Determinants of Capital Structure: Evidence from a Major Emerging Market Economy

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Abstract. This paper uses a new and comprehensive dataset to investigate the capital structure of non-financial firms in a major emerging market economy, Turkey. We study both statistical and economic significance of four types of leverage factors: Firm-specific, tax-related, industry-specific, and macroeconomic. Results suggest that tax-related factors and asset tangibility are the most economically significant factors for short-term and long-term debt ratios, respectively. Results also suggest that inflation is an important determinant of leverage and the most economically significant macroeconomic factor. Moreover, we provide evidence that firms adjust their leverage towards the industry median, that firms match the maturity of their assets and liabilities, and that inflows of foreign capital have a marked influence on firms' capital structures, particularly on large and mature non-manufacturing firms. We also conduct a systematic analysis of capital structure differences between manufacturing and non-manufacturing, small and large, and young and mature firms. Overall, the trade-off theory appears to be more successful than the pecking order theory in accounting for the capital structure of Turkish non-financial firms.

JEL Classification: G30, G32

Keywords: Capital structure, non-financial firms, pecking order theory, trade-off theory, Turkey.

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1. Introduction

In the past few decades, there has been an outpouring of empirical research aimed at understanding how firms choose their capital structures. While the earlier work concentrated on the developed countries, particularly the United States, a major preoccupation of recent research has been to find out whether the factors that are correlated in the cross-section with firm leverage in the developed countries are similarly correlated in emerging and developing countries. Despite considerable progress, the issue is not settled, both for developed and developing countries, and more so for the latter.

In this paper, we investigate the factors that determine the capital structure choices of non-financial firms in a major emerging market economy, namely, Turkey. Although there is by now an abundance of research on capital structure in emerging and developing economies, these studies cannot to speak to the capital structure choice of the *average* non-financial firm as they generally focus on manufacturing firms listed on the stock exchanges, while neglecting both private firms and non-manufacturing firms. Moreover, data limitations force most studies to limit the span of their analyses to less than ten years. We contribute to this line of literature by utilizing a unique and comprehensive dataset compiled by the Central Bank of the Republic of Turkey (CBRT) that provides financial data for Turkish private as well as public manufacturing and non-manufacturing firms for the past twenty years. Since this dataset is substantially more representative of the universe of Turkish non-financial firms and has a longer time span, it enables us to take a more accurate picture of the capital structure decisions of the average non-financial firm in Turkey. It also allows us to investigate systematically the capital structure differences between firms of various kinds. To our knowledge, no empirical study exists having these features of our paper in the context of capital structure research on emerging and developing economies.

The extant literature reviewed in Section 2 has identified several factors that are correlated in the cross-section with firm leverage in both developed and developing countries. Following this body of work, we investigate concurrently the influences on leverage of four types of variables: Firm-specific, tax-related, industry-specific, and macroeconomic. Several results emerge from our panel data analysis. In particular, we find that most of the independent variables have the signs

that would be expected in light of previous theoretical work and the empirical findings obtained for other countries. Specifically, we provide evidence that leverage (short-term, long-term, or total) is *positively* correlated with size, potential debt tax shields, industry median debt ratios, inflation, and capital inflows, and *negatively* correlated with profitability, business risk, and real GDP growth. Asset tangibility is positively correlated with long-term and total leverage but negatively correlated with short-term leverage. Firm growth, on the other hand, does not seem to be related with firms' leverage decisions. The positive correlation of leverage with inflation is consistent with the notion that, in the presence of tax-deductibility of nominal interest payments, an inflation-induced increase in nominal interest rates increases the tax advantage of debt financing. On the other hand, the positive association of leverage with industry median leverage can be interpreted as evidence of target adjustment behavior wherein firms adjust their leverage towards the industry median. Finally, the finding that tangibility is positively correlated with long-term leverage but negatively correlated with short-term leverage might be interpreted as evidence that firms match the maturity of their assets and liabilities.

In addition to statistical significance, we investigate the economic significance of leverage factors and find that each of the four types of leverage factors does indeed play an economically important role in shaping the capital structure decisions of Turkish non-financial firms during our sample period. Specifically, our findings indicate that while potential debt tax shields are the most economically significant factor for short-term and total leverage, tangibility is the most economically significant factor for long-term leverage. Firm size is another major determinant of leverage, second only to tangibility and potential debt tax shields for long-term and total leverage, respectively. Industry median leverage and inflation also play a notable but smaller role when compared to firm size, profitability, tangibility, and tax-related factors.

We next investigate the capital structure differences between manufacturing and non-manufacturing, large and small, and mature and young firms. One of our main findings is that regardless of their size, age, and industrial membership, firms' short-term leverage is generally substantially larger than their long-term leverage. We also find that manufacturing firms and young firms generally have higher leverage (both short-term and long-term) than non-manufacturing firms and mature firms, respectively. Large firms, on the other hand, have higher long-term leverage but lower short-term leverage than small firms. Therefore, it is the young and

small manufacturing firms that have the highest levels of short-term indebtedness. Another major finding in our analysis is that what matters most for a firm's capital structure is not its age or industrial membership but rather its size. In this regard, we provide evidence that short-term debt ratios increase with firm size, but only for firms that are sufficiently large, indicating a "threshold effect" in size for short-term indebtedness. Also, business risk appears to be an important determinant of the capital structures of small firms but not large firms, which might suggest differences between small and large firms in access to external finance. Inflation, while very important for large firms, does not seem to be related with the leverage decisions of small firms, indicating that, once the direct leverage impact of taxes is taken into account, inflation does not induce a further tax benefit for debt financing for small firms. Capital flows influence large and small firms differently as well, having a considerably greater importance for the leverage decisions of large firms, particularly those that are mature and outside the manufacturing industry.

On the whole, our empirical findings suggest that the trade-off theory is a better description of the capital structure of Turkish non-financial firms than the pecking-order theory. This is in stark contrast with the judgments of previous researchers on the Turkish economy. This difference in judgments is in part due to the fact that we use a more comprehensive and representative dataset that allows us to measure the leverage effects of different factors much more precisely. Another contributing factor is the fact that, for some of the leverage determinants we consider, the trade-off theory has a prediction while the pecking order theory does not.

The remainder of the paper proceeds as follows. Section 2 reviews the relevant theoretical and empirical literature on capital structure. Section 3 describes the data and Section 4 summarizes the hypotheses regarding the relationship between leverage and its determinants. Section 5 presents the main results and a number of robustness checks. Section 6 sheds light on the capital structure differences between firms of various types. Section 7 evaluates the predictive abilities of static trade-off and pecking order theories in light of our empirical findings. Section 8 provides concluding remarks.

2. Related literature

Since Modigliani and Miller (1958), there has been extensive theoretical work on the determinants of firms' capital structures, yet we do not have a unifying model that can simultaneously account for all of the observed relationships. The two major competing theories of capital structure are the *static trade-off theory*, wherein firms balance tax savings from debt against deadweight bankruptcy costs, and the *pecking order theory*, wherein, due to adverse selection, firms prefer internal to external financing and debt to equity if external financing is used.[1] Each of these theories, however, has problems with different characteristics of the observed data. Even the state-of-the-art versions of these theories cannot do a fully satisfactory job of confronting the data.

Nevertheless, the trade off, pecking order, and other theories have been instrumental in identifying a large number of factors that seem to be correlated with firms' debt ratios. Frank and Goyal (2009) lists as many as 36 variables that are correlated with the leverage decisions of publicly traded U.S. firms (see, also, Harris and Raviv, 1991). Empirical studies typically employ a variety of variables from this list that can be justified using any of the existing theoretical models.

Most of the earlier research attempts to test various theories using the developed countries, mainly the United States, as a laboratory (e.g. Bradley et al., 1984; Taggart Jr, 1985; Pozdena, 1987; Titman and Wessels, 1988). In an influential study, Rajan and Zingales (1995) show that factors such as growth, size, profitability, and tangibility, which are correlated in the cross-section with firm leverage in the United States are similarly correlated in the other G-7 countries as well. Following Rajan and Zingales (1995), there has been an outpouring of empirical research on international comparisons of capital structure including, among others, Demirgüç-Kunt and Maksimovic (1996 and 1999), Wald (1999), De Jong et al. (2008), and Antoniou et al. (2008). A particularly important study in this line of research has been Booth et al. (2001), which provides evidence that firms' capital structure decisions in developing countries are affected by the same

[1] We do not consider the *market timing theory* here as it is probably more relevant for public firms whereas the majority of firms in our dataset are private. *Agency* or *signaling* considerations, on the other hand, can easily be incorporated into either of the two major theories.

variables as in developed countries. There are also a growing number of studies that explore the determinants of capital structure in individual emerging and developing countries.[2]

In this paper, we contribute to this last strand of literature by analyzing the capital structure of Turkish non-financial firms. Previous studies on the Turkish economy include, among others, Durukan (1997, 1998), Gönenç (2003), Acaravcı and Doğukanlı (2004), Aydın et al. (2006) Sayılgan et al. (2006), Korkmaz et al. (2007), Yıldız et al. (2009), Demirhan (2009), and Okuyan and Taşçı (2010). These papers study the capital structure choice of manufacturing firms listed on the Istanbul Stock Exchange (ISE) from various angles and for different time periods. There are three exceptions: Demirhan (2009) focuses on non-manufacturing firms on the ISE, Okuyan and Taşçı (2010) use a dataset compiled by Istanbul Chamber of Industry that provides information on the largest 1000 manufacturing firms in Turkey, and Aydın et al. (2006) use the same dataset as ours but restrict themselves only to a descriptive analysis of firms' capital structures. Cebenoyan et al. (1995) and Dinçergök and Yalçıner (2011), on the other hand, carry out comparative studies of Turkey, Greece, Canada, and the U.S., and of Turkey, Brazil, Argentina, and Indonesia, respectively, again using data on listed manufacturing firms.

