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The Effect of Earning Risk on Debt: Evidence from Turkey

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Abstract
This study examined the effect of firms' earning risk on their debt ratios controlling for some macroeconomic factors and firm size. A sample of 60 firms was selected from the first-100 of Istanbul Stock Market to collect firm-level data of earning risk and debt ratios. Macroeconomic data were obtained from the development indicators of the World Bank. A cross-sectional analysis was conducted to explore the effect of earning risk and macroeconomic variables of inflation, stock market growth rate, and economic recession on the short-term and long-term debt ratios of sample firms. Results suggested that earning risk, inflation, and economic recession are positively correlated with short-term, and negatively correlated with long-term debts regardless of firm size. The only exception to this is the stock market growth rate, which is negatively correlated with both short-term and long-term debt. While the theories of corporate finance do not distinguish between the maturities of debt when constructing their hypotheses, the findings of this study suggest that firms act in a different direction in their short- and long-term financing decisions against earning risk, inflation, and economic recession.
Keywords: capital structure, earning risk, tradeoff, market timing, corporate finance
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1. Introduction

Financing is inevitable for firms to fund their routine operations and future investments. Despite many forms available in the market, debt and equity are the two basic financing options for companies. Debt is a loan that a firm has to pay back with interest whereas equity has no such commitments. On the other hand, debt is cheaper than issuing equity because of the associated tax advantage. However, equity relinquishes the ownership of the firm to its shareholders. Given the relative advantages and disadvantages of these financing alternatives, it is not simple for firms to determine the best choice each time. For this reason, firms do not make their financing choices in a vacuum. They need to take different firm-level and macroeconomic risks into consideration while making such decisions. Besides, these risks usually arise concurrently, which makes financing choices even more difficult and complicated.

As a firm-level risk, earning risk refers to the downward changes in the company's average income. A firm with high earning risk lacks the opportunity to use its retained earnings for its future investments. Earning risk might also influence firms' external financing by debt. When the uncertainty or volatility in the earnings is high, creditors are likely to loan at a high rate. Debt with a high-interest rate can increase the cost of financing, which subsequently can drag the company into bankruptcy. Therefore, the extent to which earning risk affects debt financing is critical to understand the variability in the debt ratios of firms. Corporate finance theories offer a broad perspective to understand how firms make their financial decisions.

The history of contemporary theories in the field of corporate finance can be traced back to Modigliani and Miller's (1958) groundbreaking article on "the cost of capital, corporation finance and the theory of investment." Based on the efficient market hypothesis, Modigliani and Miller (1958) hypothesized that firms' financing choices do not influence their values. Accordingly, it is not possible to lower the cost of capital by increasing the debt to equity ratio since utilizing more debt increases investors' risk perceptions and return expectations. As a result, the benefits of debt will decrease with an increase in the cost of equity. Modigliani and Miller's (1958) theory was well framed in its original form and acknowledged by many researchers for its clarity. However, there were also reactions over the assumption of market efficiency. Nobody, including Modigliani and Miller, could deny the presence of market imperfections such as tax, unfair competition, and information asymmetry. Five years after their original article, Modigliani and Miller (1963) corrected their original proposition by admitting the facts that tax creates an advantage for debt over equity when financing because firms can deduce their debts from their corporate taxes.

Baxter (1967), Stiglitz (1972), and Kraus and Litzenberger (1973) later asserted that debt is not always the best alternative for financing as it holds bankruptcy risk in it, which will eliminate the tax advantage in the end. The feedback implied that tax benefit and bankruptcy cost of debt would eventually offset each other, and firms will try to preserve an optimal capital structure by trading off between the relative costs and benefits of financing options (static tradeoff). Myers (1984) stated that firms have a target capital structure and move towards this target considering tax rates, asset types, profitability, bankruptcy laws, and earning risk. Accordingly, firms with high earning risk will have a lower debt ratio than those with low earning risk because debt increases costs of bankruptcy and firms with high earning risk are more likely to go bankrupt than others.

