affected by the pre-crisis level of leverage and changes in firms' performance during the crisis.

JEL classifications: *C33, G32*

Keywords: *Panel Data, Corporate Capital Structure, Pecking Order Theory, Trade-off Theory*

[1] The author would like to thank Ana Mitreska, Sultanija Bojceva-Terzijan, Petar Debnikov and Rilind Kabashi for their valuable comments. The views expressed in this paper are those of the author and do not necessarily represent the views of the National Bank of the Republic of Macedonia.

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Introduction

The firms' financial performance is directly affected by its capital structure which makes the choice of capital structure composition one of the key questions every firm faces. When making decisions regarding the capital structure firms face more than one choice – they might raise funds internally, or alternatively, from external sources such as debt or equity. Moreover, firms decide on issuing specific debt-equity combination, subject to various constraints, with final goal – to maximize the overall market value. This combination affects the weighted average cost of capital and the availability of capital, and from here, the firms' investment, production and employment.

This paper investigates firms' capital structure decisions on a sample of 194 Macedonian companies. More specifically the research is focused on two questions:

1. What are determinants of financial leverage on Macedonian companies?

2. What might explain changes in firms' capital structure decisions in the period after the crisis as compared to the pre-crisis period?

To identify the theoretical determinants of leverage, two-step system dynamic panel data estimator which allows for dynamics and controls for possible endogeneity between variables, is employed. Dynamic model was needed in order to test the theoretical predictions on adjustment towards specified debt target. Besides theoretical determinants, the model on leverage determinants of Macedonian firms includes controls for changes in the macroeconomic environment.

Second question is connected with the consequences of the global economic and financial crisis. It affected economies worldwide through different channels, but, in general, the final outcome was decline in economic growth and, in most of the countries, rise in unemployment. At the same time, most economies faced debt problems originating from the rapid pre-crisis debt accumulation and increase in overall leverage ratios. Thus, one of the key challenges that policymakers faced after the crisis, besides restoring growth and stability, was how to stabilize debt levels and organize the process of deleveraging. By using specific difference-in-difference cross section database we tried to see whether pre-crisis state of the determinants can explain post-crisis leverage changes.

The paper is organized as follows. Section I discusses theoretical models of capital structure. Section II surveys empirical literature. In Section III we discuss determinants of leverage, their theoretical background and expected signs, as well as construction of these variables in the Macedonian case. Section IV presents the empirical analyses of leverage determinants of Macedonian firms. Section V analyses the factors that triggered changes in firms' capital structure choices after the crisis. Finally, section VI concludes.

I. Financial leverage and review on capital structure theories

Firm's financial performance is directly affected by its choice of capital structure. Companies may raise funds from internal (using part of the profit that would have been otherwise distributed as dividend to shareholders) and/or from external sources (issuance of debt or equity). When it comes to external financing, companies have to choose a specific debt-equity mix having in mind the consequences of both types of financing on their capital structure. Namely, in the case of equity financing, the company may, but it is not obliged, to pay dividend to shareholders. However, in the case of debt financing the company must pay regular interest to debt-holders. In good times, borrowed money might be invested in actions that ultimately will result in higher production volume, sales and profits. In this case, debt holders will continue to receive a fixed amount of interest, whereas shareholders might receive higher dividends. In bad times, debt holders will again receive their fixed interest, whereas shareholders, most probable, will not be paid the dividends. Because debt positively affects returns on shareholders in good times and negatively affects them in bad times, it creates a "financial leverage". Within the capital structure, the level of the leverage is of great importance because it affects the weighted average cost of capital (WACC). The company has to choose the level of leverage so that the WACC is minimized and the firm's value is maximized.

The theoretical literature on capital structure starts with the Modigliani-Miller framework (Modigliani and Miller, 1958) which suggests that, under the assumptions of perfect capital markets and a neutral tax system, capital structure has no influence on firm's value and the cost of capital. Under these assumptions firms are indifferent between internal and external sources of financing i.e. they are considered to be perfect substitutes. Most of the later theoretical work on this subject has focused on the relevance of firms' financial decisions once these assumptions are relaxed and tried to answer the question on the determinants of capital structure decisions. In general, the theories on capital structure can be structured into two groups – theories that predict existence of optimal debt-equity ratio for each firm (so-called static trade-off models) and theories that declare that there is no well defined target (pecking-order theories).

Static trade-off theory was first propounded in 1984 by Myers and Majluf. The basic assumption underlying this theory is that there exists an optimal capital structure, which is achieved in the moment when the marginal present value of the benefit from an additional unit of debt is equal to the marginal present value of the costs of financial distress on additional debt. Debt financing is very attractive because the interest rate expense paid to debt-holders is tax deductible i.e. debt financing creates "tax shield". However, debt financing is not costless – debt issuance is connected with certain bankruptcy costs and costs of financial distress, as well as agency, moral hazard, monitoring and contracting costs. Firms balance debt and equity by making trade-offs between benefits as opposed to

costs of debt financing. On the other hand, ***the pecking order theory***, developed by Myers (1984), suggests that there is no optimal capital structure. Instead, the pecking order model suggests that firms prefer internal rather than external financing. This comes from the existence of information asymmetry between managers and investors which, in turn, increases the cost on external financing. Therefore, for firms is cheaper to finance its investment decisions form internal funds. If external funds are necessary then firms will choose debt rather than equity because debt financing entails lower costs and no outside shareholders.