Our study differs from these studies in an important way. Specifically, we utilize a dataset that (i) covers not only listed firms but also privately-held firms, (ii) includes both manufacturing and non-manufacturing firms, and (iii) as we shall explain in Section 3, contains a substantially larger number of firms and spans a considerably longer time period than previous studies. Therefore, the novelty of our study comes from the fact that we are the first to investigate the capital structures of non-financial firms in Turkey using a comprehensive micro-level dataset over a relatively long time horizon. This enables us to take a significantly more accurate account of the average non-financial firm's capital structure choice in Turkey than previous studies. It also allows us to carry out a systematic analysis of capital structure differences between firms of various kinds (e.g. manufacturing and non-manufacturing, large and small, mature and young firms). To the best of our knowledge, our dataset is more comprehensive (both in terms of leverage factors suggested by theory and time coverage) than the datasets used in capital structure studies on other emerging and developing countries as well. Last but not least, and in contrast with previous studies, our

[2] See, for example, Mohamad (1995) for Malaysia; Wiwattanakantang (1999) for Thailand; Bhaduri (2002) for India; Omran and Pointon (2004) for Egypt; Huang and Song (2006) for China; Correa et al. (2007) for Brazil; and Qureshi (2009) for Pakistan.

findings provide evidence that the trade-off theory may be a better description than the pecking order theory of the capital structures of Turkish non-financial firms.

3. Data

Our firm- and industry-specific data come from the Sectoral Balance Sheets Dataset (SBSD) of the CBRT, which is the largest source of annual balance sheet and income statement data on Turkish non-financial firms.[3] Our sample period covers the years 1996-2009. The sample includes almost all of the largest non-financial firms, many of which are also listed on the ISE. There are on average about 9000 firms employing a total of 1.5 million workers each year. This is substantially larger than the corresponding figures for non-financial firms listed on the ISE during the same period (138 firms employing 225 thousand workers), indicating that the SBSD is significantly more representative of the population of Turkish non-financial firms than the ISE.

The two broad industry categories we use are 'manufacturing' (excluding petroleum and nuclear energy production) and 'non-manufacturing' or 'services'.[4] Our data on macroeconomic and tax-related variables, on the other hand, are collected from a variety of sources including SBSD, ISE, Undersecretariat of Treasury of the Republic of Turkey, and World Development Indicators.

To minimize the effects of outliers in the data on our results, we use winsorization, in which the most extreme tails of the distribution are replaced by the most extreme value that has not been removed (Frank and Goyal, 2008). Following common practice, we winsorize each tail at 0.5 percent. The final sample is an unbalanced panel of 11726 firms (roughly 53 percent of which are manufacturing) with 74155 firm-year observations. We do not have 14 years of data for all firms because each year some firms enter or exit the sample.[5]

[3] SBSD firms report unconsolidated balance sheets. As noted by Rajan and Zingales (1995), this may cause firms to incorrectly appear to have lower leverage than otherwise identical firms who report consolidated balance sheets. This should not be a serious problem for our analyses since most of the sample firms are stand-alone enterprises. Still, some care is warranted in interpreting the results.

[4] The industries we exclude are: agriculture, hunting, and forestry; fishing; mining; electricity, gas, and water supply; air transportation; communications; real estate, renting, and business activities; education; health and social work; and other community, social, and personal service activities. Unlike the industries included in our analyses, these industries are generally under the influence of various sorts of government intervention that distort the operation of market forces.

[5] Possible bias introduced by firm entry or exit is discussed in Section 5.

4. Variables and hypotheses

We consider three different measures of leverage: Short-term, long-term, and total debt over total assets. According to Rajan and Zingales (1995), this is a more appropriate measure of financial leverage than the ratio of liabilities (both short term and long term) to total assets because it provides a better indication of whether the firm is at risk of default any time soon and also a more accurate picture of past financing choices. Debt is classified as long-term if it has a maturity of at least one year and short-term otherwise.

On the other hand, we use four types of independent variables, namely, firm-specific, tax-related, industry-specific, and macroeconomic as described below. The nature of the relationships between leverage and individual factors has been studied extensively in the literature. Our discussion benefits, among others, from the review by Frank and Goyal (2008).

4.1 Firm-specific factors

Rajan and Zingales (1995) use four firm-specific independent variables in their study of capital structures: size, profitability, growth, and tangibility. Booth et al. (2001) add business risk to this list. We include all five firm-specific variables in our analyses.

Size Static trade-off theory predicts a positive relationship between firm size and leverage. This is because larger firms are more diversified and have lower default risk. The pecking order theory, on the other hand, is generally interpreted as predicting a negative relationship, since large firms face lower adverse selection and can more easily issue equity compared to small firms. However, as noted by Frank and Goyal (2008), adverse selection may not be necessarily lower for larger firms if the adverse selection impinges on a larger asset base. Therefore, the pecking order theory can also be interpreted as implying a positive relation between leverage and size. An overwhelming majority of empirical studies finds a positive relation between leverage and size. Following Titman and Wessels (1988) and Rajan and Zingales (1995), among others, we define size as the natural logarithm of total sales, adjusted for inflation.[6]

[6] We use total sales rather than total assets to alleviate the problem of multicollinearity since many of our variables are scaled by total assets, including those for debt ratios. These two measures are highly correlated, indicating that each of them should be a sound proxy for size.

Profitability Static trade-off theory is generally interpreted as predicting a positive relation between firm profitability and leverage. This is because default risk is lower and interest tax shields of debt are more valuable for profitable firms. However, Frank and Goyal (2008) argue that the trade-off theory can also be viewed as predicting an inverse relation between leverage and profitability. This would be true, for instance, if profitability is a better proxy for growth opportunities than market-to-book ratios. Moreover, dynamic trade-off models generally predict a negative relationship between leverage and profitability (see, for example, Fischer et al., 1989, and Hennessy and Whited, 2005). Thus, the trade-off prediction for profitability is ambiguous. Pecking order theory, on the other hand, predicts a negative relation between leverage and profitability, as profitable firms can use earnings to fund investment opportunities and hence have less need for external debt. Empirical tests find the relation to be robustly negative. Following Titman and Wessels (1988) and De Jong et al. (2008), among others, we define profitability as operating income over total assets.

Tangibility We use tangibility as a proxy for the type of assets. The static trade-off theory predicts a positive relation between leverage and tangibility. This is because tangible assets are easier to collateralize and they suffer a smaller loss of value when firms go into distress. In addition, since firms tend to match the maturity of assets with that of liabilities (Stohs and Mauer, 1996), tangibility should be positively correlated with long-term leverage. The pecking order theory, on the other hand, is generally interpreted as predicting a negative relation between leverage and tangibility, since the low information asymmetry associated with tangible assets makes the issuance of equity less costly (Harris and Raviv, 1991). Empirical studies generally find a positive correlation between tangibility and total and long-term leverage. Following Rajan and Zingales (1995) and Demirgüç-Kunt and Maksimovic (1999), we define tangibility as the ratio of net fixed assets to total assets.

Growth Static trade-off theory predicts a negative relation between leverage and firm growth. Intangibility of the assets of growth firms implies that they lose more of their value in the event of financial distress. By contrast, the pecking order theory predicts a positive relation between leverage and growth. This is because internal funds are unlikely to be sufficient to support investment opportunities for high growth firms, which increases their demand for external debt. Although the results are mixed, most empirical work finds the relation between

leverage and growth to be negative. Since our sample consists of both private and public firms, we cannot use market measures such as market-to-book ratios to proxy for growth. Our proxy is the percent change in sales as in Frank and Goyal (2009) and Schoubben and Van Hulle (2004).

Business risk Both the static trade-off and pecking order theories predict a negative relationship between leverage and business risk. The trade-off theory implies that the expected cost of financial distress increases with risk, at least for reasonable parameter values. In addition, the probability of wasting interest tax shields increases when earnings are less than tax shields (Frank and Goyal, 2008). Both forces work to reduce leverage. From a pecking order perspective, business risk exacerbates the adverse selection between firms and creditors. Most empirical work find a negative relation between leverage and risk. In this study, business risk is defined as the standard deviation of operating income over total assets over the past three years (including the current year) as in De Jong et al. (2008).

4.2 Tax-related factors

The two tax-related factors we consider are corporate taxes and non-debt tax shields.[7] These factors naturally fit in with the static trade-off theory.

Corporate taxes Static trade-off theory predicts a positive relationship between corporate tax rates and leverage. This is because features of the tax code allow interest payments to be deducted from the tax bill but not dividend payments, which provides a tax advantage for debt. The effect of taxes on debt ratios, however, has been difficult to clearly identify in the data and the available evidence is rather mixed (see, for example, Frank and Goyal, 2008, and Antoniou et al., 2008). One explanation for this might be the uncertainty about what would constitute a good proxy for tax effects. Another explanation is that transaction costs make it difficult to identify tax effects even when they are an element of the firm's problem (Hennessy and Whited, 2005).

Non-debt tax shields DeAngelo and Masulis (1980) were probably the first to formally introduce the concept of non-debt tax shields to the literature. Examples of such shields include

[7] Studies such as Miller (1977) and Rajan and Zingales (1995) recommend including both personal and corporate taxes in studies of capital structure. However, in Turkey, tax rates on equity and debt income at the personal level are extremely complicated and have gone through several reforms during the past two decades. This makes it almost impossible to come up with good indicators of personal tax rates on different sources of income that would also be consistent over time. As a result, we are forced to do away with personal taxes in our analyses.

depreciation deductions, depletion allowances, and investment tax credits. These shields can be considered as substitutes for the corporate tax benefits of debt financing. Accordingly, firms with higher amounts of non-debt tax shields will choose to have lower levels of debt. Thus, the static trade-off theory predicts a negative relationship between leverage and non-debt tax shields. More often than not, empirical studies find results that are supportive of this prediction.