Myers and Majluf (1984) proposed that a firm's financing decision reflect a preference between internal and external financing rather than seeking an optimal balance between debt and equity. In their pecking-order theory, Myers and Majluf (1984) suggested that firms follow a hierarchy in their financial decisions. In general, firms prefer internal financing to external financing. If a firm has a preference between retained earnings and debt for financing, it will select the first option. If, however, the retained earnings are not adequate for future investment, then it will turn to external financing. Between the different alternatives of external funding, the firm will first prefer debt to security because the cost of debt is lower than the cost of issuing equity. The equity is the last resort in the hierarchy of financing.

Baker and Wurgler (2002) claimed that market timing is the first order consideration in capital structure decisions of firms. Unlike static tradeoff and pecking-order hypotheses, market-timing approach claims that firms do not care about general advantages or disadvantages of debt and equity when making their financial decisions. Instead, they care about the timing of the option that they have. In other words, whatever they select among different financing choices, firms consider the correct timing first for a given option since the market value of that option frequently changes.

2. Literature Review

In the light of corporate finance theories, previous studies found mix evidence on the effect of firm-specific and macroeconomic variables on debt. The wide variability in the findings makes it difficult to understand the relationship between these variables and to construct research hypotheses accordingly. Firm-related factors are the first order factors, but country, market conditions, and sectors are also important in understanding the complex nature of the capital structure choices of firms. The high number of determinants of capital structure makes it necessary to repeat the analyses with different sample and control groups at certain intervals to determine the precise effect of each variable. Therefore, previous studies were reviewed under three different headings for a better understanding of the wide variability in their findings.

2.1. Studies in the United States

Corporate finance theory was developed in the United States. Early tests and subsequent modifications, particularly in the first 30 years after Modigliani and Miller (1958), were all done based on U.S. data. In a pioneering study of 851 firms from 25 different industries in the U.S., Bradley, Jarrell, and Kim (1984) found that leverage has a positive relationship with non-debt tax shield and a negative relationship with the volatility in the earnings and research and development (RD) expenses. In their analysis of 489 firms in the U.S., Titman and Wessels (1988) reported a negative relationship between firm size, profitability, and debt ratios. Their analysis revealed that the changes in debt ratios have no relationship with earning risk. Titman and Wessels (1988) estimated the earning risk as the standard deviation of the change in the firm's operating income. They claimed that this measure " could not be directly affected by the firm's debt level (p.6)." For their findings, however, they admitted that the changes in operating income might not capture the relevant aspects of earning risk. Frank and Goyal (2009) utilized an exploratory approach to discover the relative importance of 38 different factors in the capital structure decisions of U.S firms. Ordinary least square (OLS) regression analysis with a forward selection method revealed that industry, asset structure, size, and expected inflation are positively, market to book value, profitability, and bankruptcy risk are negatively related with debt.

2.2. Studies at Cross-Country Level

Another group of studies focused on cross-country comparisons to determine whether the determinants of capital structure are similar across countries. Demirguc-Kunt and Maksimovic (1996) analyzed the relationship between stock market development and financing choices of companies in 30 developing and industrial countries including Turkey. They found a significant and negative relationship between stock market growth rate and debt ratios. This study, however, did not include any variable representing earning risk. In a similar study, Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001) examined the determinants of capital structure in 10 emerging economies including Turkey. Their findings showed that size and tangibility of assets are positively; profitability and earning risk are negatively related to debt ratios. Booth et al. also conducted a separate analysis on the impact of macroeconomic variables including inflation, GDP (Gross Domestic Product) growth rate, and stock market growth rate. They found that inflation and stock market growth rate have a negative; GDP growth rate has a positive effect on total and long-term debts. Dincergok and Yalciner (2011) examined the factors affecting the capital structure in five developing countries including Turkey. Findings indicated that when there is high volatility in the income before interest and tax, there is also an increase in both total and long-term debts. Oztekin and Flannery (2012) analyzed the adjustment speed to the optimal capital structure using a sample of 15,177 firms from 37 different countries. A generalized method of moments (GMM) analysis showed that legal and financial traditions (which impacts transaction costs) are associated with adjustment speed. Buvanendra, Sridharan, and Thiyagarajan (2017) studied the elements of optimum capital structure and speed of adjustment towards target

capital structure of 90 firms in Sri Lanka and India using fixed effect and dynamic adjustment models (GMM). Fixed effects model showed that debt increases with size in Sri Lanka and with the tangibility of assets in India. The dynamic model indicated that it takes nearly 2.3 years in Sri Lanka and 1.1 years in India for firms to adjust their existing debts to their target debts.