II. Literature review

The empirical literature on this topic is rather broad. Generally, most of the research done in this area is concentrated on the theoretical capital structure determinants (profitability, growth opportunities, firm size, assets' tangibility and tax shields). In general, in line with different predictions from the theoretical models, different studies provide evidence on different relationships between corporate structure determinants and firms' leverage. For illustration, Antoniou et al. (2008), Flannery and Rangan (2006), Clark et al. (2009) and Frank and Goyal (2009) found out that the leverage ratio of the firms is positively affected by the size of the firm. On the other hand, Talberg et al. (2008) and Titman and Wessels (1988) provided evidence for negative relationship between debt ratio and firm size. Summary of empirical evidence from a number of selected empirical studies is given in Table 1.

Table 1. Summary of empirical evidence from selected empirical studies

Study	Determinants of capital structure			
	Firm size	Profitability	Growth opportunity	Asset tangibility
Braedly et al. (1984)				+
Kim and Sorensen (1986)			-	
Friend and Lang (1988)	*	-		+
Rajan and Zingales (1995)	+	-	-	+
Titman and Wessels (1988)	-	+/-	*	*
Shyam-Sunder and Myers (1999)		-		+
Flannery and Rangan (2006)	+	-	*	+
Antoniou et al. (2008)	+	-	-	+
Talbaerg et al. (2008)	-	-	-	+
Clark et al. (2009)	+	*		*
Chang et al. (2009)		+/-	+/-	+/-
Frank and Goyal (2009)	+	-	-	+
Huang and Song (2002)	+	-	-	+
Chen (2004)	-	-	+	+
Gaud et al	+	-	-	+
Ferri and Jones (1979)	+			+
Padron et al (2005)	+		-	+

The + (-) sign indicates positive (negative) relationship; * indicates included but insignificant variable in the model; empty cells mean that the variable was not included in the model.

Regarding the geographical coverage, existing empirical evidence is based mainly on data on developed countries. Bradley et al. (1984), Kim and Sorensen (1986), Friend and Lang (1988) and Titman and Wessels (1988) are investigating capital structure decisions on a sample of U.S. companies; Rajan and Zingales (1995) and Wald (1999) examine firms' decisions in G7 countries; Gaud et al. (2005) identify capital structure determinants in the Swiss case. Concerning developing and transition countries in the empirical literature, Booth et al. (2001) uses a sample of firms in several developing countries[3], Huang and Song (2002) are concentrated on firms' capital structure in China; Bauer (2004) investigates determinants of capital structure in the case of the Czech Republic and Mangafic and Martinovic (2015) test the relationship between the leverage and its determinants in the case of Bosnia and Herzegovina. No similar study has been conducted for Macedonian firms, at least to the knowledge of the author.

III. Leverage and its determinants – the case of Macedonia

Based on theoretical predictions and findings from the empirical studies this section identifies the potential determinants of the capital structure decisions of the Macedonian firms. The most commonly used firms' leverage determinants, as pointed in Table 1 are size, profitability, growth opportunity and asset tangibility. Additionally, we consider the effect of taxes, non debt tax shields and macroeconomic environment. In this section we present the theoretical background, the expected sign in the empirical analysis and the construction of the variables. The dependent variable is the leverage ratio defined as a ratio of total debt to total equity. All the variables included in the analysis are in real terms i.e. they are deflated by the CPI index.

Size

Firm size is one of the most common determinants of capital structure of the firms. Regarding the sign, theoretical models, generally predict a positive relationship between the size of the firm and the leverage. According to trade-off models larger firm have higher debt capacity and therefore, are able to have higher leverage. Larger firms usually have smaller costs of financial distress because of different reasons (easer access to the credit markets, more favorable conditions, smaller bankruptcy risk, economies of scale etc.) which allows them to have higher debt ratio. The pecking order model also predicts positive relationship between firm size and the leverage. Namely, the larger the firm the more

[3] Brazil, Mexico, India, South Korea, Jordan Malaysia, Pakistan, Thailand, Turkey and Zimbabwe.

transparent it is, which leads to less information asymmetry in the market and makes it easier for the firm to obtain external financing. The positive relationship between size and leverage has been confirmed in many empirical studies, such as Huang and Song (2002), Rajan and Zingales (1995), Friend and Lang (1988), Antoniou et al. (2008), Flannery and Rangan(2006), Clark et al. (2009) etc.