Rather than including corporate taxes and non-debt tax shields separately in our analyses, we use a single indicator that simultaneously takes into account the presence of both effects. Whether a firm actually enjoys a positive tax advantage for debt financing depends on the trade-off between these two effects. Building on DeAngelo and Masulis (1980) and Titman and Wessels (1988), Shuetrim et al. (1993) propose a measure called the "potential debt tax shield (*PDTS*)" that captures the net effect of these two forces:

$$PDTS = \begin{cases} I_{it} + \frac{T_{it}}{\tau_t} & if \quad T_{it} > 0 \\ 0 & if \quad T_{it} = 0 \end{cases},$$

where I_{it} and T_{it} denote, respectively, interest payments and tax payments by firm *i* at time *t* and τ_t denotes the statutory corporate tax rate at time *t*. *PDTS* is gross earnings minus non-debt tax shields and Shuetrim et al. (1993) show that it is equal to the sum of interest paid and taxable income after all non-debt tax deductions have been made as shown in the above expression.[8] They scale this sum by a firm's total assets to get their final proxy of net tax shields. Note that when tax payments are zero (i.e. tax is exhausted), the relative proportions of income shielded by interest payments and by non-debt tax shields cannot be determined and hence *PDTS* is set to zero. In order to control for this possibility, we follow Shuetrim et al. (1993) and include firms' state of tax exhaustion as a separate regressor in our analyses. It is a dummy variable that is equal to 1 for all observations when the tax paid by a firm is equal to zero. Its value can be interpreted as the mean effect of *PDTS* on leverage taken over all observations with zero tax payments. From a trade-off perspective, the predicted relation between this dummy variable and leverage is positive. Note that both *PDTS* and tax exhaust factors can be calculated at the firm level, that is, they are firm-specific.

[8] This measure is also desirable because it takes into account the actual statutory tax rates and the fact that firms focus on the amount of income that can be shielded from tax using interest payments.

4.3 Industry-specific factors

The extant literature reviewed in articles such as Harris and Raviv (1991) and Frank and Goyal (2008) suggests that industry membership may be an important determinant of firms' capital structures. According to Frank and Goyal (2009), this is mainly because industry reflects a number of otherwise omitted factors common to all firms. For example, supply and demand conditions or the extent of competition may differ from industry to industry. From a trade-off perspective, therefore, although imperfect, the *industry median leverage* is likely to be a proxy for firms' target capital structure. Not entirely coincidentally, empirical evidence on industry effects is rather mixed. For instance, while Hovakimian et al. (2001) find that firms adjust their debt ratios towards industry median debt ratios, Mackay and Phillips (2005) provide evidence that there is significantly more variation in leverage within industries than across industries. For a given year, we define industry median leverage as the median of (short, long, or total) debt to total assets in that industry (that is, one for each of the two broad industry categories, manufacturing and non-manufacturing).

4.4 Macroeconomic factors

In order to explore the influence of the macroeconomic environment on firms' capital structures, we include key macroeconomic variables in our analyses. Specifically, we include inflation and GDP growth as indicators of the general economic environment and the size of capital flows as an indicator of financial development.

Inflation According to Taggart (1985), features of the tax code in the U.S. increases the real value of interest tax deductions on debt when inflation is expected to be high. Thus, the static trade-off theory predicts a positive relationship between leverage and expected inflation. By contrast, it is hard to see why inflation would matter for firms' leverage decisions in a model of pecking order (Frank and Goyal, 2009). Empirical studies generally find a positive relation between leverage and inflation. In the absence of inflation expectations data that spans the whole sample period, we follow previous studies and use data on the realized inflation. Specifically, we use the percentage change in the annual consumer price index (CPI) as a rough proxy for expected inflation. It is important to note that the debt-bias in the U.S. tax system alluded to by

Taggart (1985) is also a feature of the tax systems of many countries around the world, including that of Turkey.

GDP growth Real Gross Domestic Product (GDP) growth can be viewed as a measure of the growth opportunities available to firms in an economy. In a high growth environment, the scarcity of firms' tangible assets relative to available investment opportunities implies a higher loss of value when firms go into distress. Hence, the static trade-off theory predicts a negative relation between leverage and GDP growth. By contrast, the pecking order theory predicts a positive relation between leverage and macroeconomic growth, since a high ratio of growth opportunities to internal funds would imply a greater need for external finance. Empirical studies generally find a negative association between leverage and macroeconomic growth (see, for example, Demirgüç-Kunt and Maksimovic, 1996). Following common practice, we define GDP growth as the percent change in the annual real GDP.

Capital flows Empirical studies such as Demirgüç-Kunt and Maksimovic (1996) and Antoniou et al. (2008), among others, provide evidence on the importance of capital markets for firms' capital structures. The size and structure of capital markets play a key role in determining the availability and allocation of funds to various types of firms within an economy. Domestic capital markets, in turn, are heavily shaped by the flows of international capital in many emerging market economies, including that of Turkey (see, for example, Kose et al., 2006). While inflows of capital lead to increases in the size of domestic capital markets, outflows lead to declines. In order to study the impact of capital flows (and hence financial development) on firms' capital structures, we include the ratio of net capital flows to GDP as an additional explanatory variable in our regression equations.

Table 1 summarizes the definitions of various leverage measures and leverage factors as well as the theoretical predictions for the relations between the dependent and independent variables.

Table 2 presents the descriptive statistics for all of our variables during 1996-2009. The median is below the mean for all three debt ratios. The divergence between the mean and median debt ratios is larger for the long-term debt ratio as the majority of firms have little to no long-term debt. Moreover, firm growth rates have the largest variance, with the mean significantly greater than the median.

[Insert Table 1 and Table 2 about here]

5. Empirical model and results

In this section, we present our empirical model, discuss the main results, and perform a number of robustness checks.

5.1 Empirical model

We model leverage as a function of various factors discussed in the previous section. Specifically, we estimate the following fixed effects panel data model:

$$L_{it} = \beta_0 + \sum_k \beta_k F_{k,it} + \mu_i + \varepsilon_{it}\,, \tag{1}$$

where L_{it} is one of the three measures of leverage (short, long, or total leverage) of firm i in year t; F is the vector of the four types of leverage factors (firm-specific, tax-related, industry-specific, and macroeconomic factors); μ_i are the time-invariant unobservable firm-specific effects; and ε_{it} is the error term. We estimate equation (1) using standard errors that are robust to heteroskedasticity and serial correlation.

5.2 Results

Table 3 presents the results from estimating equation (1). In what follows, we summarize the results and evaluate them in light of theoretical hypotheses and previous empirical findings.

[Insert Table 3 about here]

5.2.1 Firm-specific factors

The first five rows of Table 3 display the estimated coefficients for our firm-specific factors. The coefficients of size, profitability, and tangibility are significant at the 1 percent level in all leverage equations. Size is positively associated with all three debt ratios, suggesting that *ceteris paribus* large firms have more debt in their capital structures. By contrast, the relation between profitability and various debt ratios is negative, implying that more profitable firms have lower debt ratios. While our result on size is consistent with the prediction of static trade-off theory, our result on profitability is consistent with the pecking order theory. These findings are also in line with the empirical evidence found in previous studies.

Tangibility is negatively associated with short-term leverage but positively associated with long-term and total leverage. Thus, firms with more tangible assets tend to have more long-term and less short-term debt in their capital structure. The fact that the signs of the estimated coefficients of the tangibility factor are opposite in the short- and long-term leverage equations can be interpreted as evidence that firms in Turkey match the maturity of their assets with their liabilities. Demirgüç-Kunt and Maksimovic (1999) report similar findings in their sample of nineteen developed and developing countries (Turkey is included) and Gönenç (2003) for industrial firms listed on the ISE. Overall, the results are consistent with the prediction of static trade-off theory but not with the pecking order theory.

Finally, while firm growth appears to be unrelated with leverage, the estimated coefficient of our business risk variable is significantly negative in the long-term and total leverage equations. So, increases in a firm's riskiness reduce the level of long-term debt in its capital structure but does not have a significant effect on the level of short-term debt relative to total assets. This is consistent with the view that firms that are viewed as risky by creditors find it more difficult to borrow long-term (see, for example, Diamond, 1991 or Demirgüç-Kunt and Maksimovic, 1999). Our results concerning the business risk factor can be understood within the framework of either static trade-off or pecking order theories.

5.2.2 Tax-related factors

The upper middle section of Table 3 presents the estimated coefficients for our *PDTS* and tax exhaustion variables. The coefficients of both variables are significant at the 1 percent level in all leverage equations and have the signs predicted by the static trade-off theory. The positive and significant coefficient on *PDTS* suggests that the tax advantage of debt is greater than the tax advantage due to non-debt shields. The positive and significant coefficient on the tax exhaustion dummy, on the other hand, indicates that the tax distortions caused by the tax system are also important for firms that pay no tax.

5.2.3 Industry-specific factors

The lower middle section of Table 3 presents the estimated coefficients for our industry median debt ratios. The coefficient of industry median leverage is positive and highly significant in all three leverage equations. Moreover, the association appears to be quantitatively strong: A 10

percentage point increase in the industry median short-term, long-term, and total leverage increases the average firm's short-term, long-term, and total leverage by 3.29, 4.23, and 2.34 percentage points, respectively. From a trade-off perspective, these findings can be interpreted as evidence of target adjustment behavior in leverage.