2.3. Studies in Turkey

There are also studies conducted in Turkey based on firm-level indicators of capital structures. In a study of 66 firms listed in Istanbul Stock Market, Durukan (1997) found a negative relationship between the volatility in the earnings before interest and tax and debt ratios (total and short-term debt). Albayrak and Akbulut (2008) analyzed to find the most significant determinants of capital structure using the decision-tree method. This method is a technique based on the stratification of predictors and used only to identify the most important factors without parameter estimation. In their analysis of 52 firms listed in Istanbul Stock Market, they found that current ratio, liquidity, non-tangible assets, and the volatility in the income before interest and tax are the most important factor in capital structure decisions. In a similar study, Cevheroglu-Acar (2018) examined the determinants of capital structure using panel data regression on a sample of 111 non-financial firms listed on Borsa Istanbul. Findings indicated that size, profitability, the tangibility of assets, and non-debt tax shield are the most significant factors on capital structure choices of firms.

2.4. A Summary of Literature Review

The literature review revealed that the findings on the relationship between the earning risk and debt vary depending on the measurement of earning risk (Bradley et al., 1984; Titman and Wessels, 1988; Frank and Goyal, 2009, the development level of the country (Booth et al., 2001; Dincergok and Yalciner, 2011), and the maturity of debt (Durukan, 1997). This study draws attention to the measurement of earning risk to explain the possible reasons for the high variability in the findings of previous studies. Titman and Wessels (1988) claimed that the changes in operating income, which was generally taken as the measure of earning risk in previous studies, might not be measuring the relevant aspects of risk in income. Booth et al. (2001) clarified what Titman and Wessels (1988) pointed out by stating that risk in operating income can only capture the short-term operational components of risk in the earnings. In other words, this measure may not adequately predict the risk in the long-term and therefore may not explain the variations in the long-term debt (Durukan, 1997). Besides, the risk in operating income is related to the ability of a firm to carry out its daily operations. Therefore, it is also called business risk. The current study aims to overcome the shortcomings of the risk in operating income by adding the risk in net income to the analysis. The risk in net income, also referred to as financial risk, measures the ability of a firm to meet its financial obligations (İçten, 2013).

3. Hypotheses

This study draws on all the theoretical approaches and studies summarized above to construct research hypotheses and to understand research findings on the predicted relationships between the variables of interest. None of these theories offers a comprehensive list of predictions about the determinants of capital structure choices of firms. Most predictions have been developed by the researchers who write on these theories rather than the researchers who stated them first. In a comprehensive study of the determinants of capital structure, Frank and Goyal (2009) presented a broad list of the predictions made by these theories (Table 1).

Table 1. Expected Relationship between DV and IVs

Variable	Trade-off	Pecking Order	Market Timing
Risk in Operating Income	-		
Risk in Net Income	-		
Inflation			+
Traded Stock			-
Gross Domestic Product			-

Source: Frank and Goyal (2009)

Static tradeoff theory claims a tradeoff between earning risk and debt ratios (Frank and Goyal, 2009). Accordingly, companies with high earning risk will have a lower debt ratio than those with low earning risk because debt increases costs of bankruptcy and firms with high earning uncertainty are more likely to go bankrupt than firms with low earning uncertainty. Thus, it can be hypothesized that

Hypothesis 1. *There is a negative relationship between earning risk and debt.*

Market timing theory offers predictions about macroeconomic variables even though it does not make predictions about traditional determinants of capital structure (Frank and Goyal, 2009). It does not necessarily mean that static tradeoff and pecking order are silent with respect to macroeconomic variables. However, the fact that market timing emphasizes outside conditions for financing decisions makes it more functional to construct the following hypotheses. For the relationship between inflation and debt, the market timing suggests that firms increase their

debts if the expected inflation is high as they want to pay off their debts in devaluated amount. Thus, one can hypothesize that

Hypothesis 2. *When the inflation rate increases, firms also increase their debt to take advantage of devaluation.*