Indicators usually met in the empirical literature about the firm size are: natural logarithm of sales, natural logarithm of total assets, natural logarithm of revenues, natural logarithm of number of employees, average value of total assets, total assets at book value and the market value of the firm. In this study we use natural logarithm of firm's employees as proxy for size [*size*].

Profitability

The pecking order theory predicts inverse relationship between profitability and firm's leverage i.e. the more profitable the firm is the less leverage it will have, because more profitable firms have more own financial funds. Rajan and Zingales (1995) and Chen (2004) are among the empirical studies that supported the pecking order theory. On the other hand, the trade-off model predicts positive relationship between profitability and leverage. Investors are more willing to supply loans to more profitable firms as the likelihood of paying back the loans in future is greater for these firms i.e. more profitable firms have lower bankruptcy risk. Results of Gaud et al. (2005) confirm empirically the positive relationship between profitability and debt level on a sample of Swiss firms.

Research studies have used different measures for firms' profitability such as: operating income over sales, operating income over total assets, the return on assets (ROA), ratio of earning before tax to total assets etc. In this research we use the ratio of earnings before tax to total assets as an indicator for profitability [*profitability*].

Tangibility

Majority of the capital structure literature predicts positive relationship between tangibility (i.e. the share of tangible assets in the total assets) and firms' leverage. The basic idea is that tangible assets represent real guarantees to the investors i.e. the higher the share of tangible assets the smaller are the agency costs of debt. From here, the greater the proportion of tangible assets on the balance sheet, investors are more willing to supply loans and leverage should be higher. This positive relationship between tangibility and leverage has been confirmed in many empirical studies (Ferri and Jones, 1979; Titman and Wessels, 1988; Rjan and Zingales, 1995; Gaud et al., 2005).

Commonly used proxy for tangibility in the empirical literature is the ratio of tangible assets plus inventories to total assets as an indicator for tangibility. Unfortunately we don't have data on tangible

assets by firms. Therefore our proxy for tangibility includes only the inventories i.e. it is represented by the ratio of inventories to total assets [*tangibility*].

Growth opportunities

Growth potential is considered to be a significant determinant of capital structure. Theory suggests that firms with higher growth opportunities are more likely to keep their debt level low so that they can use new opportunities when they appear. Moreover, in line with the agency cost framework growing firms face more severe agency problems and therefore they should use more equity financing (because it reduces agency costs), whereas firms with smaller growth opportunities should rely primary on debt financing because of its disciplinary role (Jung et al., 1996). The results of Titman and Wessels (1988), Rajan and Zingales (1995), Gaud et al. (2005) and Padron et al. (2005) confirmed that the relationship between growth opportunities and debt is negative.

Usual proxies for growth opportunities in the empirical studies include ratio of the market value of common stocks to total liabilities, growth rate of total assets, ratio of capital expenditures over total assets, the ratio of advertising expenses to sales, research and development expenses to sales etc. Unfortunately, due to data limitations the only variable that we were able to construct was the growth rate in total assets. Shuetrim et al. (1993) and Frank and Goyal (2009) also used growth rate in total assets as proxy for growth opportunities of the firms.

Taxes

The impact of taxation on leverage has more dimensions. On one hand, higher taxes might stimulate more debt financing given that the interest rate expense paid to debt-holders is tax deductible (interest tax shield). In simple words, between two firms with same amount of assets, the firm that relies more on debt financing will pay less taxes in comparison with the firm that has more equity, all else equal. Hence, if the firm is in good tax-paying position, the more tax liability the firm has, the higher its motivation to use debt financing instead of equity. This positive relationship between tax rates and leverage has first been discussed by Modigliani and Miller (Modigliani and Miller, 1958) and empirically has been confirmed by Graham (2000) and Bancel and Mittoo (2004).

However, besides interest, there exist other expenditures that are also tax deductible, but are not debt creating (Allen and Mizuno, 1982), such as depreciation and investment tax credits[4]. These non-debt creating expenditure create so-called non debt tax shields i.e. they reduce the amount of taxes that firms

[4] Investment tax credits refer to an amount that businesses are allowed by law to deduct from their taxes, reflecting an amount they reinvest in themselves.

have to pay without creating new debt. Hence, the more non-debt creating expenditure a firm has, the less incentive for issuing debt for tax reducing purposes it will have. The negative relationship between leverage and non-debt tax shields has been confirmed in many empirical studies (Bradley, Jarrel and Kim, 1994; Bowen et al., 1982; MacKie-Mason, 1990; Dhaliwal et al., 1992 and Givoly et al., 1992).

The effect of taxes on debt in our studies has been captured by two variables. The first one captures the effect of corporate tax and it is calculated as corporate tax paid by the firms divided by earning before tax [*tax*]. The second one refers to the effect of the non-debt tax shields and it is represented by depreciation expenses divided by the total assets [*non-debt tax shield*].