5.2.4 Macroeconomic factors

The bottom section of Table 3 presents the estimated coefficients for our macroeconomic factors. In all equations, inflation is positively related with leverage and with coefficients that are significant at 1 percent. Therefore, firms' indebtedness increases with inflation. This finding is consistent with the static trade-off theory in which, given the tax-deductibility of nominal interest payments, an inflation-induced increase in nominal interest rates increases the tax advantage of debt financing. In addition, the impact of inflation appears to be quite strong: The fact that inflation has come down from over 80 percent to less than 10 percent between 1996 and 2009 would suggest roughly a 5 percent decline in the average firm's total leverage due solely to the fall in inflation, all else equal.

On the other hand, the coefficient on GDP growth is negative and highly significant in the long-term and total leverage equations, but not the short-term leverage equation. One explanation of this finding might be that the scarcity of firms' tangible assets relative to available investment opportunities is exacerbated in a high growth environment. The implied higher loss of value in the event of a distress, in turn, reduces firms' ability to raise longer-term debt. Put differently, creditors reduce the amount of long-term debt they extend because it allows them to review the firms' decisions more frequently and, if necessary, to vary the terms of financing before sufficient losses have accumulated to make default by the borrower optimal (Diamond, 1991 and Demirgüç-Kunt and Maksimovic, 1999). Overall, our findings on inflation and GDP growth appear to be consistent with the static trade-off theory.

Finally, capital flows are positively and highly significantly correlated with all three measures of leverage, indicating that capital flows do in fact play an important role in shaping firms' capital structures. Specifically, consistent with expectations, measures of leverage rise with inflows of capital and fall with outflows. While capital inflows are in principle beneficial for emerging

market economies, particularly for those with low saving rates such as Turkey,[9] they can also lead to economic overheating, excessive appreciation, or pressures in particular sectors of the economy such as sectoral credit booms or asset price bubbles (Ostry et al., 2011). In particular, rapid growth in private indebtedness induced by capital inflows might be characteristic of the early stages of financial instability (Mishkin, 1997) and might cause banking crises (Reinhart and Rogoff, 2011). Our results, therefore, indicate that the surge in international capital flows since the early 2000s, which were only briefly interrupted by the global financial crisis, continue to pose serious risks to macroeconomic and financial stability. Reflecting these concerns, policymakers in emerging market economies have been very keen on finding appropriate ways to deal with the adverse effects of capital flows, particularly in the aftermath of the crisis. For example, Brazil and South Korea have chosen to implement capital control measures whereas Turkey and Indonesia have preferred macroprudential measures (see, for instance, Oduncu et. al., 2013).

5.3 Economic significance of leverage factors

In the previous subsection, we investigated whether a given leverage factor, holding other factors constant, was statistically significant in accounting for various debt ratios. However, statistical significance need not imply economic significance. In order to study the relative economic significance of various leverage factors, we standardize all variables and rerun our regressions. Now, the estimated standardized coefficients show the impact of a one standard deviation change in an independent variable on the dependent variable. Accordingly, the magnitudes of the standardized coefficients are comparable across different leverage factors for a given leverage equation (short-term, long-term, or total leverage). The left panel of Table 4 reports these results. The right panel of Table 4 sorts the leverage factors according to their economic significance, where the ordering is based on the absolute value of the standardized coefficients.

[Insert Table 4 about here]

The results indicate that *PDTS*, our tax-shield measure, is the most economically significant factor for firms' total leverage, with size a very close second. A one standard deviation increase

[9] Dell'Ariccia et al. (2008), among others, argue that capital inflows can ease financing constraints for productive investment projects, foster the diversification of investment risk, promote intertemporal trade, and contribute to the development of financial markets.

in *PDTS* increases total leverage by 0.1595 standard deviations. *PDTS* is also the most important factor for short-term leverage, followed by profitability. For long-term leverage, tangibility is by far the most economically important factor, followed by size. Tax exhaust is consistently among the top three important factors.

A few general lessons can be drawn from these results. Tax-related factors are overall the most economically significant leverage factors, suggesting that they in fact do play an important role in shaping firms' capital structures. This finding is particularly interesting in light of the fact that tax effects on leverage have historically been notoriously difficult to detect in the data. A close second in terms of economic significance is firm-specific factors such as size, tangibility, and profitability, while business risk and firm growth play little or no role. Industry median leverage, on the other hand, appears to have a fairly important influence on firms' leverage decisions. Macro-level factors generally score lower than firm-level (i.e. tax-related and firm-specific) factors and industry-level factors in the economic significance rankings, which is perhaps not surprising given that they have only a single observation per year. Among the macro-level factors, inflation stands out both in terms of statistical and economic significance, even surpassing in ranking the industry median debt ratio in the total leverage equation. The only case in which inflation is not the highest ranking macro-level factor is the long-term leverage equation, where it is second only to GDP growth and only by a small margin. These findings are particularly important in light of the fact that inflation in Turkey has only recently come down to single digits after decades of extremely high levels.

A second general lesson is that the economic importance of a given leverage factor is different for different measures of leverage. For example, while tangibility appears to be a key determinant of long-term leverage, it is not as important for short-term leverage. A third and final lesson is that leverage factors that are more closely associated with the static trade-off theory such as tax-related factors and size generally have higher rankings (in addition to having the correct signs and higher levels of statistical significance as shown in Section 5.2) than those that are more closely associated with the pecking order theory such as profitability. The evidence in favor of the trade-off theory is particularly strong for the long-term and total debt ratios.

5.4 Robustness checks

We perform a number of checks to confirm that our results are robust. First, it doesn't matter whether the data is winsorized or not; estimated coefficients are qualitatively and quantitatively very similar. This suggests that outliers in our dataset are not a significant problem for estimates.

Second, the fact that some firms in our dataset enter or exit the sample might potentially induce attrition bias in our estimations. To see if this is the case, we also estimate our empirical model only for those firms that have data for T years or more, where $T = 2, 3, ..,14$ ($T = 1$ corresponds to the full sample results we report in Section 5). Table 5 displays, for each leverage factor and for each of the short-term, long-term, and total regression equation specifications, the total number of positive and negative signs in the thirteen regressions we run. The results reported in Table 5 indicate that our results are very robust.

[Insert Table 5 about here]

Finally, we split the sample into two seven-year periods, namely, 1996-2002 and 2003-2009, to test for any structural breaks in the firms' capital structure choices.[10] The results displayed in Table 6 indicate that firm-specific and tax-related leverage factors generally have the same pattern of signs and significance as those we obtained for the full sample. The only significant change here is that the coefficient of firm growth turns significant in the short-term leverage equation in the 2003-2009 subsample, perhaps reflecting the improved growth prospects during this period. It is also interesting to note that the relative magnitude of the coefficient on tax exhaust (*PDTS*) is larger in the former (latter) period, which suggests that the tax distortions caused by the tax system during the earlier period are larger (smaller) for firms that pay no tax (pay tax). Also, the coefficient of business risk in the short-term leverage equation turns significant in the 1996-2002 subsample, most likely a reflection of the volatile state of the economy during this period. Finally, there are some changes in the signs and significance of some of the industry-level and macro-level factor coefficients.[11] Specifically, the coefficient of industry

[10] Dividing the sample period in this way is reasonable given the fact that the Turkish economy went through a dramatic transformation following the crises in 2000 and 2001. See, for example, Turhan (2008).

[11] This is, to some extent, expected as each of the industry- and macro-level factors (unlike the firm-level factors) has only two and one observations per year, respectively, and splitting the sample into two further reduces the sample size, making precise estimation of their coefficients difficult.

median debt ratio turns insignificant in the long-term leverage equation in both subsamples and there is a loss of significance in the coefficients of inflation, GDP growth, and capital flow variables. In the case of capital flows, the contrast is particularly stark, where the coefficient is significant only in the 2003-2009 subsample, most likely reflecting the surge in capital inflows during this period.

[Insert Table 6 about here]

6. Capital structures of firms in various circumstances

Having examined the overall relation between various measures of leverage and their determinants in Section 5, we now investigate the differences between manufacturing and non-manufacturing firms, large and small firms, and mature and young firms with respect to their capital structure choices.[12] These exercises can also be viewed as additional robustness checks on our main results in Section 5.

6.1 Manufacturing and non-manufacturing firms

As discussed previously in Section 4.3, industry membership may be an important determinant of firms' capital structures. To a certain extent, the analysis so far controls for industry effects since manufacturing and non-manufacturing industry median debt ratios are included in the regressions. In this section, we take a closer look.

Figure 1 displays the ratios of short-term, long-term, and total indebtedness for manufacturing and non-manufacturing firms averaged over the whole sample period. While manufacturing firms generally have higher debt ratios, the difference is more apparent in the short-term debt ratios.

[Insert Figure 1 about here]

In order to investigate the relation of debt ratios with various leverage factors, we also run regressions separately for manufacturing and non-manufacturing firms. The results displayed in Table 7 suggest that manufacturing and non-manufacturing firms are in general quite similar in terms of their capital structures. Importantly, there are no material differences in the relations

[12] We also examined capital structure differences between profitable and unprofitable firms but did not find any meaningful differences. These results are available upon request.

between debt ratios and the factors that we identified in Section 5.3 as the most economically important such as size, profitability, tangibility, tax-related factors, and inflation.