For the relationship between stock market growth rate and debt, market timing proposes that stock market becomes attractive for financing as it becomes more developed (Booth et al., 2001; Frank and Goyal, 2009). Therefore, it can be hypothesized that

Hypothesis 3. *As the stock market grows, firms' debt level drop.*

For the relationship between GDP growth rate and debt, market-timing theory predicts that the growth in GDP makes the equity market more favorable. Therefore, it can be hypothesized that

Hypothesis 4. *Firms tend to make use of less debt when the GDP is in growth.*

On the other hand, in a recession, the relationship described between the GDP growth rate and debt is reversed. Thus, for the relationship between the economic recession and debt, it can be hypothesized that

Hypothesis 5. *Firms tend to use more leverage in a recession.*

Alternatively, tradeoff theory suggests that the cost of debt outweighs its benefits when the economy is in a recession. In other words, firms tend to use lesser debt in a recession as the cost of debt such as the deadweight cost of bankruptcy increases with the recession. Findings of previous researches also show evidence of a tradeoff between these variables (Booth et al., 2001; Frank and Goyal, 2009). Therefore, it can be asserted that there is a relationship between recession and debt in the opposite direction of the hypothesis suggested by the market timing theory.

4. Methods

4.1.Data

Firm-level data relating to debt and earnings were collected from the balance sheets and income statements of 60 manufacturing firms. These firms were listed on the first-100 firms of Istanbul Stock Market. Balance sheets and income statements were obtained from Istanbul Stock Market (2000-2009) data center and Public Disclosure Platform (2009-2016), which is a digital platform in Turkey that all publicly traded companies have a legal obligation to report their financial records periodically (KAP, 2018). The dataset covers the firms' records between 2000 and 2016 (N=1020). The rest of the 40 firms in the list were not included since their financial records were not kept in the same way as the records of the companies on the list. Macroeconomic data were obtained from the development indicators of the World Bank. The data covered annual figures of inflation, the GDP growth rate, and traded stocks between 2000 and 2012 (N=17) (World Bank, 2018). While earning risk and debt have 1020 firm-year observations, macroeconomic variables have only 17 observations. Previous researchers in the field of corporate finance employed two different methods to examine the relationship between macroeconomic variables and capital structure. Booth et al. (2001) analyzed the effect of macroeconomic variables on aggregate debt ratios of firms. Frank and Goyal (2009), however, used the same macroeconomic values for each firm-year observation. This study follows Frank and Goyal's (2009) step as the number of macro-level observation is critically low to conduct a regression analysis with aggregate debt ratios.

4.2. Measures

The dependent variable of interest or debt has two measures: Short-term (*STD*) and long-term debt (*LTD*). These measures are estimated as the ratio of debt to the companies' total assets. Volatility in the earnings is estimated in two ways: Changes in operating income (*Risk1*) and changes in net income (*Risk2*). Unlike previous studies, where risk in the earnings was calculated as the standard deviation of the changes in the earnings of a firm, this study measures the risk as the coefficient of variation in the earnings. Gallagher and Andrew (2000) stated that measuring the volatility in the earnings with the coefficient of variation rather than standard deviation allows a more accurate comparison between small and large firms. Since this study compares the results between small and large firms, Gallagher and Andrew's (2000) method is adopted. More specifically, risk in operating income is calculated as the coefficient of variation in the earnings before interest and tax. The risk in net income is calculated as the coefficient of variation in the earnings after interest and tax. In addition to risk measures, macroeconomic variables relating to the inflation rate (*Inflation*), GDP growth rate (*GDP*), stock market growth rate (*Stock*), and economic recession (*Recession*) is included in the analysis. The inflation rate is taken as the consumer price index. The GDP growth rate is the annual percentage growth in gross domestic products. The stock market growth rate is estimated as the ratio of the total value of traded stocks to the GDP. The economic recession (*Recession*) is a nominal measure with two values: "*0*" indicating the non-recession years and "*1*" indicating the years of economic recession (2001, 2008 and 2009). The Turkish economy suffered a severe banking crisis in 2001, and a recession in 2008 and 2009 (Macovei, 2009; Rawdanowicz, 2010). Variables and estimation methods are summarized in Table 2 and the signs of economic crisis can be seen in Figure 1 and Figure 2.