Macroeconomic environment

All the above mentioned determinants are firm specific. However, many empirical studies concluded that besides these firm specific factors, capital structure decisions are significantly influenced by the macroeconomic environment. Korajczuk and Levy (2003) argued that firms' capital structure decisions are function of firms' specific factors, as well as of the macroeconomic conditions. McClure et al. (1999) investigated the difference in capital structure in G7 countries and concluded that different macroeconomic factors are one part of the explanation. Booth et al. (2001) investigated the relationship between capital structure and macroeconomic factors on a sample of 10 developing countries to conclude that macroeconomic factors, such as economic growth, interest rates, inflation and development of capital markets, have significant influence on capital structure of the companies.

The macroeconomic environment in our research is proxied by two variables – real GDP growth to describe the general macroeconomic conditions in the country and the real lending interest rate, as the price of borrowing.

Lagged leverage

Gaud et al. (2005) and Antoniou et al. (2008) included lagged leverage variable in their empirical models to test the existence of optimal capital structure. As trade-off theory predicts if optimal structure exists than firms will tend to make some adjustment to their current debt level towards the targeted debt level at every period.

The targeted debt level ($Leverage_{it}^{*}$) is a function of k explanatory variables (equation 1):

$$Leverage_{it}^{*} = \sum_{k=1} \varphi_k X_{kit} + \omega_{it} \qquad (1)$$

,where X is a vector of k explanatory variables. However, because of the existence of transaction costs, the firms cannot adjust their leverage ratios too frequently. According to Leary and Roberts (2005)

firms adjust their capital structure on average once a year. In other words, firms face a trade-off between the costs of being off-target and the cost of leverage adjustment. The process of adjustment to targeted debt level is given by equation 2:

$$Leverage_{it} - Leverage_{it-1} = \theta(Leverage_{it}^{*} - Leverage_{it-1}) \quad (2)$$

,where $Leverage_{it}$ stands for the current debt level and θ is the adjustment coefficient. If $\theta = 1$ than actual change in leverage is equal to the desired change and the adjustment is transaction cost free. On the other hand, if $\theta = 0$ it is very costly for the firms to adjust i.e. there is no adjustment in leverage. Substituting (1) into (2) gives the dynamic model, which will be estimated in the next section with lagged leverage variable as explanatory variable:

$$Leverage_{it} = (1-\theta)Leverage_{it-1} + \sum_{k=1} \theta\varphi_k X_{kit} + \theta\omega_{it} \quad (3)$$

IV. Empirical analysis on determinants of financial leverage

After elaborating the theoretical determinants of firms' leverage, in this section we conduct a formal empirical analysis to answer the first research question "what are determinants of financial leverage on Macedonian companies?". We start the section with a short discussion of the dataset and methodology and then we present the estimation results.

Data

The database used in this study is compiled from the annual financial accounts (balance sheet and income statement) that firms submit to the Central Register of the Republic of Macedonia. The total sample available to us consists of annual data for 194 firms for two sub-periods – from 2000-2009 and from 2013-2014[5]. In this section we are using only the first sample which has a longer time dimension. Time dimension is very important for the research question we are trying to answer in this section i.e. which are the determinants of Macedonian firms' leverage and for the method we are employing – panel data estimation. Because we do not have data for all the firms for the entire period (some firms are opened later than 2000, whereas other went bankruptcy before 2009) the dataset is unbalanced i.e. we have 1532 observations.

[5] The period from 2010-2012 was not available.

Methodology

The estimation method used in the analysis of leverage determinants is system dynamic panel data estimator also known as "system GMM" estimator. We consider this method to be appropriate for several reasons. First, a panel data analysis may capture both cross-sectional and inter temporal relationships between firm's leverage and its determinants. Second, as explained in the previous section, our model is dynamic i.e. we include lagged dependent variable in the model. Third, the sample we are working with has in total 1532 observations, but only ten years of data i.e. it is a so-called "small T, large N" panel. In such cases, as argued by Roodman (2009), "system GMM" estimator is more efficient when compared to other panel estimators. Fourth, the problem of endogeneity can be more easily addressed within "system GMM" estimator; compared to other estimators "system GMM" allows for the use of uncorrelated with the residual lagged independent variables as instruments.

Given that we work with micro data, constructed variables are prone to have more outliers in comparison with macro data. In order to reduce the impact of outliers on final results, we winsorized[6] the dependent, as well as the independent variables, at 1% level.

Results

In this section we present and discuss the estimation results. The dependent variable is the leverage calculated as total debt to equity, whereas the explanatory firms' specific variables - size, profitability, growth opportunities, tangibility of assets, non-debt tax shields and tax variable are calculated as discussed in the previous section. The correlation matrix between these variables is presented in Table2.

[6] Winsorizing or winsorization is the transformation of statistics by limiting extreme values in the statistical data to reduce the effect of possibly spurious outliers.