The few small differences relate to the remaining less economically important factors. For instance, while firm growth is positively associated with long-term leverage for manufacturing firms (consistent with the pecking order theory), it is negatively correlated with short-term leverage for non-manufacturing firms (consistent with the static trade-off theory). Also, comparison of the magnitudes of coefficients suggests that the debt ratios of manufacturing firms respond more to changes in size and profitability than non-manufacturing firms. The most striking difference relates to the impact of capital flows, however. In particular, the coefficient on capital flows is both much more significant and considerably larger in the non-manufacturing equations. This finding might suggest that international capital has tended to flow remarkably more to the sectors outside manufacturing, thereby influencing the financing patterns of the firms in such sectors to a greater extent during our sample period. In light of our findings in Section 5.4, this seems to be particularly true after the early 2000s, a period during which capital inflows soared. Our findings, therefore, might be interpreted as evidence that risks created by capital flows has tended to accumulate more in the sectors outside the manufacturing sector, especially after the 2000s. There is reason to believe that this is a general phenomenon among emerging market economies as UNCTAD (2004) and Doytch and Uctum (2011) show that there has been a large increase in the amount of foreign investment in services relative to that of manufacturing from the 1990s to the 2000s.

[Insert Table 7 about here]

6.2 Large firms versus small firms

Previous research (e.g. Demirgüç-Kunt and Maksimovic, 1999) provides evidence that differences in access to financial markets and institutions might lead to differences in financing patterns of firms of different sizes. To see if this is the case, we plot in Figure 2 the ratios of short-term, long-term, and total indebtedness by firm size averaged over the whole sample period. We divide the firms into quartiles by value of total assets and report the average debt ratios of the smallest 25%, the largest 25%, and those in between the smallest and largest quartiles. The figure shows that larger firms have higher long-term leverage and lower short-term leverage than

smaller firms. By contrast, there do not appear to be differences in total debt ratios across firm-size quartiles.

[Insert Figure 2 about here]

In order to investigate the capital structure choices of firms of various sizes, we rerun our regressions separately for the smallest and largest firms. Results displayed in Table 8 suggest that there are marked differences across firm sizes in how various factors are related with debt ratios. At the firm level, the most striking differences are in the effects of firm size and business risk factors. Specifically, for small firms, the association between leverage and size is relatively weak. In fact, firm size appears to become relevant for leverage decisions only when a firm is sufficiently large. This may be indicative of a "threshold effect" in size in the sense that marginal changes in the size of firms smaller than a certain threshold have little effect on such firms' ability to raise external debt. The business risk factor, on the other hand, is highly significant in all leverage regressions for small firms but always insignificant for large firms. Thus, while small firms' ability to raise debt seems very sensitive to their riskiness, large firms' access to debt is not hindered by that at all. Finally, the debt ratios of large and small firms appear to be affected differently by firm growth rates. Specifically, while firm growth is not related with leverage for small firms, there is some evidence that short-term and total leverage go down with firm growth for large firms.

[Insert Table 8 about here]

Our results in Table 8 also suggest that there are interesting differences between large and small firms in how various industry-related and macroeconomic factors are related with debt ratios. For example, the coefficient on industry median leverage is much more significant and remarkably larger for large firms, suggesting that target adjustment is a much more pertinent phenomenon among large firms. One explanation of this finding could be that there are fundamental technological differences between small and large firms and hence naturally follow different financial policies a la Maksimovic and Zechner (1991). Or, as documented in World Bank Group (2010) and hinted by our findings on the relationships between leverage and size and business risk and between leverage and capital flows (see below), it could reflect differences between

small and large firms in access to external finance, which prevent small firms from following an optimal financial policy.

With respect to macro-level factors, the most striking difference between large and small firm capital structures is in inflation. Specifically, while inflation does not seem to be related with the leverage decisions of small firms, large firms' leverage increases with inflation. This might suggest that, once the direct leverage impact of taxes is taken into account, inflation does not induce a further tax benefit for debt financing for small firms. Capital flows also appear to influence large and small firms differently, with capital flows having a remarkably greater importance for the leverage decisions of large firms. This might be explained by the fact that large firms are more diverse and informationally more transparent than small firms, which increases their ability to secure funds from domestic sources as well as directly from foreign sources. Our findings in Section 5.4 suggest that this difference has been considerably starker after the early 2000s. Finally, the association of leverage and GDP growth seems to be significantly stronger in the case of large firms, likely reflecting the fact that large firms are better equipped to capture the benefits of economic growth.

Overall, our findings on the relationships between leverage and various leverage factors appear to be more in line with the predictions of static trade-off theory than with the pecking order theory, particularly in the case of large firms.

6.3 Mature firms versus young firms

Mature firms have been around longer and possibly have built-up reputations for meeting their financial obligations, which may ease their access to capital markets. From a static trade-off perspective, this would imply a positive relation between maturity of a firm and leverage, whereas a negative relation would be expected from a pecking order perspective. Furthermore, mature firms are also typically larger, which may further improve their ability to raise external funds. Thus, it might be interesting to see if in fact such firms are different from young firms in terms of their capital structure choices.

We define young firms as firms that are at most seven years old and mature firms as firms that are at least twenty years old, which roughly corresponds to the first and fourth quartiles of the age distribution of firms, respectively. Since our dataset provides information on firms' dates of

incorporation, we are able to determine the exact age of each firm in our sample in any given year. Figure 3 plots the ratios of short-term, long-term, and total indebtedness by firm age averaged over the whole sample period. The figure shows that the more mature the firm the smaller the leverage, but the pattern is clearer for short-term leverage. These results cannot be explained by the fact that mature firms tend to be large, since we know from Section 6.2 that larger firms have higher leverage, not lower.

[Insert Figure 3 about here]

In order to further investigate the capital structure differences between young and mature firms, we rerun our regressions separately for young and mature firms. Results presented in Table 9 suggest that there are as many differences as there are similarities. While there is no material difference between young and mature firms in the association of leverage with profitability, tangibility, tax-related factors, industry-related factors, or inflation, this is not so for the remaining leverage factors. In particular, the correlation between leverage and size is quite weak for young firms, except for long-term leverage. Therefore, an increase in size appears to benefit a mature firm more than it benefits a young firm, again except in terms of long-term leverage. Also, while the coefficient of firm growth is not significant in any of the leverage equations for young firms, it is significant at 5 percent in the short-term leverage equation for mature firms. More interestingly, the coefficient of business risk is significant only in the leverage equations for mature firms, suggesting that leverage decisions of young firms are not affected by variations in business risk. One explanation of this finding could be that young firms tend to rely on internal funds, the availability of which, unlike external funds (equity or debt), is not as sensitive to variations in business risk in the first place.[13]

[Insert Table 9 about here]

There are also interesting differences between young and mature firms in how debt ratios are related with GDP growth and capital flows. In particular, the coefficient of GDP growth is never significant in leverage equations for young firms, which is in stark contrast with the case for mature firms. From the perspectives of both the trade-off theory and pecking order hypothesis, this result suggests availability of growth opportunities for mature firms and the lack thereof for

[13] Another explanation could be that our definition of business risk, the standard deviation of operating income over total assets over the past three years (including the current year), is not a good proxy of business risk for young firms.

young firms during our sample period. Capital flows, on the other hand, while unrelated with the leverage decisions of young firms, appear to have a significant and positive association with leverage decisions of mature firms, and more so after the early 2000s (see Section 5.4). In addition, combined with our results from Section 6.2, we can infer that international capital has tended to flow more to large and mature firms during our sample period. This result is in line with the findings of Falkenstein (1996) and Gompers and Metrick (2001) who find that international investors invest more in large and mature firms. This can be attributed to asymmetric information problems, which tend to be greater in smaller and younger firms (Dahlquist and Robertsson, 2001 and Forbes, 2007).

Overall, our findings on the relationships between leverage and various leverage factors appear to be more in line with the predictions of static trade-off theory than with the pecking order theory, particularly in the case of mature firms.

7. Pecking order or static trade-off?

Which of the two major theories, pecking order and static trade-off, is a better description of our findings? Current research on the Turkish economy generally views the pecking order theory as a better framework than the static trade-off theory for understanding the capital structure of Turkish firms (see, for example, Acaravcı and Doğukanlı, 2004; Korkmaz et al., 2007; and Yıldız et al., 2009). The formation of this view can be traced to the finding of a negative sign on the coefficient of profitability and the sometimes mixed results obtained for the factors that are more closely associated with the static trade-off theory such as corporate debt tax shields and non-debt tax shields. We confirm the negative and highly significant correlation of profitability with leverage in our data sample as well. However, our findings suggest that, on the whole, the static trade-off theory provides a better account of the capital structure decisions of Turkish firms than the pecking order theory. Table 10 presents the predictions of the two theories alongside with our empirical findings. The table includes only those factors for which at least one of the two theories has a prediction.

[Insert Table 10 about here]

A simple comparison of the signs reveals that the static trade-off theory has more correct predictions than the pecking order theory. The main advantage of pecking order theory over the

static trade-off theory is that it predicts the sign of profitability correctly. This is important because profitability is probably the only leverage factor that has a robust (negative) association with leverage in the data in all countries. Note, however, that a negative sign can also be rationalized in dynamic versions of the trade-off theory such as Fischer et al. (1989) and Hennessy and Whited (2005). On the other hand, the pecking order theory has difficulty accounting for the positive signs on size and tangibility as well as explaining the negative association between leverage and GDP growth. Perhaps as importantly, the theory does not generate predictions about some very key leverage factors such as corporate debt tax shields, non-debt tax shields, and inflation for which the static trade-off theory correctly predicts the nature of the association with leverage.

Myers (2003) argued that different factors might affect different types of firms in fundamentally different ways. Moreover, the capital structure choice of a given firm is, at least to some extent, also dependent on the types of other firms operating in the same economy. If this is true, then expecting a single capital structure model to account for the behavior of firms in different situations may not be reasonable. This is in fact what we have found: Neither the pecking order theory nor the static trade-off theory can simultaneously account for all of the empirical observations.