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Table 2. Variables and Estimation Methods

Variable	Symbol	Estimation Method
Short-term Debt Ratio	STD	Short-term debt/total assets
Long-term Debt Ratio	LTD	Long-term debt/total assets
Risk in Operating Income	Risk1	Coefficient of variation in the earnings before interest and tax
Risk in Net Income	Risk2	Coefficient of variation in the earnings after interest and tax
Inflation	Inflation	Consumer price index
Traded Stock	Stock	The ratio of the total value of traded stocks to the GDP
Gross Domestic Product	GDP	GDP growth rate
Economic Recession	Recession	1 for 2001, 2008, and 2009; 0 for all other values of the year

Figure 1 shows the annual GDP growth rates for Turkey between 2000 and 2016. The Turkish economy has seen the lowest growth rates in GDP during the crisis years of 2001, 2008, and 2009.

Figure 1. GDP Growth (annual %)
Source: World Development Indicators of the World Bank
(https://data.worldbank.org/country/turkey)

Figure 2 depicts the unemployment rates between 2000 and 2015. The unemployment rate rose almost 2% during the 2001 crisis from 8.4% to 10.4% in 2001. Another dramatic rise in the unemployment rate is seen in 2008 at nearly 3%.

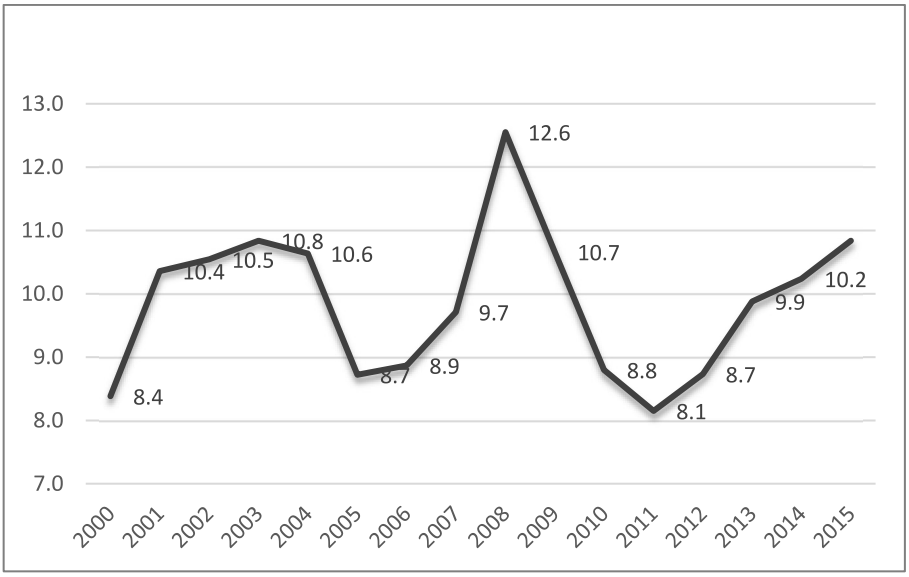

Figure 2. Unemployment (% of total labor force)
Source: World Development Indicators of the World Bank
(https://data.worldbank.org/country/turkey)

4.4. Empirical Models

A general linear model is constructed to identify whether earning risk and macroeconomic variables are cross-sectionally correlated with debt.

$$\begin{vmatrix} STD \\ LTD \end{vmatrix} = \propto + \begin{vmatrix} \beta 1 Risk1 \\ \beta 2 Risk2 \\ \beta 3 Inflation \\ \beta 4 GDP \\ \beta 5 Stock \\ \beta 6 Recession \end{vmatrix} + \varepsilon \quad (1)$$

The model allows testing two dependent variables at the same time and thereby reduces the risk of error arising from running two separate models. This model also allows using categorical variables as fixed factors in the regression analysis, which is employed in this study for the economic recession (*Recession*). To have control over firm size, firms were divided into two groups according to the median averages of their total assets. A methodological control of this type is needed since there is a considerable variation in asset values of listed firms. Table 3 illustrates descriptive figures for both groups. Accordingly, the value of total assets varies between ₺40M-₺752M with a median value of ₺295M for the first group (*Small*) and ₺835M-₺8,060M with a median value of ₺1,666M for the second group (*Large*). Statistical analyses were conducted separately for both groups.