Table 2. Correlation matrix

	leverage	size	profitability	growth opportunities	tangibility	non debt tax shield	tax
leverage	1.00						
size	-0.52	1.00					
profitability	0.07	-0.21	1.00				
growth opportunities	0.24	-0.27	0.07	1.00			
tangibility	-0.14	0.31	-0.14	-0.12	1.00		
non debt tax shield	-0.32	0.32	0.03	-0.23	-0.07	1.00	
tax	0.03	-0.04	-0.16	-0.02	-0.05	0.00	1.00

Additionally we included the lagged dependent variable, to test the leverage adjustment theory and GDP and real lending interest rate, to control for changes in the macroeconomic environment.

Before proceeding with the estimation of the model an important question to be resolved is the issue of possible endogeneity between the variables. As previously mentioned, one of the advantages of the GMM panel estimator refers exactly to the treatment of endogeneity. However, capital structure theory does not give clear predictions whether firm's leverage might influence some of the firm's specific characteristics. The most commonly discussed source of endogeneity in the empirical studies on this topic is that all variables are based upon accounting values and are thus determined simultaneously (Gaud et al., 2003). Therefore, we tested various specifications concerning the endogeneity of the explanatory variables. Each estimation was checked for validity of the instruments through Sargan and Hansen tests of overidentifying restrictions (the null hypotheses in these tests are that the overidentifying restrictions are valid), and through the Arellano-Bond test for autocorrelation in the idiosyncratic residuals (presence of autocorrelation may imply that the lags are invalid instruments; see Arellano and Bond (1991)). In order to obtain robust standard errors we applied the Windmeijer correction.

The estimation results are presented in Table 3. Model 1 defines firms' leverage as function only of the firm specific characteristics. Only size is treated as endogenous variable, whereas all the other firm specific variables are predetermined. In model 2 we augment the first model with the GDP growth and real interest rate to test whether macroeconomic conditions influence capital structure decisions of the firms. Both variables are treated as endogenous.

Table 3. Determinants of leverage - estimation results

	model 1 leverage	model 2 leverage
leverage (t-1)	0.94**	0.94**
	(0.04)	(0.04)
size	0.03***	0.02***
	(0.01)	(0.01)
profitability	-0.10**	-0.11***
	(0.04)	(0.04)
growth opportunities	0.06***	0.06***
	(0.01)	(0.01)
tangibility	-0.19***	-0.18***
	(0.07)	(0.06)
non debt tax shield	-0.47***	-0.41***
	(0.15)	(0.14)
tax	-0.004	-0.01
	(0.01)	(0.01)
real lending interest rate		-0.08
		(0.20)
GDP growth		-0.16
		(0.21)
Constant	-0.05	-0.02
	(0.05)	(0.06)
Observations	1532	1532
Number of instruments	12	18
Arellano-Bond test for AR(2) p value	0.26	0.29
Hansen test of overid. restrictions: chi2(10) p value	0.70	0.59

Corrected standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The diagnostic tests suggest that the model is well specified – the number of instruments is smaller than the number of observation, the hypothesis of no second order serial correlation between the residuals can not be rejected at the conventional levels (Areallano-Bond test for AR(2)) and the Hansen test suggest that the instruments are valid. Next, we continue with the interpretation of the results.

The coefficient of the ***lagged dependent variable*** is high and significant at the 5% level in both models. High value for the coefficient before the lagged variable has been found in other studies (Gaud et al., 2003, Mangafic and Martinovic, 2015). This coefficient, as discussed previously, is an important indicator for the existence/non-existence of an adjustment towards targeted debt level. Relatively high value of the lagged dependent variable means that the coefficient of adjustment θ is low. In the Macedonian case θ is 0.06, which actually means that Macedonian firms do adjust current debt ratios to the target but the adjustment is rather slow. In the literature such a behavior is explained by significantly higher cost of adjustment as compared to the cost of remaining off target. This leads to firms' setting their current debt-ratios close to their past level.

With regard to the theoretical determinants, our empirical analysis suggests that all included variables are important; the only exception is the tax variable whose coefficient has been estimated as

insignificant. ***Size*** of the firms is positively related to the level of leverage, meaning that the bigger the firm the higher leverage. More specifically, one percent increase in size leads to 0.03% increase in leverage. This finding is in line with the theoretical predictions of both, the trade-off model, as well as the pecking order theory. Another determinant that is positively related with the level of leverage is the ***growth opportunities*** variable i.e. one percent higher growth opportunities result in 0.06% increase in leverage. Positive relationship between leverage and growth opportunities is opposite to the theory; however, some empirical studies also found positive relationship between leverage and growth opportunities (Shuetrim et al 1993). Possible explanation for the positive sign, as argued by Shuetrim et al is that rapid growth exhausts firms' internal reserves and therefore firms that experience high growth must rely on external sources of financing.