8. Concluding remarks

In this paper, we examine the determinants of capital structure for non-financial firms in Turkey. The novelty of our paper comes from the fact that we use a new dataset that is substantially larger and more comprehensive in terms of both time and variable coverage than those used in previous studies on individual emerging and developing economies. Our dataset includes manufacturing, non-manufacturing, small, large, listed and unlisted firms, which enables us to take a more accurate picture of the capital structure choices of the average non-financial firm.

Several results emerge from our analysis. First, we find that regardless of their size, age, and industrial membership, firms' short-term leverage is generally substantially larger than their long-term leverage, indicating that short-term finance was and still is the norm for Turkish non-financial firms, particularly for young and small manufacturing firms. In addition, we provide evidence that, from a capital structure perspective, the most distinguishing characteristic of a firm

is its size rather than its age or industrial membership. Second, we find that each of the firm- and industry-specific, tax-related, and macroeconomic leverage factor types does indeed play a role in shaping the capital structure decisions of Turkish non-financial firms during the past fifteen years. Third, unlike most of the previous studies on the Turkish economy, we consider a wide range of leverage factors and provide evidence that these factors have the signs that would be expected in light of previous theoretical results and empirical findings obtained for developed and developing countries. Fourth, the economic importance of a given factor can be different for different leverage definitions. In particular, while potential debt tax shields are the most important factor for short-term debt ratios, tangibility is the most important factor for long-term debt ratios. Fourth, firms match the maturity of their assets and liabilities. Fifth, firms adjust their leverage (particularly short-term) towards the industry median. Sixth, inflation is among the economically significant leverage factors and is by far the most important macroeconomic leverage factor. This seems to be especially true for large firms after the early 2000s. Finally, capital flows have a marked influence on firms' capital structures, particularly for non-manufacturing firms that are large and mature. Overall, our empirical findings suggest that the trade-off theory may be a better description of the capital structures of Turkish non-financial firms than the pecking-order theory, particularly after the early 2000s.

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Table 1
Definitions and Hypotheses
This table describes the dependent and independent variables and the theoretical predictions for the relations between the dependent and independent variables.

	Definition	Pecking Order	Trade-Off
Debt Ratios			
Short-term leverage	Short-term debt / Total assets	N/A	N/A
Long-term leverage	Long-term debt / Total assets	N/A	N/A
Total leverage	Total debt / Total assets	N/A	N/A
Firm-specific factors			
Size	Natural logarithm of total net sales	**+/-**	**+**
Profitability	Operating income / Total assets	**-**	**+/-**
Tangibility	Net fixed assets / Total assets	**+**	**+**
Growth	Percent change in net sales	**+**	**-**
Business risk	Std. dev. of operating income / Total assets	**-**	**-**
Tax-related factors			
Potential debt tax shields	Interest payments + Tax payments / Corporate tax rate	**?**	**+**
Tax exhaust	Dummy equal to 1 if firm pays no tax	**?**	**+**
Industry-specific factors			
Industry median leverage	Industry median of (short, long, or total) debt to total assets	**?**	**+**
Macroeconomic factors			
Inflation	Percent change in CPI	**?**	**+**
GDP growth	Percent change in real GDP	**+**	**-**
Capital flows	Net capital flows / GDP	**?**	**?**

Table 2
Descriptive Statistics
This table presents the descriptive statistics for the dependent and independent variables described in Table 1. All variables (other than industry-specific and macroeconomic variables) are winsorized at 0.50% level in both tails of the distribution. The sample period is 1996-2009. All numbers are reported in two decimal places. Agricultural firms, financial firms and firms that operate in regulated industries are excluded.

	Observations	First Quartile	Mean	Median	Third Quartile	Coefficient of Variation
Debt ratios						
Short-term leverage	74155	3.48	20.37	15.08	31.57	97.12
Long-term leverage	74155	0.00	6.81	0.00	7.73	195.37
Total leverage	74155	7.73	27.20	23.87	42.17	81.18
Firm-specific factors						
Size	74155	12.93	14.01	14.04	15.15	12.72
Profitability	74155	0.01	0.09	0.07	0.15	156.83
Tangibility	74155	10.82	31.36	25.87	46.78	78.39
Growth	74155	-18.94	44.35	1.57	24.07	1005.70
Business risk	74155	0.03	0.07	0.05	0.10	100.96
Tax-related factors						
Potential debt tax shields	74155	0.00	0.04	0.00	0.04	188.91
Tax exhaust	74155	0.00	0.37	0.00	1.00	130.65
Industry-specific factors						
Short-term industry median leverage	28	10.68	13.64	12.69	17.28	30.34
Long-term industry median leverage	28	0.00	0.46	0.00	0.04	217.86
Total industry median leverage	28	17.05	22.04	22.78	26.87	28.32
Macroeconomic factors						
Inflation	14	10.51	50.61	54.40	84.64	70.14
GDP growth	14	0.66	3.56	6.16	7.58	143.92
Capital flows	14	2.14	2.91	3.02	4.85	104.37

Table 3

Determinants of Leverage: Full Sample Results

This table presents the results from the estimation of our fixed effects panel regression equation (1): $L_{it} = \beta_0 + \sum_k \beta_k F_{k,it} + \mu_i + \varepsilon_{it}$, where $\boldsymbol{L_{it}}$ is one of the three measures of leverage (short, long, or total leverage) of firm i in year t; $\boldsymbol{F}$ is the vector of the four types of leverage factors (firm-specific, tax-related, industry-specific, and macroeconomic factors); $\boldsymbol{\mu_i}$ are the time-invariant unobservable firm-specific effects; and $\boldsymbol{\varepsilon_{it}}$ is the error term. The variables are the same as those defined in Table 1 and all (except growth) are reported in three decimal places. Heteroskedasticity and serial correlation robust standard errors are reported in parentheses. ***, ** and * denote significance levels at the 1%, 5%, and 10% levels, respectively.

Firm-specific factors	**Short-term Leverage**	**Long-term leverage**	**Total leverage**
Size	1.079***	0.843***	1.918***
	(0.100)	(0.0734)	(0.114)
Profitability	-15.260***	-5. 358***	-20.690***
	(0.677)	(0.454)	(0.755)
Tangibility	-0.072***	0.097***	0.025***
	(0.006)	(0.005)	(0.007)
Growth	-0.0002	0.0000	-0.0002
	(0.0001)	(0.0001)	(0.0002)
Business risk	-1.527	-4.245***	-5.692***
	(1.189)	(0.751)	(1.306)
Tax-related factors			
Potential debt tax shields	40.080***	10.350***	50.280***
	(1.461)	(0.938)	(1.566)
Tax exhaust	4.221***	2.261***	6.500***
	(0.170)	(0.122)	(0.189)
Industry-specific factors			
Industry median leverage	0.329***	0.423***	0.234***
	(0.041)	(0.057)	(0.021)
Macroeconomic factors			
Inflation	0.037***	0.015***	0.057***
	(0.003)	(0.002)	(0.004)
GDP growth	-0.000	-0.105***	-0.071
	(0.016)	(0.013)	(0.019)
Capital flows	0.106***	0.119***	0.188***
	(0.0328)	(0.0226)	(0.0361)
Number of observations	74155	74155	74155
Number of firms	11726	11726	11726
Adjusted R-squared	0.650	0.612	0.673

Table 4

Economic Significance of Leverage Factors

This table presents the findings on the relative economic significance of various leverage factors. The estimated standardized coefficients show the impact of a one standard deviation change in an independent variable on the dependent variable. The magnitudes of the standardized coefficients are comparable across different leverage factors. The left panel shows these results. The right panel sorts the leverage factors according to their economic significance, where the ordering is based on the absolute value of the standardized coefficients. When a variable has a statistically insignificant coefficient it is denoted by "_" and left out of the economic significance rankings. The variables are the same as those defined in Table 1 and all are reported in three decimal places. Heteroskedasticity and serial correlation robust standard errors are reported in parentheses. ***, ** and * denote significance levels at the 1%, 5%, and 10% levels, respectively.

	Standardized Coefficients			***Rankings***		
Firm-specific factors	**Short-term Leverage**	**Long-term leverage**	**Total leverage**	**Short-term Leverage**	**Long-term leverage**	**Total leverage**
Size	0.097	0.113	0.155	4	2	2
Profitability	-0.106	-0.055	-0.129	2	4	4
Tangibility	-0.089	0.179	0.028	5	1	7
Growth	-0.005	0.001	-0.004	_	_	_
Business risk	-0.006	-0.024	-0.019	_	9	9
Tax-related factors						
Potential debt tax shields	0.142	0.054	0.160	1	5	1
Tax exhaust	0.103	0.082	0.142	3	3	3
Industry-specific factors						
Industry median leverage	0.063	0.037	0.059	6	7	6
Macroeconomic factors						
Inflation	0.056	0.033	0.077	7	8	5
GDP growth	0.000	-0.038	-0.016	_	6	10
Capital flows	0.014	0.024	0.023	8	10	8
Number of observations	74155	74155	74155			
Number of firms	11726	11726	11726			
Adjusted R-squared	0.650	0.612	0.673			

Table 5
Robustness of Full Sample Results to Attrition Bias
This table presents a summary of robustness tests on the attrition bias due to entry or exit of some firms to or from the dataset. The estimates are obtained only for those firms that have data for *T* years or more, where *T* = 2, 3, ..,14 (*T* = 1 corresponds to the full sample results in Table 3). The table displays, for each leverage factor and for each of the short-term, long-term, and total regression equation specifications, the total number of positive and negative signs in the thirteen regressions we run. The variables are the same as those defined in Table 1.