Table 3. Asset Value of Small and Large Firms (in ₺[a])

Size		N	Minimum	Maximum	Median	Std. Deviation
Small	Asset value in ₺	30	40.292.930	751.739.205	294.775.425	181.890.554
Large	Asset Value in ₺	30	835.363.337	8.060.791.469	1.665.802.346	2.101.059.275

a. Turkish Lira

5. Findings

Table 4 show descriptive statistics for debt, earning risk. Variables are described by their median values where they are not normally distributed.

Table 4. Descriptive Statistics for Debt and Earning Risk

Size		N	Minimum	Maximum	Mean	Median	Std. Dev.	Variance
Small	STD	510	,01	,89	,3297	0,2999	,21109	0,045
	LTD	510	,00	,82	,1063	0,0588	,10728	0,010
	Risk1	510	-7,37	36,55	2,0107	1,7650	9,33179	5,852
	Risk2	510	1,68	5,25	2,8813	2,7900	0,75522	2,656
Large	STD	510	,01	,87	,3174	0,2868	,16597	0,026
	LTD	510	,00	,84	,1892	0,1666	,14022	0,012
	Risk1	510	-17,71	13,51	0,7430	2,4900	5,60175	7,400
	Risk2	510	1,36	60,78	4,7793	2,6800	10,44555	0,914

Between 2000 and 2016, the median *STD*s are 30% and 29% while the median *LTD*s are 6% and 17% on average for small and large firms, respectively. There is almost 11% difference in the median *LTD*s of small and large firms while the median *STD*s are very close. While *Risk2* is nearly the same for small and large firms with a median value of 2.79% and 2.68%, the *Risk1* is relatively higher for large firms with a median value of 1.76% and 2.49%, respectively.

Table 5 shows descriptive statistics for macroeconomic variables. The median inflation is 9% between 2000 and 2016, with 55% being the highest in 2001. In the same period, the Turkish economy had a 5% growth rate on average as indicated by the change in the gross domestic product. Stocks traded as a percentage of GDP is 40% on average in the same period.

Table 5. Descriptive Statistics for Macroeconomic Variables

	N	Minimum	Maximum	Mean	Median	Std. Dev.
Inflation	17	,06	,55	,1712	,0889	,17017
GDP	17	-,06	,11	,0512	,0609	,04641
Stock	17	,29	,61	,4030	,3983	,08590

Before running the full GLM model, a baseline analysis was conducted to check and avoid a multicollinearity issue. Since results indicated high multicollinearity between *GDP* and *Recession*, one of these indicators had to be excluded from the analysis to avoid misleading estimates. In such cases, there are a couple of statistical methods to determine the variable to be removed. Without following one of these methods, however, *GDP* was excluded from the general linear model as growth can be considered a function of economic stability[1]. Besides, outlier values were removed from the dataset to analyze with normally distributed variables.

[1] Frank and Goyal (2009) did not report any multicollinearity issue between the indicators of GDP growth and recession.

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Table 6 shows parameter estimates for *STD* and *LTD* models. All models are statistically significant, but explanatory powers are relatively weak. Independent variables altogether can explain 8% and 2% of the total variance in *STD*; 4% and 9% of the total variance in *LTD* for small and large firms, respectively. Each predictor, except *Stock*, affects debt in the same direction at the same maturity of debt and firm size. Regardless of firm size, *Risk1* and *Risk2* have a positive impact on *STD* and a negative impact on *LTD*. All estimates are statistically significant, except for the ones that the *Risk1* has on the *LTD* of small firms, and the *Risk2* has on the *STD* of large firms. Like earning risk measures, *Inflation* affects the debt in the same direction at the same level of debt and firm size. For each value of firm size, *Inflation* has a positive effect on *STD* and a negative effect on *LTD*. Parameter estimates are statistically significant, with the one for the *LTD* of small firms being an exception.

The *Recession* also affects the debt in the same direction at the same debt level and firm size if the estimates for *Recession*(1) is taken for consideration. Since the estimates are calculated for the *Recession*(0), however, the direction of the relationship seems to be reversed. If one is to speak for the *Recession*(1), it has a positive impact on *STD* and a negative impact on *LTD*. The relationship holds for both small and large firms. However, only the estimates for small firms are statistically significant. The only predictor that has an effect on debt in the same direction at all levels of debts and firms size is *Stock*. Unlike other variables, the direction of the effect that *Stock* has on debt is negative in all models. Since the standard errors of coefficients are relatively large, however, none of the parameter estimates for *Stock* is statistically significant.