On the other hand, ***profitability*** and ***tangibility*** have negative influence on firms' leverage. As profitability is concerned the estimated results are in line with the pecking order theory that suggests that more profitable firms tend to use less leverage. The inverse relationship between profitability and debt has been found in Rajan and Zingales (1995) and Chen (2004). In our case, an increase in the profitability of one percent will cause decline in firms' leverage by around 0.1%. Unlike profitability, the negative relationship between leverage and tangibility is not in line with the capital structure theories, as well as with the findings in majority of the empirical studies. Only several studies have found negative relationship between these two variables (Booth et al., 2001; Huang and Song, 2002; Bauer, 2004). Additionally, as stressed previously, our variable is imperfect proxy for tangibility as it includes only inventories; adding fixed assets might change results.

The ***effect of taxes***, as argued in the previous section is very complex and there is no clear cut about the precise impact on tax structure on firms' capital financing decisions. On one hand, corporate tax is expected to be positively related to leverage as the interest rate expense paid to debt-holders is tax deductible. On the other hand, there exist the so-called non-debt tax shields that act as substitutes for the debt tax shield. Firms that are able to use non-debt tax shields will be less willing to finance themselves through debt issuance. This implies negative relationship between non-debt tax shields and debt. In the Macedonian case two variables that capture the potential impact of taxes on debt level were included. The first one is proxy for non-debt tax shields. In line with the theoretical predictions and majority of the empirical literature the estimated coefficient is negative and significant implying an inverse relationship between non-debt tax shields and leverage for Macedonian firms i.e. an increase in the non-debt tax shields for one percent results in decline of firms' leverage for 0.4 - 0.5%. The second variable that captures the influence of the corporate tax on firms' debt turned to be insignificant in the Macedonian case leading to a conclusion that firms' capital structure decisions in Macedonia are not significantly influenced by the corporate tax rate.

In the second model we included the macroeconomic variables. The coefficients of the firm specific variables remain stable and significant after adding the additional variables. However, the results

showed no significant impact of the macroeconomic variables on leverage decisions of Macedonian firms (model 2).

V. Changes in firms' capital structure after the crisis

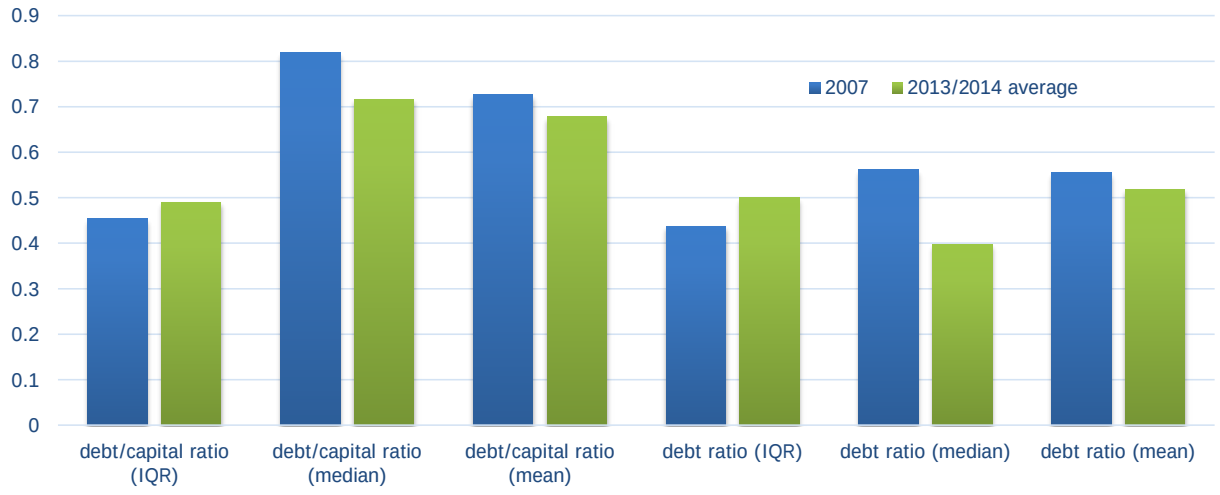
The 2007/2009 global crisis is marked as the most severe crisis since the 1930s. It affected economies worldwide through different channels, but, in general, the final outcome faced by most of the countries was decline in economic growth and rise in unemployment. At the same time most economies faced debt problems originating from the rapid pre-crisis debt accumulation and increase in leverage ratios in all sectors (government, households and corporative sector). Thus, one of the key challenges that policymakers faced after the crisis, besides restoring growth and stability, was "how to guide their economies through the looming and lengthy process of debt reduction, or deleveraging"[7]. A report published by McKinsey Institute in 2011 that investigated 45 episodes of deleveraging since the Great Depression in the world concluded that 32 of them followed a financial crisis.