Firm-specific factors	**Short-term Negative**	**Short-term Positive**	**Long-term Negative**	**Long-term Positive**	**Total Negative**	**Total Positive**
Size	0	13	0	13	0	13
Profitability	13	0	13	0	13	0
Tangibility	13	0	0	13	0	7
Growth	0	0	0	0	0	0
Business risk	0	0	13	0	11	0
Tax-related factors						
Potential debt tax shields	0	13	0	13	0	13
Tax exhaust	0	13	0	13	0	13
Industry-specific factors						
Industry median leverage	0	13	0	13	0	13
Macroeconomic factors						
Inflation	0	13	0	13	0	13
GDP growth	6	0	13	0	13	0
Capital flows	0	13	0	11	0	13

Table 6

Robustness of Full Sample Results to Alternative Time Periods

This table presents the findings on the robustness of full sample results considering separately the period before 2002 and the period after 2002. The variables are the same as those defined in Table 1 and all (except growth) are reported in three decimal places. Heteroskedasticity and serial correlation robust standard errors are reported in parentheses. ***, ** and * denote significance levels at the 1%, 5%, and 10% levels, respectively.

	1996 – 2002			**2003 - 2009**		
Firm-specific factors	**Short-term leverage**	**Long-term leverage**	**Total leverage**	**Short-term leverage**	**Long-term leverage**	**Total leverage**
Size	0.074	0.442***	0.519**	1.185***	0.721***	1.890***
	(0.212)	(0.121)	(0.222)	(0.121)	(0.095)	(0.141)
Profitability	-14.100***	-3.970***	-18.010***	-16.570***	-6.660***	-23.320***
	(0.986)	(0.583)	(1.044)	(1.001)	(0.740)	(1.141)
Tangibility	-0.036***	0.070***	0.035***	-0.060***	0.124***	0.064***
	(0.0106)	(0.00748)	(0.0113)	(0.00825)	(0.00663)	(0.00918)
Growth	0.0002	0.0002	0.0004	-0.0003**	0.0001	-0.0003
	(0.0005)	(0.0003)	(0.0004)	(0.0002)	(0.0001)	(0.0002)
Business risk	-3.927**	-2.838***	-6.578***	-2.674	-3.433***	-6.165***
	(1.778)	(0.965)	(1.864)	(1.733)	(1.200)	(1.931)
Tax-related factors						
Potential debt tax shields	31.890***	4.263***	35.970***	54.620***	16.120***	70.820***
	(1.756)	(1.039)	(1.807)	(3.516)	(2.481)	(3.701)
Tax exhaust	6.188***	2.205***	8.390***	2.968***	1.837***	4.828***
	(0.331)	(0.218)	(0.349)	(0.208)	(0.159)	(0.230)

Industry-specific factors						
Industry median leverage	0.453*** (0.127)	_[a]	0.443*** (0.090)	0.412*** (0.099)	0.135 (0.101)	0.206*** (0.041)
Macroeconomic factors						
Inflation	0.027* (0.015)	0.007 (0.005)	0.030** (0.013)	0.060*** (0.017)	0.038*** (0.012)	0.132*** (0.016)
GDP growth	0.033 (0.028)	-0.033* (0.018)	0.022 (0.028)	-0.011 (0.024)	-0.231*** (0.030)	-0.166*** (0.039)
Capital flows	0.039 (0.074)	-0.018 (0.038)	-0.042 (0.076)	0.101** (0.045)	0.224*** (0.027)	0.311*** (0.046)
Number of observations	31732	31732	31732	40717	40717	40717
Number of firms	7311	7311	7311	8447	8447	8447
Adjusted R-squared	0.738	0.701	0.758	0.726	0.711	0.763

[a] Since most of the firms did not have long-term debt before 2002, the median debt for manufacturing and non-manufacturing industries were zero. Thus, there is no variation in industry median leverage variable in the 1996-2002 period and its coefficient cannot be estimated.

Table 7

Sample Split between Manufacturing and Non-Manufacturing Firms

This table presents the findings considering separately manufacturing and non-manufacturing firms. The variables are the same as those defined in Table 1 and all (except growth) are reported in three decimal places. Heteroskedasticity and serial correlation robust standard errors are reported in parentheses. ***, ** and * denote significance levels at the 1%, 5%, and 10% levels, respectively.

	Manufacturing Firms			**Non-Manufacturing Firms**		
Firm-specific factors	**Short-term leverage**	**Long-term leverage**	**Total leverage**	**Short-term leverage**	**Long-term leverage**	**Total leverage**
Size	1.432***	1.207***	2.615***	0.787***	0.632***	1. 395***
	(0.176)	(0.134)	(0.202)	(0.123)	(0.086)	(0.138)
Profitability	-20.000***	-6.553***	-26.510***	-10.420***	-4.267***	-14.770***
	(0.900)	(0.604)	(0.995)	(1.024)	(0.698)	(1.153)
Tangibility	-0.120***	0.104***	-0.017**	-0.010	0.090***	0.080***
	(0.008)	(0.006)	(0.009)	(0.009)	(0.00709)	(0.0104)
Growth	0.0001	0.0008*	0.0010	-0.0002*	-0.0000	-0.0002
	(0.0008)	(0.0005)	(0.0007)	(0.0001)	(0.0001)	(0.0002)
Business risk	-2.646	-2.883***	-5.317***	-1. 340	-5.406***	-6.559***
	(1.664)	(1.005)	(1.785)	(1.702)	(1.121)	(1.911)
Tax-related factors						
Potential debt tax shields	43.550***	10.730***	54.160***	34.560***	10.170***	44.640***
	(1.772)	(1.143)	(1.910)	(2.486)	(1.614)	(2.636)
Tax exhaust	4.733***	2.366***	7.107***	3.405***	2.153***	5.583***
	(0.211)	(0.151)	(0.234)	(0.285)	(0.206)	(0.314)

Industry-specific factors						
Industry median leverage	0.421***	0.489***	0. 334***	0.264***	0.426***	0.204***
	(0.060)	(0.077)	(0.038)	(0.070)	(0.092)	(0.029)
Macroeconomic factors						
Inflation	0.036***	0.019***	0.057***	0.037***	0.010**	0.056***
	(0.005)	(0.003)	(0.005)	(0.006)	(0.004)	(0.007)
GDP growth	-0.005	-0.098***	-0.081***	0.013	-0.109***	-0.035
	(0.020)	(0.018)	(0.024)	(0.026)	(0.021)	(0.032)
Capital flows	0.046	0.075**	0.115**	0.151***	0.169***	0.210***
	(0.041)	(0.030)	(0.046)	(0.054)	(0.036)	(0.060)
Number of observations	42998	42998	42998	31134	31134	31134
Number of firms	6262	6262	6262	5566	5566	5566
Adjusted R-squared	0.646	0.577	0.658	0.657	0.654	0.692

Table 8

Sample Split between Small and Large Firms

This table presents the findings considering separately small and large firms. Firms are divided into quartiles by value of total assets. A firm is classified as "small" if it is below the first quartile and "large" if it is above the third quartile. The variables are the same as those defined in Table 1 and all (except growth) are reported in three decimal places. Heteroskedasticity and serial correlation robust standard errors are reported in parentheses. ***, ** and * denote significance levels at the 1%, 5%, and 10% levels, respectively.

	Small Firms			**Large Firms**		
Firm-specific factors	**Short-term leverage**	**Long-term leverage**	**Total leverage**	**Short-term leverage**	**Long-term leverage**	**Total leverage**
Size	0.191	0.357**	0.524*	0.774***	0.979***	1.757***
	(0.264)	(0.146)	(0.281)	(0.173)	(0.144)	(0.205)
Profitability	-12.980***	-3.992***	-17.060***	-20.560***	-8.258***	-28.850***
	(1.476)	(0.869)	(1.599)	(1.327)	(1.103)	(1.585)
Tangibility	-0.010	0.044***	0.033**	-0.118***	0.131***	0.0127
	(0.014)	(0.009)	(0.015)	(0.0104)	(0.00983)	(0.0127)
Growth	0.0004	-0.0001	0.0002	-0.0004*	-0.0000	-0.0004**
	(0.0003)	(0.0002)	(0.0004)	(0.0002)	(0.0002)	(0.0002)
Business risk	-9.677***	-4.847***	-14.580***	0.379	-1.431	-1.033
	(2.573)	(1.400)	(2.781)	(2. 384)	(1.927)	(2.773)
Tax-related factors						
Potential debt tax shields	40.170***	1.427	41.760***	33.850***	14.800***	48.160***
	(4.289)	(2.204)	(4.617)	(2. 395)	(1.802)	(2.652)
Tax exhaust	3.486***	0.677**	4.216***	4.447***	3.102***	7.521***
	(0.479)	(0.295)	(0.503)	(0.282)	(0.234)	(0.330)

Industry-specific factors						
Industry median leverage	0.117 (0.122)	0.105 (0.120)	0.111** (0.053)	0.233*** (0.0674)	0.574*** (0.117)	0.189*** (0.0375)
Macroeconomic factors						
Inflation	0.007 (0.011)	-0.004 (0.006)	0.007 (0.012)	0.067*** (0.005)	0.028*** (0.005)	0.094*** (0.006)
GDP growth	0.088** (0.044)	-0.063** (0.031)	0.062 (0.051)	-0.154*** (0.026)	-0.118*** (0.027)	-0.279*** (0.033)
Capital flows	0.0795 (0.091)	0.118** (0.053)	0.151 (0.094)	0.131** (0.055)	0.138*** (0.046)	0.263*** (0.063)
Number of observations	14843	14843	14843	20883	20883	20883
Number of firms	3456	3456	3456	3245	3245	3245
Adjusted R-squared	0.686	0.679	0.719	0.703	0.639	0.725

Table 9

Sample Split between Young and Mature Firms

This table presents the findings considering separately young and mature firms. A firm is classified as "young" if it is at most seven years old and "mature" if it is at least twenty years old. The variables are the same as those defined in Table 1 and all (except growth) are reported in three decimal places. Heteroskedasticity and serial correlation robust standard errors are reported in parentheses. ***, ** and * denote significance levels at the 1%, 5%, and 10% levels, respectively.