Table 6. GLM Model for STD and LTD

Size	Dep. Var.	Parameter	B	Std. Error	t	Sig.	R^2	F
Small	STD	Intercept	,289	,064	4,492	,000	,081	9,109***
		Risk1	,010	,003	3,730	,000		
		Risk2	,028	,014	1,973	,049		
		Inflation	,275	,060	4,618	,000		
		Stock	-,121	,118	-1,022	,307		
		[Recession=0]	-,051	,026	-1,969	,050		
		[Recession=1]	0					
	LTD	Intercept	,182	,033	5,462	,000	,022	3,048**
		Risk1	-,001	,001	-,572	,568		
		Risk2	-,020	,007	-2,776	,006		
		Inflation	-,032	,031	-1,048	,295		
		Stock	-,091	,061	-1,493	,136		
		[Recession=0]	,027	,014	1,968	,050		
		[Recession=1]	0					
Large	STD	Intercept	,317	,047	6,709	,000	,038	4,626***
		Risk1	,006	,002	3,153	,002		
		Risk2	,001	,008	,076	,939		
		Inflation	,152	,048	3,200	,001		
		Stock	,000	,094	,003	,997		
		[Recession=0]	-,023	,021	-1,106	,269		
		[Recession=1]	0					
	LTD	Intercept	,363	,039	9,243	,000	,085	9,504***
		Risk1	-,003	,002	-1,966	,050		
		Risk2	-,038	,007	-5,373	,000		
		Inflation	-,143	,040	-3,620	,000		
		Stock	-,096	,079	-1,227	,220		
		[Recession=0]	,004	,017	,213	,831		
		[Recession=1]	0					

***p<0,001; **p<0,01; *p<0,05

6. Discussion

Findings showed that maturity of debt, rather than the size of firms, matters in the direction of effect that independent variables on debt. Both of the earning risk measures have a negative effect on long-term and a positive effect on short-term debts. The direction of impact changes by the maturity of debt, but not by the size of the firm. If the insignificant effect of risk in operating income in the second model is ignored, there is evidence that all firms, small and large, consider the earning risk as a threat for their long-term financing. This finding supports the tradeoff hypothesis that earning risk is negatively related to debt. This finding is also consistent with the findings of previous studies that found a negative relationship between earning risk and long-term debts (Booth et al., 2001; Dincergok and Yalciner, 2011; Durukan, 1997). On the other hand, there is evidence that neither small nor large firms see any types of earning risk as a threat for their short-term financing needs if the insignificant effect of risk in net income in the third model is ignored. In other words, firms continue to borrow in the short-term despite the risk in their incomes. This finding is neither consistent with the tradeoff hypothesis nor with the findings of previous studies that found a negative relationship between earning risk and total debts[1]. It appears that firms are not trading off between earning risk and short-term debts. If this is the case, then the question becomes "what other explanations are there in corporate finance theories?" The answer begs further investigations because pecking-order and market timing do not provide a prediction on the relationship between earning risk and debts.

Despite a similarity in the direction of risk in the long-run, the estimated coefficient for risk in net income is greater than the estimated coefficient for risk in operating income. On the other hand, the estimated coefficient for risk in operating income is minimal and not significant for small firms. The estimated coefficient values show that the risk in net income, as an indicator of financial risk, is more effective than the risk in operating income. Besides, the finding that the estimated coefficient for risk in operating income is higher in the short-term debt models supports Booth et al.'s (2001) statement that risk in operating income can only capture the short-term operational components of earnings risk.