In what follows we try to see whether the global crisis changed the behavior of the Macedonian firms concerning their financial decisions. Namely, in this section we try to answer two specific questions. First, we investigate whether the initial state of the theoretical determinants of leverage mattered for firms' financial decisions after the crisis. Put differently, we are interested in finding out whether firms' characteristics before the crisis can explain post-crisis changes in the firms' capital structure. Second, we test whether the global economic and financial crisis had direct significant impact on firms' leverage decisions in Macedonia after the crisis.

Figure 1 shows selected leverage indicators for the sample of Macedonian firms used in the empirical analysis in the previous chapter. One can notice that most of the indicators show some decline in corporate indebtedness in the period 2013-2014 on average relative to 2007; however, the intensity is fairly small. Next, we continue with the empirical analysis.

[7] McKinsey Global Institute, Debt and deleveraging: The global credit bubble and its economic consequences, 2011.

Figure 1: Selected leverage indicators before and after the crisis



debt ratio = total debt/total assets
IQR = The interquartile range (IQR) is a measure of variability, based on dividing a data set into quartiles.

Source: Central Register of the Republic of Macedonia and author's own calculations.

Specific cross section database was constructed to answer the two questions stated above. The dependent variable is the leverage defined in differences, the difference being calculated as a change between financial leverage after the crisis and financial leverage before the crisis (in percentage points). The independent variables are created by taking into consideration the specific research question – whether the pre-crisis state affected the post-crisis response or not. Therefore, we included the theoretical determinants of firms' financial decisions tested in the previous section (size, profitability, growth opportunities, taxes, tangibility, non-debt tax shields, pre-crisis leverage) in the pre-crisis period. Important issue when creating the database was the choice of the pre-crisis and after the crisis year. As a represent of the pre-crisis period we choose 2007, the same year as in Jovanovikj and Georgievska (2015) analysis of the transmission channels of the global crisis to Macedonian firms. The choice of 2007 instead of 2008 as a pre-crisis period is justified on the basis that the first effects of the global crisis in the Macedonian economy were visible in the second half of 2008 and, therefore, using 2008 as a pre-crisis period would probable understate the true negative effects. The decision regarding the choice after the crisis period was significantly constrained by data limitations. Namely, as mentioned previously, our data sample consists of 194 firms in two periods – the first one from 2000-2009, which was used in the panel estimation of the capital structure determinants in the previous section, and second one, from 2013-2014. From here, the only choice for the period after the crisis was 2013 or 2014. Also, economic growth picked up in 2013, after being negative in 2012, which can be considered as an additional economic argument in favor of choosing 2013/2014 as proxy for the period after the crisis. We are using three variants for the period after the crisis – 2013 (leverage2013-leverage2007), 2014 (leverage2014-

leverage2007) and the average of 2013 and 2014 (leverage2013/2014-leverage2007). Before proceeding with estimation of the model it must be acknowledged that the choice of 2013-2014 period as after the crisis period have its weaknesses. Namely, by having a gap in the data (2010-2012 period) it is possible that we are missing factors connected with the post-crisis recovery, as well as other important events. In other words, even though we interpret 2013/2014 period as post crisis period, in fact changes in the level of leverage in 2013/2014 might not solely be result of the post-crisis adjustment, but also to other factors that are not included in the analysis. Having this in mind, we proceed with the analysis. Regarding the interpretation of the results, a positive sign on some of the independent variable should be interpreted as an evidence of that variable supporting rise in leverage, whereas a negative coefficient on some independent variable means decline in leverage i.e. deleverage.

The second question referred to the direct effect of the financial crisis on the post-crisis leverage. Direct effect of the crisis was approximated through several explanatory variables that immediately react to reduced economic activity as a consequence of the global financial crisis such as profitability ratio (crisis_profitability), sales (crisis_sales) and revenues (crisis_revenues). The crisis variables were constructed by taking percentage changes from these variables in 2009 (peak of the crisis) as opposed to 2007 (the pre-crisis period). The expected sign of the coefficient of the crisis variables is positive i.e. firms that experience decline in profitability, sales and/or revenues in 2009 as opposed to 2007 would reduce their leverage in 2014 as opposed to 2007.

All models were estimated by using the OLS estimator. The results are presented in Table 4.