	Young Firms			**Mature Firms**		
Firm-specific factors	**Short-term leverage**	**Long-term leverage**	**Total leverage**	**Short-term leverage**	**Long-term leverage**	**Total leverage**
Size	-0.076	0.941***	0.795*	1.823***	0.789***	2.616***
	(0.389)	(0.254)	(0.435)	(0.165)	(0.138)	(0.199)
Profitability	-14.53***	-2.571*	-17.17***	-16.360***	-6.961***	-23.340***
	(2.078)	(1.404)	(2.244)	(1.066)	(0.819)	(1.242)
Tangibility	-0.001	0.097***	0.0863***	-0.089***	0.090***	0.002
	(0.022)	(0.016)	(0.025)	(0.010)	(0.008)	(0.012)
Growth	0.0007	-0.0001	0.0006	-0.0003**	0.0001	-0.0002
	(0.0005)	(0.0004)	(0.0005)	(0.0002)	(0.0002)	(0.0002)
Business risk	-0.593	-3.246	-3.784	-3.951**	-4.697***	-8.697***
	(4.008)	(2.379)	(4.490)	(1.980)	(1.341)	(2.228)
Tax-related factors						
Potential debt tax shields	35.080***	1.094	36.030***	41.240***	11.100***	52.270***
	(4.758)	(2.460)	(4.705)	(2.503)	(1.707)	(2.649)
Tax exhaust	3.415***	1.260***	4.706***	4.927***	2.539***	7.476***
	(0.613)	(0.397)	(0.639)	(0.271)	(0.199)	(0.304)

Industry-specific factors						
Industry median leverage	0.328**	0.189	0.255***	0.225***	0.266***	0.123***
	(0.158)	(0.296)	(0.091)	(0.068)	(0.090)	(0.035)
Macroeconomic factors						
Inflation	0.050***	0.002	0.056***	0.030***	0.020***	0.053***
	(0.015)	(0.009)	(0.016)	(0.006)	(0.004)	(0.006)
GDP growth	0.034	-0.043	0.041	-0.089**	-0.106***	-0.189***
	(0.058)	(0.039)	(0.060)	(0.025)	(0.023)	(0.031)
Capital flows	0.135	0.018	0.092	0.148***	0.071**	0.225***
	(0.111)	(0.075)	(0.118)	(0.052)	(0.036)	(0.057)
Number of observations	9539	9539	9539	25507	25507	25507
Number of firms	2786	2786	2786	4111	4111	4111
Adjusted R-squared	0.774	0.794	0.794	0.663	0.603	0.698

Table 10
Comparison of Theoretical Predictions with Data Facts
This table presents the predictions of the pecking order and static trade-off theories alongside with our empirical findings for the relations between the dependent and independent variables.

	Pecking Order Theory	Static Trade-off Theory	Data
Firm-specific factors			
Size	**+/-**	**+**	**+**
Profitability	**-**	**+/-**	**-**
Tangibility	**-**	**+**	**+**
Growth	**+**	**-**	**?**
Business risk	**-**	**-**	**-**
Tax-related factors			
Potential debt tax shields	**?**	**+**	**+**
Tax exhaust	**?**	**+**	**+**
Industry-specific factors			
Industry median leverage	**?**	**+**	**+**
Macroeconomic factors			
Inflation	**?**	**+**	**+**
GDP growth	**+**	**-**	**-**

Figure 1
Debt Ratios: Manufacturing and Non-manufacturing Firms
This figure displays the ratios of short-term, long-term, and total debt to total assets for manufacturing and non-manufacturing firms averaged over the entire sample period.

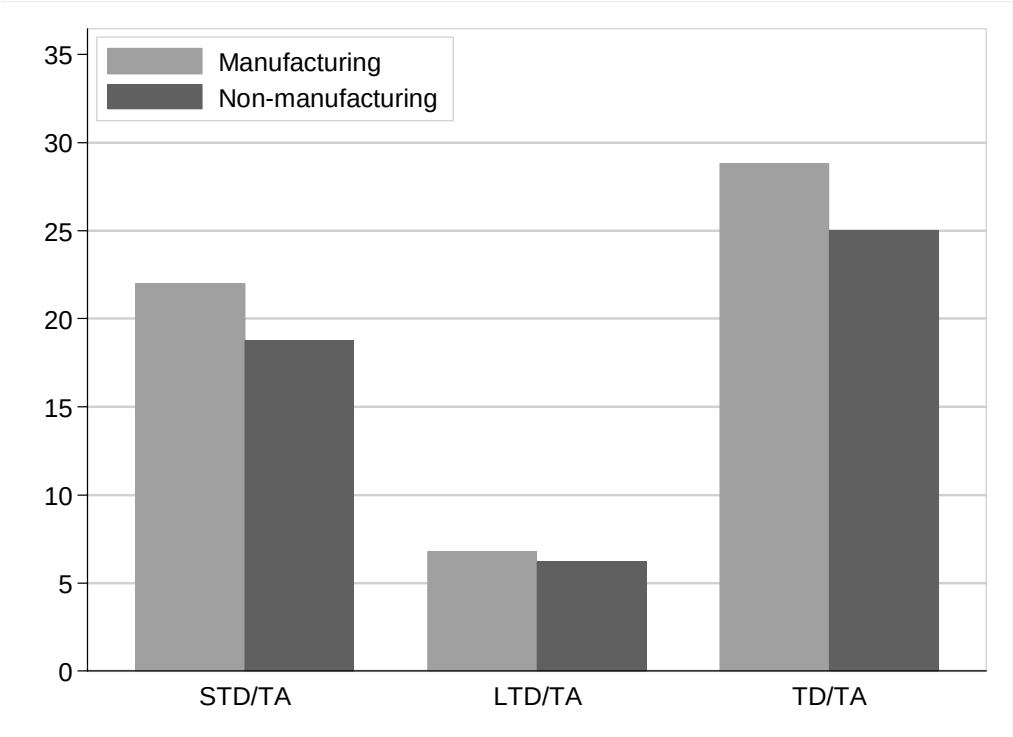

Figure 2
Debt Ratios: Small, Medium, and Large Firms
This figure displays the ratios of short-term, long-term, and total debt to total assets by firm size averaged over the entire sample period. Firms are divided into quartiles by value of total assets. A firm is classified as "small" if it is below the first quartile, "medium" if it is between the first and third quartiles, and "large" if it is above the third quartile.

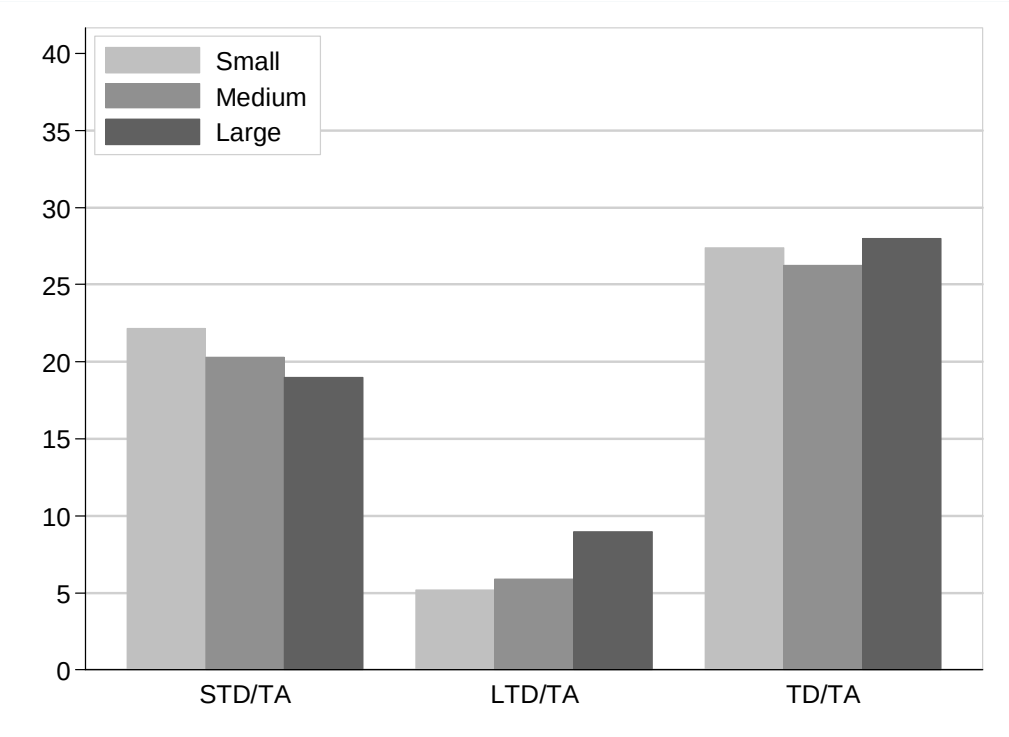

Figure 3
Debt Ratios: Young, Middle-aged, and Mature Firms
This figure displays the ratios of short-term, long-term, and total debt to total assets by firm age averaged over the entire sample period. A firm is classified as "young" if it is at most seven years old, "middle-aged" if it is at least seven years old and at most twenty years old, and "mature" if it is at least twenty years old.