The impact of inflation in the opposite direction at different maturities is also notable. Findings for the short-term debt models imply that firms continue to borrow against inflation in the short-run, which is consistent with the market timing hypothesis that inflation is positively related to debt. Relying on market timing rationale, one can state that firms seem to take advantage of inflation, at least in the short-run, to pay off their debts in devaluated money. This finding also supports the findings of Frank and Goyal (2009). The same finding, however, does not hold for the long-term debt models. It seems that firms are not buying market timing argument in the long-run. More specifically, firms consider inflation as a risk rather than an opportunity for their long-term liabilities. Although the estimates for the small firms is not significant, it seems that long-term debts decrease as inflation increases. This finding confirms Booth et al.'s findings on the same variables (Booth et al., 2001). They claimed that inflation causes higher interest rate and monetary risk, which then causes debt ratios to fall (pp.98). In the absence of any proposition about the relationship in question from the pecking-order and tradeoff, this explanation seems reasonable.

The finding on the economic recession is also interesting. Like earning risk and inflation, a recession in the economy seems to be associated with an increase in short-term debts. This finding satisfies the market timing hypothesis that firms become more leveraged in a recession. If firms are behaving as proposed by the market timing theory, then one should buy the argument that the equity market becomes less favorable in a recession. This, in turn, means that firms will turn to the debt market for financing when the equity market becomes unfavorable because of recession.

On the other hand, the positive relationship found in the short-term debt models seems to be reversed in the long-term debt models. The sign of the recession is negative in these models, which is consistent with the findings of previous studies (Frank and Goyal; Bradley et al., 1984; Titman and Wessels, 1988; Demirguc-Kunt and Maksimovic, 1996; Booth et al., 2001). Since this last finding does not satisfy market-timing proposition, then one can buy tradeoff argument that firms tend to have a lesser amount of leverage in a recession than they have in a stable economy as the expected costs of debt outweigh its benefits in a recession.

The effect of stock market growth on debt follows a steady pattern compared to the other variables. Stock market growth lowers firms' use of debt in all models, except the one for short-term debts of small firms. Although coefficient estimates are not significant, there is evidence that firms buy market timing hypothesis that as the stock market becomes more developed the amount of traded stock increases and firms' use of debt decreases. Findings are also consistent with Demirguc-Kunt and Maksimovic (1996) and Booth et al.'s (2001) findings on the same variables.

7. Conclusions

The purpose of this study is to examine the effect of earning risk on debt controlling for macroeconomic factors

[1]. Because short-term debts have a large share of total debts, it is highly probable that the direction of effects that predictor variables have in total debt models will be the same as the direction of effect that predictor variables have in short-term debt models (Yilmaz, 2017). Thus, the discussions for the results reported in the previous studies for total debt can be applied to the results reported in this study for short-term debt.

and firm size. Findings partly answer the question posed in the introduction. Earning risk has some impact on debt ratios even though the effect size is relatively small. Still, the effect size that the earning risk has on debt cannot be considered negligible given the number of other factors that are not included in this study. It is remarkable that the signs of coefficients reported for earning risk, as well as inflation and recession, change by the maturity of debt, which has not been reported before. The difference in the direction of effect according to the maturity of debt makes it difficult to interpret findings because theories of corporate finance, mostly, do not distinguish between the maturities of debt when constructing their hypotheses.

This study showed that the effect of risk in net income on long-term debts is higher than the effect of risk in operating income. On the other hand, the risk in operating income is more effective on short-term debts. As stated earlier, the risk in operating income has some drawback as it does not adequately reflect the characteristics of the earning risk proposed by corporate finance theories. Therefore, the use of risk in net income in addition to the risk in operating income in the analysis is an important contribution of this study to the corporate finance studies.

Findings on the macroeconomic indicators are also noteworthy. It seems that financing decisions are not merely a function of the internal dynamics of firms. Macroeconomic factors such as inflation and recession also affect debt. Further, the difference in the effects on short-term and long-term debts should be noted. The findings on the effect of recession should also be read carefully because the variable only measures the existence or the absence of recession based merely on the calendar year. However, the intensity and duration of the recession might be different if the sectoral differences are considered.

Future studies should consider the possibility that the difference in the measurements of earning risk can significantly alter the results of their analyses. Besides, while testing the determinants of debt at different maturities, the impact of firm size can be controlled more effectively if the sampling pool is added to more firms from different sectors. The fact that the findings of this study did not significantly change by the firm size may have resulted from the sampling pool in which firms are selected. It should also be noted that the impact of macroeconomic variables can be measured with high precision if the observation number is kept high.

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