Table 4. Estimation results

	model 1	model 2	model 3	model 4	model 5	model 6
dependent variable	leverage2014-leverage2007 (p.p.)	leverage2013-leverage2007 (p.p.)	leverage(2013/2014) -leverage2007 (p.p.)	leverage(2013/2014) -leverage2007 (p.p.)		
leverage	**-0.14***	**-0.16****	**-0.15****	**-0.14***	**-0.16****	**-0.16***
	(0.07)	**(0.07)**	**(0.07)**	**(0.07)**	**-0.06**	**-0.06**
size	0.004	0.004	0.004	0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
profitability	0.02	0.03	0.02	0.03	0.03	0.01
	(0.18)	(0.14)	(0.15)	(0.14)	(0.14)	(0.14)
growth opportunities	0.04	**0.09****	0.06	**0.09***	0.06	0.07
	(0.06)	**(0.04)**	(0.05)	**(0.05)**	(0.05)	(0.05)
tangibility	0.02	0.13	0.07	0.10	0.08	0.05
	(0.25)	(0.19)	(0.21)	(0.21)	(0.20)	(0.20)
non debt tax shield	-0.09	-0.06	-0.07	-0.23	-0.08	-0.19
	(0.5)	(0.42)	(0.42)	(0.44)	(0.43)	(0.42)
tax	0.06	0.03	0.05	0.06	0.01	0.02
	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.08)
crisis_profitability				**0.02****		
				(0.01)		
crisis_revenues					**0.11*****	
					(0.04)	
crisis_sales						**0.12*****
						(0.04)
Constant	-0.03	-0.02	-0.02	-0.12	-0.13	-0.24
	(0.34)	(0.29)	(0.30)	(0.27)	(0.32)	(0.27)

The dependent variable in model 4 to model 6 is the changes in the average level of leverage for the period 2013-2014 to 2007 level. However, the result are not sensitive to the choice of the dependent variable and therefore, the other results are not reported in the paper.

HAC Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results suggests that majority of the included theoretical determinants of financial leverage are not able to explain changes in capital structure in the period after the crisis i.e. coefficients were not significant at the conventional levels. This is valid across all models – the coefficient are stable in size in all six models, but they remain insignificant. The only exception is the growth opportunities variable whose coefficient has been estimated as positive and significant in model 2 and model 4, suggesting that firms with higher growth opportunities before the crisis, have higher leverage in 2014.

The coefficient on the leverage variable in 2007 was estimated as negative and significant across all model meaning that firms with higher leverage before the crisis reduced the level of leverage in 2014. Moreover the estimates are quite stable – the coefficient ranges from -0.14% to -0.16%.

The variables that capture the direct effect of the crisis are included in model 4-6. The coefficients of all three crisis variable are estimated as positive and significant at the conventional levels. This provides evidence that firms experiencing higher changes in profitability, sales and/or revenues in

2009 changed the level of leverage more in 2014. However, it must be acknowledged that significant and positive coefficients before the crisis variables do not strictly mean that there was ongoing deleveraging as a result of the global and financial crisis. What the results tell us is that, if the global economic crisis affected negatively the firms' performance and firms experienced decline in profitability, revenues and/or sales, then this situation led to a significant adjustment in firms' leverage in 2014. If firms' performance didn't worsen in 2009 (due to different reasons) and changes in profitability, sales and revenues remained positive (i.e. they continue to grow) then the positive coefficient actually means that these firms in 2014 have higher leverage as compared to 2007.

VI. Conclusion

This paper presents a study of the determinants of capital structure for a sample of Macedonian companies. The analyses are performed by using micro data of 194 firms for two periods 2000-2009 and 2013-2014. In the first part of the paper we tried to identify the determinants of capital structure of the Macedonian firms for the period from 2000 to 2009. To do so we used two-step system dynamic panel data estimator which allows for dynamics and controls for possible endogeneity between variables. Our results show that the size of the companies and growth opportunities are positively related to leverage, while profitability, tangibility and non-debt tax shield are negatively associated with leverage. Furthermore, the coefficient on the lagged leverage variable was estimated as positive and statistically significant, meaning that Macedonian firms do adjust their debt level towards some targeted level, in line with the theoretical predictions. However, the adjustment process is very slow.

In the second part of the paper we tried to identify factors that might explain changes in firms' behavior in the post-crisis period compared to the pre-crisis period. To that end, specific cross section database was created with the dependent variable defined as difference in leverage between the two periods and independent variables defined at their per-crisis levels. Generally, we found no evidence that the pre-crisis state of the determinants affected leverage after the crisis. The only exception is the variable capturing growth opportunities but only in two of the six specified models. On the other hand, in all models we found negative and statistically relevant impact of the pre-crisis level of leverage i.e. firms that had higher leverage before the crisis deleveraged more after the crisis.

The pre-post crisis analysis investigated one additional aspect – whether the global crisis had direct effect on firms' capital structure decisions after the crisis, the direct effect being measured as changes in firms' performance in 2009 compared to 2007. The coefficient of all three crisis variable are estimated as positive and significant at the conventional levels meaning that firms that experienced higher changes in profitability, sales and/or revenues in 2009 changed the level of leverage more in

2014. Under the assumption that the global economic crisis lead to decline in firms' profitability, revenues or/and sales this might explain downward adjustment in firms' leverage in 2014.

Nevertheless, we do not aim to overstate the results. The main weakness of the analysis is the incomplete dataset – even though the time span is from 2000 to 2014 we are missing data for the period 2010-2012. Factors and events that were in play during this period are not taken into consideration and this might pose serious bias to the results of the research. Therefore, useful recommendation for future research on this topic would be to repeat the analysis by using a complete and enriched firm-level dataset.

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